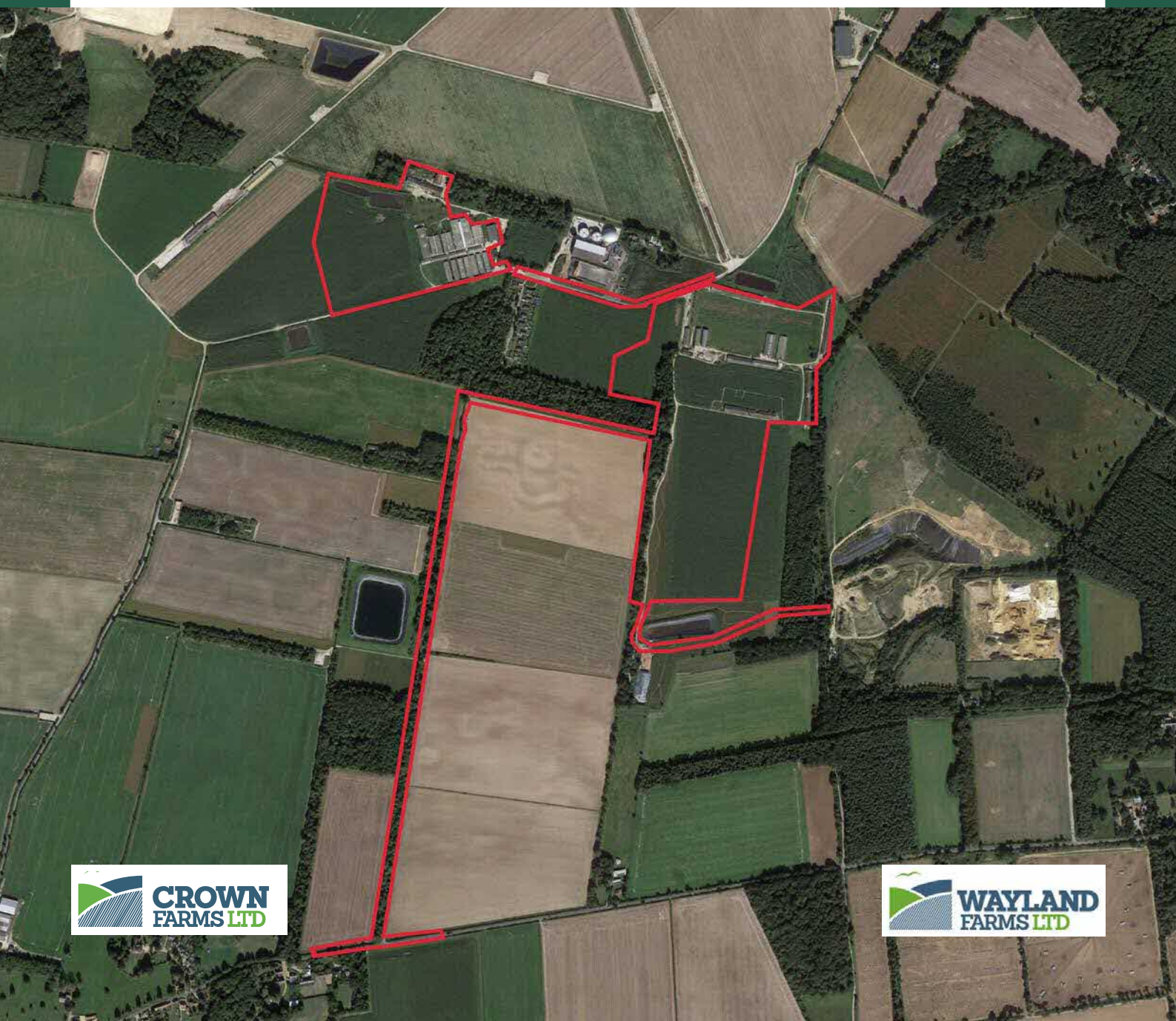

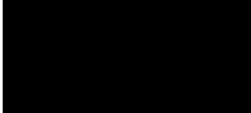


ENVIRONMENTAL STATEMENT ADDENDUM VOLUME 1 - MAIN REPORT



Quality Assurance

Quality Assurance

Site name:	Land at Airfield Farm, Feltwell Farm and Methwold Farm
Client name:	Wayland Farms Limited and Crown Chicken Limited (part of Cranswick plc)
Type of report:	Environmental Statement Addendum
Prepared by:	Caroline Rodger BSc (Hons) MSc PIEMA
Signed	
Date	January 2022 (Updated February 2023)
Reviewed by:	James Alflatt BA(Hons) DipTP MSc MRTPI PIEMA
Signed	
Date	January 2022 (Updated February 2023)

A copy of the Environmental Statement Addendum and Appendices may be viewed online at: https://www.west-norfolk.gov.uk/homepage/169/comment_on_a_planning_application or by prior appointment at the Borough Council's Offices, King's Court, Chapel Street, King's Lynn, Norfolk, PE30 1EX.

Paper copies of the Environmental Statement Addendum, together with the Technical Appendices can be purchased from Bidwells at a cost of £150. Alternatively, a CD containing the documents can be provided at a cost of £15 (prices are inclusive of VAT). The Non-Technical Summary is available free of charge.


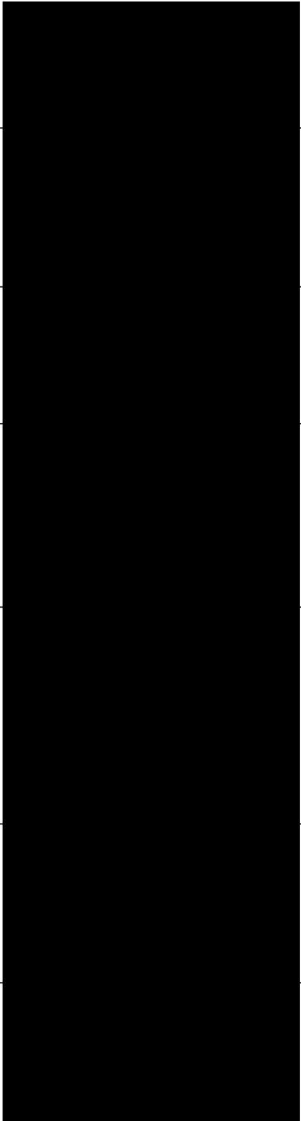






Comments on the Environmental Statement Addendum should be directed in writing to the Borough Council at the address above.



Technical Quality Assurance

Technical Quality Assurance

For each of the topic chapters included within this Environmental Statement Addendum, the relevant consultants responsible for their production have confirmed the technical robustness of the assessment process.

CHAPTER	ORGANISATION	AUTHOR	AUTHOR'S SIGNATURE
Air Quality and Odour		Pearl Hutchinson	
Ecology		Graham Hopkins	
Flood Risk and Drainage		Michelle Robinson	
Ground Conditions and Contamination		Aamer Raza	
Landscape and Visual		Tim Jackson	
Noise		Thomas Bailess	
Transport		Michelle Robinson	

Statement of Competency

Statement of Competency

This Environmental Statement Addendum has been prepared by competent experts. Relevant expertise and qualifications of the expert team are outlined below.

DISCIPLINE	CONSULTANT	AUTHOR, RELEVANT QUALIFICATIONS AND EXPERTISE
EIA Coordinator and ES editor, authors of chapters not otherwise specified below.		Caroline Rodger PIEMA , 3 years' experience in EIA. James Alflatt, MRTPI PIEMA , 15 years' experience in EIA coordination, and Registered EIA Practitioner of IEMA.
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Ecology		Graham Hopkins Dr Graham Hopkins. The project lead and author of the Environmental Statement chapter was Dr Graham Hopkins, Director of Hopkins Ecology Ltd. He has over thirty years of professional experience as an ecologist, with fifteen years in ecological consultancy. He holds a PhD in ecology with chartered status as a Chartered Environmentalist (CEnv), membership of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and fellowship of the Royal Entomological Society (FRES).
Flood Risk and Drainage		Michelle Robinson BSc(Hons) MCIHT MTPS MICE EngTech Michelle joined Canham Consulting in 2012 and currently leads the pre-planning and Civil engineering team. Her early career focused on transport planning and in particular, pre-planning work such as transport assessments, transport statements, travel plans and travel information packs. She also has experience in travel plan coordinator roles, S278 and S38 applications, access reviews, visibility splay assessments, swept path analysis, parking assessments, highway advice and applications to discharge planning conditions. she provides engineering advice and reports on flood risk and drainage strategies.
Ground Conditions and Contamination		Aamer Raza B.Sc M.Sc M.Sc Mr. Raza is a highly experienced environmental professional with over 25 years' experience in the field of environmental consulting notably in the areas of environmental permitting, air quality, pollution prevention and control, and contaminated land assessment and remediation. Mr. Raza holds an M.Sc. degree in Environmental Health Management from Harvard University in the USA, and a M.Sc. in Environment and Development Studies from University of East Anglia in the UK.




DISCIPLINE	CONSULTANT	AUTHOR, RELEVANT QUALIFICATIONS AND EXPERTISE
Landscape and Visual		<p>Tim Jackson is a Director of FPCR and is responsible for leading a wide range of major environmental, infrastructure and development projects. He has over 30 years' experience on complex development projects, from initial feasibility and conceptual studies to environmental impact assessments (EIA), LVIA, detail design, project management and implementation. His recent work encompasses a number of successful Strategic Rail Freight Interchanges (SRFIs), a Garden Village, a series of housing led schemes. He has presented expert evidence on landscape and visual matters at over 30 planning appeals in recent years.</p>
Noise		<p>Thomas Bailess MEng MIOA The assessment has been carried out by Thomas Bailess MEng MIOA, Principal Consultant at Hepworth Acoustics, who has the following qualifications and experience:</p> <ul style="list-style-type: none"> • Full corporate member of the Institute of Acoustics (MIOA). • Master of Engineering degree from Imperial College, London. • Diploma in Architectural Acoustics and Noise Control from the Institute of Acoustics. • 17 years of experience conducting noise and vibration assessments.
Transport		<p>Michelle Robinson BSc(Hons) MCIHT MTPS MICE EngTech Michelle joined Canham Consulting in 2012 and currently leads the pre-planning and Civil engineering team. Her early career focused on transport planning and in particular, pre-planning work such as transport assessments, transport statements, travel plans and travel information packs. She also has experience in travel plan coordinator roles, S278 and S38 applications, access reviews, visibility splay assessments, swept path analysis, parking assessments, highway advice and applications to discharge planning conditions. she provides engineering advice and reports on flood risk and drainage strategies.</p>

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List of Abbreviations

List of Abbreviations

AADT	Annual Average Daily Traffic
AATC	Average Daily Traffic
ACM	Asbestos Containing Material
ADM	Atmospheric Dispersion Modelling
APIS	Air Pollution Information System
Appropriate Assessment	An assessment required by the Habitats Directive where a project (or plan) would be likely to have a significant effect on a Nature Directives site, either alone or in combination with other plans or projects
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
ATC	Automatic Traffic Count
BGS	British Geological Survey
Biodiversity Net Gain	This is an approach to development that leaves biodiversity in a better state than before. It is determined using a quantitative metric, valuing habitats before and after development against criteria of habitat type, condition and location. The change is determined as the difference between the biodiversity score before and after development.
BRE	Building Research Establishment
C&D	Construction and Demolition waste
C&I	Commercial and Industrial waste
CEMP	Construction Environmental Management Plan
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants
CIEEM	Chartered Institute of Ecology and Environmental Management
CIEH	Chartered Institute of Environmental Health
Commercial and Industrial (C&I) Waste	Waste produced by a range of sectors, which arises from commercial (Retail and Wholesale, Public Services and other services) and industrial (including food, drink and tobacco, chemical/non-metallic minerals, power and utilities, metal manufacturing, machinery and equipment and textiles, wood and paper publishing) activities.
CSM	Conceptual Site Model
CSWMP	Construction Surface Water Management Plan
Defra	Department for Environment, Food and Rural Affairs
DEFRA	Department for Environment, Food and Rural Affairs
DEFRA	Department for Environment, Food & Rural Affairs
DEFRA	Department for Environment, Food & Rural Affairs
Demolition (work)	The action or process of deconstructing, demounting or otherwise bringing down / breaking out of buildings and structures.
Disposal	Discarding of waste to landfill.
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EA	Environment Agency
EA	Environment Agency

EA	Environment Agency
Frequency and Hertz (Hz)	As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.
Habitats and species of principal importance.	These are recognised within the planning system via their listing within Section 41 of the Natural Environment and Rural Communities Act. This does not afford legal protection, but they are of importance for determining impacts on biodiversity.
Habitats Regulations Assessment (HRA)	An assessment of projects (or plans) potentially affecting Nature Directives sites in the UK, required under the Habitats Directive and Regulations. The Appropriate Assessment is a stage of the assessment for pathways where impacts are likely.
Hazardous Waste	Waste that by legal definition may cause particular harm to human health or the environment.
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
KLWNBC	King's Lynn and West Norfolk Borough Council
LA	Local Authority
$L_{A10,T}$	This is the A-weighted noise level exceeded for 10% of the time period, T. L_{A10} is commonly used as a measure of traffic noise.
$L_{A90,T}$	This is the A-weighted noise level exceeded for 90% of the time period, T. L_{A90} is used as a measure of background noise.
$L_{Aeq,T}$	This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
$L_{Amax,f}$	This is the maximum A-weighted noise level that was recorded during a measurement duration.
Landfill	A facility designed to receive disposed waste. Usually involves the infill of pre-existing voids.
LAQM	Local Air Quality Management
LCRM	Land Contamination: Risk Management
LLFA	Lead Local Flood Authority
Local Nature Reserves	Local Nature Reserves are designated by local authorities and are sites of importance for wildlife, geology, education or public enjoyment. Although their designation is via the National Parks and Access to the Countryside Act they are protected via local planning policies.
LOD	Limit of detection
LPA	Local Planning Authority
MCHLG	Ministry of Housing, Communities and Local Government
MRF	Materials Recovery Facility
National Nature Reserves	National Nature Reserves are designated under section 35 of the Wildlife & Countryside Act 1981. They are owned by or managed through agreements with Natural England and all are also designated as Sites of Special Scientific Interest.
Nature Directives Sites	This is the collective term for Special Areas of Conservation and Special Protection Areas.

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NCC	Norfolk County Council
NE	Natural England
NGR	National Grid Reference
Non-statutory Sites	Non-statutory sites are sites of nature conservation value identified 'locally' (i.e. excluding those with statutory designation). Local Nature Reserves are included as they are a designation made by the Local Authority rather than statutory country conservation bodies. Local Sites are often called Wildlife Sites, Local Nature Conservation Sites, Sites of Importance for Nature Conservation or other, similar names.
NPPF	National Planning Policy Framework
NPPF	National Planning Policy Framework OS Ordnance Survey
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NVZ	Nitrate Vulnerable Zone
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
PPE	Personal Protective Equipment UXB unexploded bomb
Proximity Principle	Managing waste as near as possible to the location where it is produced.
Recovery	Processing waste to prevent it being disposed of to landfill. Recovery processes include incineration with energy recovery, advanced thermal treatment, anaerobic digestion and composting.
Recycle	Any recovery operation where waste is reprocessed into products, materials or substances whether for its original or other purposes. Recycling includes the reprocessing of organic material, but excludes energy recovery and the reprocessing of waste into materials to be used as fuels or for backfilling operations.
Red and Amber List Birds	These are birds that have conservation status based on declines in national distributions and abundances. Some are 'rare' while others remain widespread but are included on the basis of these national declines. Red List species are a higher conservation priority than Amber List species.
Reuse	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived; reuse presumes that significant reprocessing is not required.
RHTL	Right hand turn lane
SAC	Special Area of Conservation
SADMPP	Site Allocations and Development Management Policies Plan
Schedule 1 Birds	These are birds afforded special protection under the Wildlife and Countryside Act, providing active nests with protection from disturbance in addition to protection from destruction.
Site Waste Management Plan (SWMP)	A system or document for implementing, monitoring and reviewing waste prevention measures
Sites of Special Scientific Interest	These are designated under the Wildlife & Countryside Act 1981 where they support habitats and/or species of national importance.

Sound and the Decibel	<p>A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).</p> <p>Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.</p> <p>The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.</p>
SPA	Special Protection Area
Special Area of Conservation	These are a class of statutory sites designated on the basis that they support internationally important habitats and/or species as listed in the Habitats Directive. Sites of importance for birds are not included and are designated as Special Protection Areas.
Special Protection Areas	These are a class of statutory sites which have been identified as being of importance at a European scale for the breeding, feeding, wintering or the migration of rare and vulnerable species of birds.
SSSI	Sites of Special Scientific Interest
Statutory Sites.	These are sites of nature conservation value that are designated via the Wildlife and Countryside Act, the National Parks and Access to the Countryside Act, or the Habitats Directive and its Regulations. These sites are variously Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest, National Nature Reserves and Local Nature Reserves.
SuDS	Sustainable Drainage Systems
TMP	Traffic Management
Waste Hierarchy	<p>A guiding theme for waste policy at all levels. Establishes an order of preference for the management of waste, to maximise the prevention of waste, whilst minimising disposal. The Waste (Management) Hierarchy is established in the Waste Framework Directive (Directive 2008/98/EC), and prescribes the following:</p> <ul style="list-style-type: none"> Prevention (Most preferred option) Preparing for reuse Recycling Recovery Disposal (Least preferred option)
WDI	Waste Data Interrogator
z_0	Roughness length

Introduction



1.0 Introduction

- 1.1 Bidwells LLP have been instructed by Wayland Farms Limited and Crown Chicken Limited, which are both part of Cranswick plc (hereafter 'the Applicants') to undertake an Environmental Impact Assessment (EIA) under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter 'the EIA Regulations') to accompany two full planning applications to the Borough Council of King's Lynn and West Norfolk (BCKLWN) ('the Council).
- 1.2 The proposals include increasing the pig and poultry rearing capacity at Feltwell Farm and Methwold Farm (hereafter "the Site"). In summary, the project involves the construction of 14 new pig rearing units and 20 new poultry units (including associated infrastructure) to house 14,000 pigs and up to 870,000 chickens on-site (hereafter 'the Proposed Development').
- 1.3 The Environmental Statement (ES) was prepared to support two separate planning applications:
- Application 1: full planning application for the demolition of all but four of the existing buildings on site and the construction of 14 new pig rearing units, new straw barn and water service shed; and
 - Application 2: full planning application for the redevelopment of site comprising demolition of existing poultry sheds, construction of 20 new poultry sheds, four workers dwellings, and associated storage and administration buildings.
- 1.4 Please note for the purposes of the EIA, both planning applications were assessed as one project.
- 1.5 The applications were received by BCKLWN and subsequently validated under references 22/00860/FM (pig facility) and 22/00866/FM (poultry facility). The planning applications were accompanied by an ES which reported the findings of the extensive EIA Process undertaken in advance of submission of the planning applications ('the original ES' dated January 2022).
- 1.6 Following submission, BCKLWN and its statutory consultees have subsequently provided a number of comments on the applications. It is, therefore, now proposed to make amendments to the Proposed Development and provide further requested environmental information, in order to take account of consultee comments.
- 1.7 The purpose of this document is to provide an update ('Addendum') to the original ES, to assess the environmental effects of the changes to the Proposed Development, and supplement the ES with further environmental information which has become available since the submission of the planning applications.
- 1.8 The main changes to the Proposed Development are summarised in the sections below.
- 1.9 Pig Facility:
- Revision of proposed access and egress arrangements, with associated amendments to the application site boundary;
 - Demolition of additional building (40sqm) to facilitate access arrangements;
 - Rationalisation and relocation of feed bins;

- Revision of roof to natural grey profiled fibre cement sheeting;
- Revision of side walls to impermeable gale breaker material;
- Revised main access doors to impermeable translucent plastic;
- Addition of cable stays to ventilation chimneys; and
- Revision of site boundary to include drainage lagoon.

1.10 Poultry Facility:

- Revision of proposed access and egress arrangements, with associated amendments to the application site boundary;
- Addition of bale store to proposed admin buildings;
- Revision and enlargement of fallen stock buildings;
- Revision to feed bin positions;
- Addition of electricity substations, back-up generators, security fencing and gates, HGV turning areas, parking areas, vehicle/wheel-wash pads, laybys to service gas tanks, water tanks, heat exchangers, flue position details and PV panels;
- Widening of poultry units to accommodate services pipework within cladding; and
- Omission of surface water lagoon to northern block, and increase in size of surface water lagoon to southern block.

1.11 This Addendum is organised into three main components:

- Volume 1: Main Report (this document);
- Volume 2: Technical Appendices (providing detailed assessment in relation to particular issues); and
- Volume 3: Non-Technical Summary (NTS) providing an overview of the main findings and recommendations reported in the ES.

Structure of Addendum

1.12 This Addendum has the same structure as the original ES, and **Table 1.1A** indicates the level of update which has been required to each of the subsequent chapters.

Table 1.1A: Structure of Addendum

CHAPTER NUMBER	CHAPTER TITLE	ADDENDUM STATUS
1	Introduction	Updated text to be read in conjunction with chapter 1 of the original ES dated January 2022.
2	Methodology	No amendments necessary. Chapter 2 of the original ES dated January 2022 remains valid.
3	Site Context	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
4	Proposed Development and Alternatives	Replacement of ES Chapter. Additions and omissions are highlighted in blue.

CHAPTER NUMBER	CHAPTER TITLE	ADDENDUM STATUS
5	Planning Policy	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
6	Air Quality and Odour	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
7	Ecology	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
8	Flood Risk and Drainage	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
9	Ground Conditions and Contamination	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
10	Landscape and Visual	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
11	Noise and Vibration	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
12	Transport	Replacement of ES Chapter. Additions and omissions are highlighted in blue.
13	Waste	No amendments necessary. Chapter 13 of the original ES dated January 2022 remains valid.
14	Cumulative Effects	No amendments necessary. Chapter 14 of the original ES dated January 2022 remains valid.
15	Conclusions	Replacement of ES Chapter. Additions and omissions are highlighted in blue.

- 1.13 As referenced in **Table 1.1A**, this Addendum must be read in conjunction with the Original ES which remains applicable to the scheme for which permission is sought and provides background environmental information on the proposals. Any information that has not altered from the Original ES has not been included in this Addendum and, therefore, all other elements of the ES and its Technical Appendices dated January 2022 remain valid and unchanged.
- 1.14 The further information contained in this Addendum has been prepared and is submitted voluntarily, to provide the updated information necessary to reflect the amendments to the Proposed Development. The requirements of Regulation 25 of the EIA Regulations are being, and will be complied with, in respect of the additional information provided within this Addendum.

Methodology and Scope



2.0 Methodology and Scope

- 2.1 No further changes are required as part of this Addendum. Chapter 2 of the submitted ES, dated January 2022, remains unchanged and valid.

Site Context



3.0 Site and Context

Introduction

- 3.1 This chapter of the ES seeks to set the context for the assessment of the likely significant environmental effects arising from the Proposed Development. It describes the nature of the Site and the surrounding area and the specific planning context, insofar as it relates to the Site and its immediate surroundings.

Site Location and Description

- 3.2 The Site covers approximately ~~29.88~~ 38.47 hectares (ha) and is primarily bounded by agricultural land. The Site has capacity to accommodate 37,000 pigs across the existing buildings. It is important to note that historically part of the Site has also been used for poultry. There are 13 residential dwellings located to the south of the existing pig sheds. Warren Energy, an Anaerobic Digestion (AD) facility, is located to the east of the existing pig sheds but is not associated with either Wayland Farm Ltd or Crown Chicken Ltd. The village of Methwold is approximately 1.5km north of the Site and Feltwell is approximately 2.5km south west.
- 3.3 The topography of the Site is relatively level at approximately 14m-19m AOD, with the land rising slightly towards higher ground to the east and falling slightly towards level drained fenland and the Cut-off Channel to the west.
- 3.4 There are no Public Rights of Way (PRoW) which cross the Site.

Geology, Hydrogeology and Soils

- 3.5 The British Geological Survey (BGS) 1:50,000 records the geology within the Site as chalk of the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated). There are no superficial deposits recorded on the Site or present within 500m of the Site.
- 3.6 The bedrock geology is classified as a principal aquifer and the Site is not within, or near, a designated groundwater Source Protection Zone (SPZ).

Flood Risk and Drainage

- 3.7 The Site is located in Flood Zone 1 and, therefore, has a low probability of flooding. The River Wissey and the Little Ouse River pass the Site approximately 6.5km to the north and 5.5km to the south respectively.

Environmental Designations and Ecological Features

- 3.8 There are five statutory designated sites within 5km of the Site:
- The Breckland Special Area of Conservation (SPA) approximately 280m east;
 - Breckland Forest Site of Special Scientific Interest (SSSI) approximately 280m east;
 - Breckland Farmland SSSI approximately 1.65 km south;
 - Breckland Special Area of Conservation (SAC) approximately 3.2 km south east; and
 - Weeting Heath SSSI approximately 3.7 km south east.

Archaeological and Heritage Features

- 3.9 There are no Designated Heritage Assets including Listed Buildings, Scheduled Monuments, Conservation Areas, Registered Battlefields or Parks and Gardens within the Site or within 1km of the Site. The closest Designated Heritage Asset is the Methwold Conservation Area, located approximately 1.5km to the north of the Site.
- 3.10 The Site is located within the 20th century Methwold World War Two Airfield which is classified as a Non-Designated Heritage Asset.

Air Quality and Pollution

- 3.11 The BCKLWN has undertaken a review and assessment of air quality within their area of jurisdiction which has indicated that nitrogen dioxide (NO₂) concentrations are above the Air Quality Objective (AQO) of 40µg/m³ within the Borough. As a result, two Air Quality Management Areas (AQMAs) have been declared in the Borough. The closest to the Site is the Railway Road AQMA in King's Lynn, approximately 28.1 km north of the Site, and therefore not directly impacted by the Proposed Development.

Conclusion

- 3.12 The next chapter describes the Proposed Development.

Proposed Development Including Alternatives

4

4.0 Proposed Development including Alternatives

Introduction

- 4.1 This chapter describes the Proposed Development which forms the basis of the EIA. It describes the various elements of the proposals in detail, as well as the means by which the proposals would be implemented.

Description of Development

- 4.2 The Proposed Development includes the construction of 14 new pig rearing units and 20 new poultry units (including associated infrastructure) to house 14,000 pigs and [approximately up to 870,000 chickens](#) on-site. These two elements have been assessed as a complete project for the purposes for EIA, and have been assessed both individually and cumulatively, but shall comprise two separate planning applications:
- Application 1: full planning application for the demolition of [22 all but four of the existing buildings](#) on site and the construction of 14 new pig rearing units, a new straw barn, water service area and associated infrastructure; and
 - Application 2: full planning application for the redevelopment of site comprising demolition of existing poultry sheds, construction of 20 new poultry sheds, four workers dwellings, and associated storage and administration buildings.
- 4.3 The parameters upon which this assessment has been based are contained within **Appendix 4.1A** of this ES [Addendum](#).

Pig Rearing Facility

Demolition

- 4.4 The Proposed Development includes the demolition of [22 all](#) existing buildings on the Site (total area 9,7041sqm). [Of these, 21 are within the main site, and a further building adjacent to the access track is to be demolished to allow for HGV access/egress.](#) Four buildings will be retained on the Site (7,998 sqm) for storage of farmyard manure and straw.

Pig Finishing Units

- 4.5 To replace the demolished buildings mentioned above, 14 modern pig finishing units will be constructed (12,957 sqm), each with the capacity to house up to 1,000 pigs. These units will be approximately [6.4 7.2m](#) high but will also include 6m high stacks for ventilation, giving a total height of [12.4 13.2m](#). The units will have a galvanised steel pig feeder bin which are approximately 9.1m in height and 3.4m wide.

Layout

- 4.6 The Proposed pig units are of rectangular formation positioned in two rows of seven in latitudinal orientation. The proposed layout of the new finishing units will allow them to be spaced out, along with an access road to the front and rear making them easily accessible. The layout has been designed to maximise site hygiene and animal welfare standards whereby the 'clean ends' of the pig finishing units face outwards and the 'dirty ends' face inwards.

Straw Barn

- 4.7 A new straw barn (2,050 sqm) will be built to the north of the new pig sheds (31.25m wide and 10.22m to the ridge high).

Water Service Area

- 4.8 A water service shed 8m long and 3.3m wide is proposed to the west of the proposed straw storage area as well as a concrete base for water tanks (10m x 4m) (total area 25 sqm).

Poultry Rearing Facility

Demolition

- 4.9 The Proposed Development includes the demolition of all existing buildings, giving a total area of 1,2261 sqm.

Poultry Houses

- 4.10 20 poultry sheds will be constructed. ~~Each flock would be reared from one day old chicks up to 38-40 day old birds, after which the chickens are collected from the Site for processing. Following this, a seven day turn around is required, where sheds are thoroughly cleaned down and emptied. each with the capacity to house 43,500 birds. Each flock will be reared from day old chicks up to 38-40 day old birds, with a seven day turn around where sheds are cleaned down and emptied. The new poultry sheds will provide 44,593.4m² of useable growing floor space.~~

- 4.11 ~~The poultry sheds are 98.0 x 24.4m with a height of 5.0m to the ridge and 2.4m to the eaves.~~

Layout

- 4.12 The proposed poultry unit comprises two blocks of poultry sheds (ten sheds to the north and ten sheds to the south) which maximises bio-security and also provides a large space for landscaping and habitat creation.

Workers' Dwellings

- 4.13 Four workers' dwellings are proposed to be located to the west of the poultry sheds. As the poultry facility will be a 24-hour operation, both the manager and assistant manager for each poultry site will be required to share the responsibility of ensuring site safety and the wellbeing of the chickens.

Other Associated Buildings

- 4.14 ~~For each block of poultry houses, The proposal also includes admin an amenity block and bale store and chilled storage area will be provided. with a combined area of 323 sqm.~~

Access

- 4.15 ~~Access to the Site will be from the north east of the Site, off the B1112. Access to the Site would be to the south, from the B1112. Vehicles would leave the B1112 heading north on Quarry Lane (a Norfolk County Council maintained unsurfaced road) before turning west to enter an existing private road network leading to the Site. Vehicles would exit the Site west along a newly created/upgraded private road to the south of the existing tree belt, linking to the existing private road which runs north-south. They would exit onto the B1112 approximately 1km west of Quarry Lane. This junction will be widened and appropriate visibility splays provided.~~

Drainage

Pig Rearing Facility

- 4.16 The proposed drainage strategy will result in a betterment of the current surface water runoff system by providing rainwater harvesting, attenuation and soakaways.

4.17 The proposed drainage strategy is detailed below:

- ~~Clean water from roofs will be collected, filtered, and stored in an underground rainwater harvesting tank, which can be used to wash down pig units and will overflow into a soakaway.~~
- All roof water will filter into underground soakaways. The new access track will drain to a French drain on the southern side of the road.
- Semi contaminated water from access roads will drain to a system of filters strips, prior to draining into a soakaway.
- ~~Dirty water from the yard area will be channelled to a foul sump prior to pumping to an above ground storage tank. The sump and tank will be sized accordingly and emptied monthly.~~
- Dirty water from shed washdown will be collected and stored in an above-ground tank, prior to being stored in a covered lagoon and then used for spreading on fields.

Poultry Rearing Facility

4.18 The proposed drainage strategy for the proposed poultry facility is for surface water from the roofs to discharge via infiltration. There will be a separate infiltration basin for the roof area and road/external areas. The surface water from the external areas will be treated via ~~a particulate interceptor for the road areas and an infiltration trench, before reaching the infiltration basin.~~ There will be a penstock valve that is closed during periods of washdown, so dirty water is diverted to the foul system and does not enter the infiltration basin. ~~an infiltration trench, before reaching the infiltration basin. The workers' dwellings will discharge surface water via a soakaway. The soakaway will receive roof water and water from the access road.~~

4.19 The new access road will have a fall and drain to a French drain along the south side of the road.

Landscaping

4.20 The landscape proposals will include new woodland and native tree and hedgerow planting. It will also include new wild flora/conservation grassland. The native planting species reflect those present within the existing site context and these proposals will be beneficial to the existing local landscape and will reflect the general objectives of the published landscape character studies.

4.21 Specifically, the poultry proposals include native hedgerow planting on all three sides of each set of poultry sheds and woodland to the west of the sheds and to the north of the workers dwellings. The pig proposals include woodland planting to the west of the proposed pig units as well as native scrub mix and woodland to the east of the proposed pig units. Details can be found in the accompanying landscape plans in **Appendix 4.1A**.

Ventilation

Pig Facility

4.22 Each pig finishing unit will comprise of a combination of both mechanical and natural ventilation. This includes gale breaker curtains, as well as 6m high ventilation stacks.

4.23 In the ridge of the proposed pig sheds, two chimneys will be placed. Each chimney will have a fan with a diameter of 820mm and a capacity of 20,000m³/h. Fans will be frequency controlled meaning that minimum ventilation can be regulated. One of the chimneys is fitted with a

measuring fan to measure the ventilation and the second chimney will run parallel with the first one. To keep the requested 10m/s output speed, an oval valve is placed within the chimney. The valve will open the speed of the fan accordingly. As more ventilation is needed, on/off fans will be added. In the ridge, a further four chimneys will be placed, again each with a fan with a diameter of 820mm. On top of each chimney a butterfly valve will be placed to close the tube when the fan is in the off position. This butterfly valve opens by the airflow through the chimney. The butterfly valve is on top of the tube, it is also closed for rainwater. When the fan is at full power, the airspeed out of the chimney is 10 m/s, as requested. The fans will be used in an on/off control. The ventilation is controlled by switching on fans in 4 groups.

- 4.24 Air inlet into the pig sheds is via galebreaker curtains. The air inlet is linked to the fan controller based on the exhaust capacity of the fans. It is controlled by way of a ventilation curve set within the controller. This curve is adjustable, so is the size of the opening in the inlet and will require amending by the end user to suit local conditions.

Poultry Facility

- 4.25 Each poultry unit will comprise of a combination of chimney fans and side ventilation. Specifically, each poultry shed will have the following:
- 10no. Ziehl 710 Ridge Fans;
 - 7no. Dacs MagFan One Gable Fans; and
 - 72no. Side Mounted Fresh Air Inlets.
- 4.26 The fans will be distributed evenly along the ridge of the building and the fresh air inlets distributed evenly along both sides of the building.
- 4.27 The ventilation system for the proposed poultry sheds will operate under a ventilation principle known as 'ridge extraction'. This is a commonly used approach whereby fans exhaust air from the building through electrically driven fans causing a negative pressure within the building, resulting in fresh air being drawn in through the side inlets. The number of fans in operation and angle of the inlets changes the amount of air being drawn through the building.
- 4.28 When the eggs are first placed into the building, there will only be one fan exhausting air with the inlets open very little; and in the final days it is possible that all of the exhaust fans would be running with the inlets fully open. The number of fans in operation will change depending upon the cooling effect needed to maintain a healthy bird environment, and it is possible that in winter months less than half of the fans would be used throughout the bird cycle.
- 4.29 The number of fans in operation is set into groups known as "stages". Stage 1 would have very few fans in operation and would be for young chicks; stage 4 would have all of the fans in operation and would be for mature birds in the warmer times of the year. The selection of the stage is done by a central computer that takes information such as temperature and pressure from the inside of the bird growing area. The number of fans increases from stages 1 to 4. The fresh air inlets are automated and react accordingly to achieve the required air pressure, which changes air velocity and temperature.

Alternatives

- 4.30 Schedule 4 of the EIA Regulations requires that an ES should provide a description of

reasonable alternatives considered by the Applicants which are relevant to the project and its specific characteristics, and an indication of the main reasons for the chosen option including a comparison of environmental effects. This is provided below.

Background to Wayland Farm Ltd

- 4.31 Wayland Farms Ltd was established in 1952 and is one of the largest outdoor reared pig producers in the UK.
- 4.32 Wayland Farms Ltd pride themselves on their high professional management and pig health welfare which led them to win the Outdoor Producer of the Year at the National Pig Awards in 2019. Wayland Farms Ltd partner with large food manufacturers in the UK, providing high quality cuts of meat to premium retailer and food service brands.
- 4.33 Wayland Farms Limited currently employs 120 staff.

Background to Crown Chicken Ltd

- 4.34 Crown Chicken Ltd is a leading integrated poultry producer who breeds, rears and processes fresh chicken for supply into a broad customer base across grocery, retail, food service, wholesale and manufacturing channels. Crown Chicken Ltd also has a well invested and efficient milling operation which satisfies all of the business' own feed requirements as well as supplying feed to other pig and poultry producers within East Anglia.
- 4.35 Crown Chicken Ltd employs a total workforce of approximately 4300 across its operations and is an important local employer.

Alternatives

Pig Facility

- 4.36 Given the Site is already an established pig facility, and the Site's proximity to the supply chain, it would not be practical nor commercially viable to relocate the Site elsewhere.
- 4.37 The Applicant has concluded that the most reasonable alternative is to continue its investment and growth at the Site as this will offer a number of substantial benefits which are detailed below.
- 4.38 Firstly, the Proposed Development will not only create a new pig housing complex but will also change how Wayland Farm is operated. ~~Currently the buildings on-site are used to house piglets, however, the Proposed Development will be for older, finishing pigs whereby the pigs will arrive at the Site at 12 weeks old (35 kg), remain on-site for 12 weeks, and depart once a target weight of approximately 110kg is obtained.~~ Currently, the buildings on-site are used to house growing pigs from 35kg to 115kg. Pigs will arrive at the site at 12 weeks old (35 kg), remain on-site for 17 weeks, and depart once a target weight of approximately 115kg is obtained. This will result in a reduction in the density of pigs on-site and a change from Red Tractor stocking rates to RSPCA stocking rates, therefore, improving animal welfare standards. Additionally, the pigs will be housed on a straw based system as opposed to the current slatted floor arrangement, further improving animal welfare standards.
- 4.39 Secondly, the Proposed Development will involve upgrading to the latest technologies and equipment. This will not only result in potential noise and carbon savings but will enable the farm to become more efficient and enable Wayland Farms Ltd to sustain their high-quality product, as well as its future in this part of the Borough.

Poultry Facility

- 4.40 Given the Site was historically in use as a poultry facility, it is therefore considered that the Site is suitable for the proposed use. The Proposed Development will also offer a number of substantial benefits as described below.
- 4.41 The poultry sector is a major contributor to the UK Economy. A report by the British Poultry Council in 2015¹ stated that the UK poultry industry supported 79,300 jobs in the industry. The report also stated that the sector contributed £3.6 billion to the UK GDP and that for every £1 billion generated, a further £1.25 billion is generated in the rest of the UK economy through the supply chain and wage consumption multiplier impacts. The poultry meat industry was reported to generate £1.1 billion in tax payable to the Exchequer. Given the above, the continued support and growth of this sector is of high importance.
- 4.42 The Proposed Development will assist the UK poultry industry in meeting the high demand for British reared poultry product. According to the latest report prepared by AHDB², poultry meat consumption in 2017 was 36.3kg per person per annum. The Office for National Statistics has estimated that the UK population will increase by 5.6 million over the next 20 years. On average this would result in an extra 280,000 people in the UK per annum. Based on current consumption, an additional 10,164,000 kg of poultry meat will be required to meet this demand. If these birds cannot be produced in the UK, they will have to be imported from abroad where the UK has no control over conditions.
- 4.43 In addition to the above, both the pig and poultry facilities will:
- Enable the retention of the existing staff and expertise and allow for recruitment of new staff;
 - Enable the redevelopment of an already developed site;
 - Enable landscape enhancement; and
 - Secure the best practices and environmental management on the farms.
- 4.44 The 'No Development' alternative, or evolution of the Site without the Proposed Development is considered in each chapter, as required under the 2017 EIA Regulations (Schedule 4, 3). This is not considered to be a realistic alternative by the Applicants, and if adopted, would reduce the commercial viability of the operation in the long term.

Conclusions

- 4.45 It has been demonstrated in this chapter that there are no suitable alternative sites for the Proposed Development. The Applicants and their design team consider this to be the most appropriate solution to meet the operational requirements identified, after having regard to those environmental assessments and engagement with stakeholders to provide the best quality solution for the Proposed Development.
- 4.46 The next chapter of this ES [Addendum](#) sets out the planning policy context, insofar as it relates to the Proposed Development.

1 Economic Impact of the British Poultry Meat Industry 2015, British Poultry Council, 2015.
2 Poultry Pocketbook -2018, AHDB, 2018.

Planning Policy

5

5.0 Planning Policy

Introduction

- 5.1 The planning policy context for the Proposed Development is set out in detail in the Planning Statement, submitted separately as part of the documents accompanying this planning application. The Planning Statement describes how the Proposed Development complies with policy, and sets out the Applicant's case for development. This ES is objective to arguments about policy compliance, and instead provides information about the planning policy context within which this EIA has been proposed. To this end, this ES chapter provides an overview of planning policies which have been considered in the EIA; individual chapters assessing particular environmental topics provide more detail on relevant policies as they relate to specific topics.
- 5.2 In identifying the planning framework, consideration has been given to Section 38(6) of the Planning and Compulsory Purchase Act 2004, which states that: "If regard is to be had to the Development Plan for the purpose of any determination to be made under the planning acts, the determination must be made in accordance with the plan unless material considerations indicate otherwise".

The Adopted Development Plan

- 5.3 The Adopted Development Plan for the Site comprises:
- King's Lynn and West Norfolk Core Strategy, (2011); and
 - Site Allocations and Development Management Policies Plan (September 2016)

King's Lynn and West Norfolk Core Strategy

- 5.4 The site is identified as the countryside on the Adopted Development Plan Proposals Map.

- 5.5 Relevant Development Plan policies:
- Policy CS01 – Spatial Strategy
 - Policy CS06 – Development in Rural Areas
 - Policy CS08 – Sustainable Development
 - Policy CS11 – Transport
 - Policy CS12 – Environmental Assets
 - Policy CS10 – The Economy

Site Allocations and Development Management Policies

- 5.6 Relevant Development Plan policies:
- Policy DM1 – Presumption in Favour of Sustainable Development
 - Policy DM2 – Development Boundaries
 - Policy DM15 – Environment, Design and Amenity
 - Policy DM17 – Parking Provision in New Development

Emerging Regulation 19 King's Lynn and West Norfolk Local Plan

- 5.7 The Borough Council has been preparing a Local Plan Review to update the current Core Strategy and Site Allocations and Development Management Policies Plan. Consultation took place on a draft Local Plan Review document in 2019. At the meeting of the Borough Council on 8 July the Council agreed to proceed to the 'Pre-Submission' consultation stage.
- 5.8 The Regulation 19 King's Lynn & West Norfolk Local Plan Review Pre-Submission was published for consultation on the 2nd August 2021. ~~The consultation closed on the 27th September 2021. The Borough Council are currently reviewing feedback from this consultation, ahead of formal submission for examination.~~ The site is not specifically identified within the King's Lynn & West Norfolk Local Plan Review Pre-Submission Plan and, therefore, countryside and rural development policies continue to have effect.
- 5.9 ~~The Local Plan was submitted to the Secretary of State on 29th March 2022, and Examination Hearing Sessions began in late 2022. However, on 11th January 2023 the Inspectors announced the adjournment of the Local Plan Examination to allow the Council the opportunity to undertake further work to justify the spatial strategy and distribution of housing in the Local Plan Review. The Inspectors have set a deadline of 28th April 2023 to complete the additional work, and anticipated Hearings resuming in autumn 2023.~~
- 5.10 ~~Furthermore, as the emerging 'Regulation 19' King's Lynn & West Norfolk Local Plan is only at the early stages, it holds limited weight at this stage.~~

Other Material Considerations

- 5.11 Consideration should also be given to the following documents:
- The National Planning Policy Framework (NPPF) (July 2021); and
 - ~~Parking Standards for Norfolk, 2007.~~
 - ~~Parking Guidelines for new developments in Norfolk, 2022.~~

Conclusions

- 5.12 This chapter has outlined the National Guidance, along with the Local Planning Policies which are applicable to the EIA and are to be considered when appraising the Proposed Development on the Site. The EIA has been undertaken and the ES prepared within the context of these policies, demonstrating that the proposals are in accordance with Local and National Planning Policy. Additional legislation, guidance and policy specific to each technical area have been considered in the appropriate topic ES chapters.
- 5.13 The remainder of the ES now provides the detailed assessment into the environmental effects of the Proposed Development on the following:
- Air Quality and Odour;
 - Ecology;
 - Flood Risk and Drainage;
 - Ground Conditions and Contamination;
 - Landscape and Visual;

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- Noise and Vibration;
- Transport;
- Waste;
- Cumulative Assessment; and
- Conclusions.

Air Quality and Odour



6.0 Air Quality and Odour

Introduction

6.1 This chapter addresses the air quality and odour impacts of the Proposed Development. It has been prepared by Redmore Environmental to assess potential air quality effects on sensitive receptors as a result of fugitive dust emission impacts during construction and odour, dust, ammonia (NH₃), bioaerosol and road traffic exhaust emission impacts during operation.

6.2 The Air Quality and Odour Chapter is supported by **Technical Appendix 6.1A**.

Potential Impacts

6.3 The Proposed Development is located on an existing holding occupied by three farms known as Airfield Farm, Feltwell Farm and Methwold Farm. Operations are regulated in an accordance with an Environmental Permit issued by the Environment Agency (EA) (Number: EPR/GP3130UC). This allows for the intensive rearing of the following livestock and their progeny:

- Feltwell Farm - 16,074 production pigs;
- Methwold Farm - 1,360 sows; and,
- Airfield Farm - 4,974 production pigs.

6.4 The proposals comprise the following:

- Feltwell Farm - Demolition of existing structures and subsequent construction of 14 livestock buildings with a capacity to house a total of 14,000 production pigs alongside 14 feed silos and a straw barn. Several sheds will be retained and used for storage of Farmyard Manure (FYM) and straw; ~~and~~. A lagoon will also be retained for storage of dirty water; and,
- Methwold Farm - Demolition of existing structures and subsequent construction of 20 livestock buildings with a capacity to house a total of 870,000 broilers alongside 18 feed silos, four farm worker dwellings and four administration buildings.

6.5 The Proposed Development has the potential to cause the following air quality impacts:

- Construction phase dust emissions associated with demolition, earthworks, construction and trackout activities;
- Operational phase odour, dust, NH₃ and bioaerosol emissions associated with pig and poultry rearing operations; and,
- Operational phase road traffic exhaust emissions associated with vehicles travelling to and from the Site.

6.6 The above potential air quality impacts have been assessed in this chapter.

6.7 It should be noted that the operations at Airfield Farm will ~~be unchanged~~ cease as result of the Proposed Development ~~and were not considered further in this chapter~~.

Legislation and Planning Policy

UK Legislation

- 6.8 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for the following pollutants:
- Nitrogen dioxide (NO₂);
 - Sulphur dioxide;
 - Lead;
 - Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
 - Particulate matter with an aerodynamic diameter of less than 2.5µm;
 - Benzene; and,
 - Carbon monoxide.
- 6.9 Target values were also provided for several additional pollutants.
- 6.10 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007 (DEFRA, 2007). The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.
- 6.11 **Table 6.1A** presents the AQOs for pollutants considered in this chapter.

Table 6.1A: Air Quality Objectives

POLLUTANT	AIR QUALITY OBJECTIVE	
	CONCENTRATION (MG/M3)	AVERAGING PERIOD
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

- 6.12 **Table 6.2A** summarises the advice provided in DEFRA guidance (DEFRA, 2021+2022) on where the AQOs for pollutants considered within this chapter apply.

Table 6.2A: Examples of Where the Air Quality Objectives Apply

AVERAGING PERIOD	OBJECTIVE SHOULD APPLY AT	OBJECTIVE SHOULD NOT APPLY AT
Annual mean	All locations where members of the public might be regularly exposed	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets)	1-hour mean

Local Air Quality Management

6.13 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in **Table 6.2A**, are likely to be exceeded, the Local Authority (LA) is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

Pollution Control

6.14 Atmospheric emissions from intensive farms are controlled in the UK through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. Existing operations at the Site are regulated in accordance with an Environmental Permit issued by the EA (Number: EPR/GP3130UC). Prior to operation of the Proposed Development there will be a requirement to vary the Environmental Permit in order to authorise the proposed changes. This process will require detailed consideration of potential atmospheric emissions and associated impacts at sensitive locations in the vicinity of the Site. In accordance with the Regulations, any Environmental Permit which is subsequently issued for the facility will include appropriate conditions to restrict environmental impacts beyond the boundary of the Site. These will help to limit the potential for any effects as a result of atmospheric releases from the Proposed Development.

Critical Loads and Levels

- 6.15 A critical load is defined by the UK Air Pollution Information System (APIS) (2021) as:
“A quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge.”
- 6.16 A critical level is defined as:
“Concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge.”
- 6.17 A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).
- 6.18 When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the exceedence. A larger exceedence is often considered to represent a greater risk of damage.
- 6.19 Maps of critical loads and levels and their exceedences have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as means for preventing the risk of damage. However, even a decrease in the exceedence may infer that less damage will occur.
- 6.20 **Table 6.3A** presents the critical levels for the protection of vegetation for pollutants considered within this chapter.

Table 6.3A: Critical Levels for the Protection of Vegetation

POLLUTANT	CRITICAL LEVEL	
	ANNUAL MEAN CONCENTRATION (MG/M3)	VEGETATION TYPE
NH ₃	1	Where lichens and bryophytes are present (where they form a key part of the ecosystem integrity)
	3	Other vegetation

- 6.21 Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been identified for the relevant designations considered within this chapter.

National Planning Policy

- 6.22 The revised National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2021) was published in July 2021 and sets out the Government’s planning policies for England and how these are expected to be applied.
- 6.23 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives, including the following of relevance to air quality:

“c) - An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

- 6.24 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:
- “Planning policies and decisions should contribute to and enhance the natural and local environment by:*
- [...]*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality [...].”*
- 6.25 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:
- “Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”*
- 6.26 The implications of the NPPF have been considered throughout this assessment.
- National Planning Practice Guidance**
- 6.27 The National Planning Practice Guidance (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible (NPPG, 2021). The air quality pages are summarised under the following headings.
1. What air quality considerations does planning need to address?
 2. What is the role of plan-making with regard to air quality?
 3. Are air quality concerns relevant to neighbourhood planning?
 4. What information is available about air quality?
 5. When could air quality considerations be relevant to the development management process?
 6. What specific issues may need to be considered when assessing air quality impacts?
 7. How detailed does an air quality assessment need to be?
 8. How can an impact on air quality be mitigated?
- 6.28 These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

Local Planning Policy

- 6.29 The Local Plan for KLWNBC consists of the Core Strategy (KLWNBC, 2011) and Site Allocations and Development Management Policies Plan (SADMPP) (KLWNBC, 2016) adopted in July 2011 and September 2016, respectively.
- 6.30 A review of the Core Strategy indicated the following policies of relevance to this chapter:
- “CS06 Development in Rural Areas*
- [...]*
- The strategy will be supportive of farm diversification schemes and conversion of existing buildings for business purposes in accordance with Policy CS10 providing any proposal:*
- [...]*
- does not adversely affect the building and the surrounding area or detract from residential amenity.*
- [...].”*
- “CS12 Environmental Assets*
- Green Infrastructure, Historic Environment, Landscape Character, Biodiversity and Geodiversity*
- [...]*
- Development should seek to avoid, mitigate or compensate for any adverse impacts on biodiversity, geodiversity and heritage as well as seeking to enhance sites through the creation of features of new biodiversity, geodiversity and heritage interest. The design of new development should be sensitive to the surrounding area, and not detract from the inherent quality of the environment.”*
- 6.31 A review of the SADMPP indicated the following policy of relevance to this chapter:
- “Policy DM 15 - Environment, Design and Amenity*
- Development must protect and enhance the amenity of the wider environment including its heritage and cultural value. Proposals will be assessed against their impact on neighbouring uses and their occupants as well as the amenity of any future occupiers of the proposed development. Proposals will be assessed against a number of factors including:*
- Heritage impact;
 - Overlooking, overbearing, overshadowing;
 - Noise;
 - Odour;
 - Air quality.
- [...]*
- Development that has a significant adverse impact on the amenity of others or which is of a poor design will be refused.”*
- 6.32 The implications of the above policies were considered in this chapter where necessary.
- ### Methodology
- 6.33 The Proposed Development has the potential to cause air quality impacts during the construction and operational phases. These have been assessed in accordance with the following methodology.

Construction Phase

- 6.34 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1' (IAQM, 2016).
- 6.35 Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:
- Demolition;
 - Earthworks;
 - Construction; and,
 - Trackout.
- 6.36 The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:
- Annoyance due to dust soiling;
 - Harm to ecological receptors; and,
 - The risk of health effects due to a significant increase in exposure to PM₁₀.
- 6.37 The first stage screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the boundary or 50m from the construction vehicle route up to 500m from the Site entrance, then the assessment proceeds to the next stage. Additionally, should ecological receptors be identified within 50m of the Site, or the construction vehicle route up to 500m from the Site entrance, then the assessment also proceeds to the next stage.
- 6.38 The second stage of the assessment screens the risk of potential dust impacts. It should be noted that the standard IAQM terminology of risk has been replaced with significance criteria to allow continuity throughout the Environmental Statement and comparison of various effects. A site is initially allocated an effect significance (risk) category based on two factors:
- The sensitivity of the area to dust impacts, which can be defined as low, moderate or high sensitivity; and
 - The scale and nature of the works, which determines the magnitude of dust arising as minor, moderate or major.
- 6.39 The two factors are combined in order to determine the potential effect significance without mitigation applied.
- 6.40 The influencing factors that define the sensitivity of the area around a development to potential impacts are shown in **Table 6.4A**.

Table 6.4A: Construction Phase Dust Emissions: Examples of Factors Defining Sensitivity of an Area

SENSITIVITY	EXAMPLES	
	HUMAN RECEPTORS	ECOLOGICAL RECEPTORS
High	<ul style="list-style-type: none"> • Users expect of high levels of amenity • High aesthetic or value property • People expected to be present continuously for extended periods of time • Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀ e.g. residential properties, hospitals, schools and residential care homes 	<ul style="list-style-type: none"> • Internationally or nationally designated site e.g. (SAC)
Moderate	<ul style="list-style-type: none"> • Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work 	<ul style="list-style-type: none"> • Nationally designated site e.g. SSSI
Low	<ul style="list-style-type: none"> • Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. E.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads 	<ul style="list-style-type: none"> • Locally designated site e.g. Ancient Woodland

6.41 The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

6.42 These factors were considered in the assessment.

6.43 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in **Table 6.5A**.

Table 6.5A: Construction Phase Dust Emissions: Sensitivity of the Area to Dust Soiling Effects on People and Property

SENSITIVITY	NUMBER OF RECEPTORS	DISTANCE FROM SOURCE (M)			
		LESS THAN 20	LESS THAN 50	LESS THAN 100	LESS THAN 350
High	More than 100	High	High	Moderate	Low
	10 - 100	High	Moderate	Low	Low
	1 - 10	Moderate	Low	Low	Low
Moderate	More than 1	Moderate	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

6.44 **Table 6.6A** outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 6.6A: Construction Phase Dust Emissions: Sensitivity of the Area to Human Health Impacts

SENSITIVITY	BACKGROUND ANNUAL MEAN PM10 CONCENTRATION	NUMBER OF RECEPTORS	DISTANCE FROM SOURCE (M)			
			LESS THAN 20	LESS THAN 50	LESS THAN 100	LESS THAN 350
High	Greater than 32µg/m ³	More than 100	High	High	High	Moderate
		10 - 100	High	High	Moderate	Low
		1 - 10	High	Moderate	Low	Low
	28 - 32µg/m ³	More than 100	High	High	Moderate	Low
		10 - 100	High	Moderate	Low	Low
		1 - 10	High	Moderate	Low	Low
	24 - 28µg/m ³	More than 100	High	Moderate	Low	Low
		10 - 100	High	Moderate	Low	Low
		1 - 10	Moderate	Low	Low	Low
	Less than 24µg/m ³	More than 100	Moderate	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Moderate	Greater than 32µg/m ³	More than 10	High	Moderate	Low	Low
		1 - 10	Moderate	Low	Low	Low
	28 - 32µg/m ³	More than 10	Moderate	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	24 - 28µg/m ³	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	Less than 24µg/m ³	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low

6.45 **Table 6.7A** outlines the sensitivity of the area to ecological impacts.

Table 6.7A: Construction Phase Dust Emissions: Sensitivity of the Area to Ecological Impacts

RECEPTOR SENSITIVITY	DISTANCE FROM SOURCE (M)	
	LESS THAN 20	LESS THAN 50
High	High	Moderate
Moderate	Moderate	Low
Low	Low	Low

6.46 The scale and nature of the construction works determine the magnitude of dust emissions arising from each activity. The relevant criteria are summarised in **Table 6.8A**.

Table 6.8A: Construction Phase Dust Emissions: Emission Magnitude

MAGNITUDE	ACTIVITY	CRITERIA
Major	Demolition	<ul style="list-style-type: none"> Total volume of building to be demolished greater than 50,000m³ Potentially dusty material (e.g. concrete) On-site crushing and screening Demolition activities more than 20m above ground level
	Earthworks	<ul style="list-style-type: none"> Total site area greater than 10,000m² Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 8m in height More than 100,000 tonnes of material moved
	Construction	<ul style="list-style-type: none"> Total building volume greater than 100,000m³ On site concrete batching Sandblasting
	Trackout	<ul style="list-style-type: none"> More than 50 Heavy Duty Vehicle (HDV) trips per day Potentially dusty surface material (e.g. high clay content) Unpaved road length greater than 100m

MAGNITUDE	ACTIVITY	CRITERIA
Moderate	Demolition	<ul style="list-style-type: none"> Total volume of building to be demolished between 20,000m³ and 50,000m³ Potentially dusty construction material Demolition activities 10m to 20m above ground level
	Earthworks	<ul style="list-style-type: none"> Total site area 2,500m² to 10,000m² Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 4m to 8m in height Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	<ul style="list-style-type: none"> Total building volume 25,000m³ to 100,000m³ Potentially dusty construction material (e.g. concrete) On site concrete batching
	Trackout	<ul style="list-style-type: none"> 10 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Minor	Demolition	<ul style="list-style-type: none"> Total volume of building to be demolished less than 20,000m³ Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities less than 10m above ground and during wetter months
	Earthworks	<ul style="list-style-type: none"> Total site area less than 2,500m² Soil type with large grain size (e.g. sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height Total material moved less than 20,000 tonnes Earthworks during wetter months
	Construction	<ul style="list-style-type: none"> Total building volume less than 25,000m³ Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	<ul style="list-style-type: none"> Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

6.47 The dust emission magnitude and the sensitivity of the area is combined to determine the effect significance of unmitigated impacts.

6.48 **Table 6.9A** outlines the effect significance from demolition activities.

Table 6.9A: Construction Phase Dust Emissions: Effect Significance from Demolition Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	MAJOR	MODERATE	MINOR
High	Major	Moderate	Moderate
Moderate	Major	Moderate	Minor
Low	Moderate	Minor	Negligible

6.49 **Table 6.10A** outlines the effect significance from earthworks and construction activities.

Table 6.10A: Construction Phase Dust Emissions: Effect Significance from Earthworks and Construction Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	MAJOR	MODERATE	MINOR
High	Major	Moderate	Minor
Moderate	Moderate	Moderate	Minor
Low	Minor	Minor	Negligible

6.50 **Table 6.11A** outlines the effect significance from trackout activities.

Table 6.11A: Construction Phase Dust Emissions: Effect Significance from Trackout Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	MAJOR	MODERATE	MINOR
High	Major	Moderate	Minor
Moderate	Moderate	Minor	Negligible
Low	Minor	Minor	Negligible

6.51 Site specific mitigation measures were identified from the IAQM guidance (IAQM, 2016) to reduce potential dust impacts based upon the predicted effect significance. For sites with **negligible** effects, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

6.52 The significance of residual impacts was determined based on the dust effect significance and appropriate mitigation measures. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible, hence the residual effect will normally be **negligible**. This is regarded as **not significant**.

Operational Phase

6.53 During the operational phase of the Proposed Development there is potential for the following air quality impacts:

- Odour, dust, NH₃ and bioaerosol emission impacts associated with pig and poultry rearing operations at the Site; and,
- Road traffic exhaust emission impacts associated with vehicles travelling to and from the Site.

6.54 The methodology used to assess potential operational phase air quality impacts is provided within the following Sections.

Odour Emissions

6.55 The Proposed Development and associated pig and poultry rearing operations have the potential to cause odour impacts at sensitive receptors located in the vicinity of the Site. These have been assessed using dispersion modelling and the methodology provided in the IAQM ‘Guidance on the Assessment of Odour for Planning V1.1’ document (IAQM, 2018). The model input data is summarised in **Appendix 6.1A**.

6.56 The assessment considered the following scenarios:

- Odour Scenario (OS) 1 - Odour concentrations as result of emissions associated with the proposed pig rearing operations at Feltwell Farm;
- OS2 - Odour concentrations as result of emissions associated with the proposed poultry rearing operations at Methwold Farm; and,
- OS3 - Odour concentrations as result of emissions associated with the proposed pig and poultry rearing operations at Feltwell Farm and Methwold Farm, respectively.

6.57 Sensitive receptors that required specific consideration during the assessment were identified from a desk-top study. The sensitivity of each location to odour impacts was defined based upon the criteria provided within the IAQM guidance (IAQM, 2018). This is summarised in **Table 6.12A**.

Table 6.12A: Operational Phase Odour Emissions: Receptor Sensitivity

SENSITIVITY	DESCRIPTION
High	<ul style="list-style-type: none"> • Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity; and, • People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Examples may include residential dwellings, hospitals, schools/education and tourist/cultural
Moderate	<ul style="list-style-type: none"> • Surrounding land where: • Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or, • People would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Examples may include places of work, commercial/retail premises and playing/recreation fields

SENSITIVITY	DESCRIPTION
Low	<ul style="list-style-type: none"> Surrounding land where: The enjoyment of amenity would not reasonably be expected; or, There is transient exposure, where the people would reasonably be expected to present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads

6.58 The odour effect significance was determined based upon the interaction between the odour exposure level predicted from the dispersion modelling and receptor sensitivity. The IAQM document (IAQM, 2018) provides an assessment matrix for either most or moderately offensive odours. In accordance with EA guidance ‘H4 Odour Management’ (EA, 2011), releases from the Proposed Development and associated intensive livestock rearing operations are considered to be moderately offensive. The relevant IAQM matrix for this category is summarised in **Table 6.13A**.

Table 6.13A: Operational Phase Odour Emissions: Effect Significance for Moderately Offensive Odours

ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY		
	LOW	MODERATE	HIGH
Greater than 10	Moderate	Major	Major
5 - 10	Minor	Moderate	Moderate
3 - 5	Negligible	Minor	Moderate
1.5 - 3	Negligible	Negligible	Minor
0.5 - 1.5	Negligible	Negligible	Negligible

6.59 The IAQM guidance (IAQM, 2018) states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **major**, the effect is likely to be considered **significant**, whilst if the effect is **minor** or **negligible**, the effect is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant**, or it is **not significant**. This has been considered to determine the overall significance of potential odour effects associated with the Proposed Development.

Dust Emissions

6.60 The Proposed Development and associated pig and poultry rearing operations have the potential to cause changes to existing PM₁₀ concentrations at sensitive receptors in the vicinity of the Site. These have been assessed using dispersion modelling and the methodology provided in IAQM document ‘Land-Use Planning & Development Control: Planning for Air Quality’ (IAQM, 2017). The model input data is summarised in **Appendix 6.1A**.

6.61 The assessment considered the following scenarios:

- Dust Scenario (DS) 1 - Existing annual and 24-hour mean PM₁₀ concentrations; **and**,
- DS2 - Future annual and 24-hour mean PM₁₀ concentrations as result of emissions associated with the proposed pig rearing operations at Feltwell Farm;

- DS3 - Future annual and 24-hour mean PM₁₀ concentrations as result of emissions associated with the proposed poultry rearing operations at Methwold Farm; and,
- DS4 - Future annual and 24-hour mean PM₁₀ concentrations as result of emissions associated with the proposed pig and poultry rearing operations at Feltwell Farm and Methwold Farm, respectively.

6.62 The significance of operational phase dust emission impacts at sensitive receptors was determined in accordance with the methodology provided within the following Sections.

Long-Term Pollutant Concentrations

6.63 The significance of operational phase dust emission impacts on annual mean PM₁₀ concentrations was defined based on the interaction between the magnitude of pollutant concentration change at sensitive locations as a result of releases from the Proposed Development and receptor sensitivity.

6.64 The sensitivity of receptors is outlined in **Table 6.14A**. These are based on the values provided within the IAQM guidance (IAQM, 2017) with additional descriptors to ensure consistency throughout the EIA.

Table 6.14A: Operational Phase Dust Emissions: Receptor Sensitivity

RECEPTOR SENSITIVITY	POLLUTANT CONCENTRATION AT RECEPTOR IN ASSESSMENT YEAR AS A PROPORTION OF AQO
Very High	110% or more
High	103 - 109%
Moderate	95 - 102%
Low	76 - 94%
Very Low	75% or less

6.65 The impact magnitude was categorised based on the pollutant concentration change from DS1 as a proportion of the relevant AQO. This is outlined in **Table 6.15A**.

Table 6.15A: Operational Phase Dust Emissions: Impact Magnitude

PREDICTED CONCENTRATION CHANGE AS A PROPORTION OF AQO (%)	IMPACT MAGNITUDE
0	Negligible
1	Very Minor
2 – 5	Minor
6 – 10	Moderate
More than 10	Major

6.66 It should be noted that the categories shown in **Table 6.15A** are intended to be used by rounding the change in percentage pollutant concentration to whole numbers.

6.67 The interaction between the impact magnitude and receptor sensitivity was utilised to define the significance of the effect, as outlined in **Table 6.16A**.

Table 6.16A: Operational Phase Dust Emissions: Long-Term Pollutant Concentrations - Effect Significance

RECEPTOR SENSITIVITY	IMPACT MAGNITUDE				
	MAJOR	MODERATE	MINOR	VERY MINOR	NEUTRAL
Very High	Major	Major	Major	Moderate	Negligible
High	Major	Major	Moderate	Moderate	Negligible
Moderate	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Very Low	Moderate	Minor	Negligible	Negligible	Negligible

Short-Term Pollutant Concentrations

6.68 The significance of operational phase dust emission impacts on 24-hour mean PM₁₀ concentrations was determined based on the pollutant concentration change from the DS1 as a proportion of the relevant AQO as a result of releases from the Proposed Development. This is summarised in **Table 6.17A**.

Table 6.17A: Operational Phase Dust Emissions: Short-Term Pollutant Concentrations - Effect Significance

PREDICTED CONCENTRATION CHANGE AS A PROPORTION OF AQO (%)	IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
Less than 10%	Negligible	Negligible
11 - 20%	Minor	Minor
21 - 50%	Moderate	Moderate
51%	Major	Major

6.69 It should be noted that in accordance with the IAQM guidance (IAQM, 2017), the above matrix is used without the need to reference the sensitivity of receptors.

Overall Effect Significance

6.70 The IAQM guidance (IAQM, 2017) states that an assessment must reach a conclusion on the likely significance of the predicted effects. Where the overall effect is **moderate** or **major**, the effect is likely to be considered **significant**, whilst if the effect is **minor** or **negligible**, the effect is likely to be considered **not significant**.

Ammonia Emissions

Assessment Stages

6.71 The Proposed Development and associated pig and poultry rearing operations have the potential to cause changes in NH₃ concentrations and nitrogen and acid deposition rates at sensitive **ecological** receptors in the vicinity of the Site. These have been assessed ~~using dispersion modelling. The input data in accordance with the stages outlined within the Habitat Regulations Assessment (HRA) guidance produced by DEFRA (DEFRA, 2021). This is summarised in Appendix 7.4: as follows, though it should be noted that completion of all elements is not always necessary, depending on the findings of each stage:~~

6.72 ~~The assessment considered the following scenarios:~~

- ~~• Ammonia Scenario (AS) 1 – Annual mean NH₃ concentrations and nitrogen/ acid deposition~~

~~rates as a result of emissions associated with existing pig rearing operations at Feltwell Farm;~~

- ~~• AS2 – Annual mean NH₃ concentrations and nitrogen/ acid deposition rates as a result of emissions associated with the proposed pig rearing operations at Feltwell Farm;~~
- ~~• AS3 – Annual mean NH₃ concentrations and nitrogen/ acid deposition rates as a result of emissions associated with existing pig rearing operations at Methwold Farm;~~
- ~~• AS4 – Annual mean NH₃ concentrations and nitrogen/ acid deposition rates as a result of emissions associated with the proposed poultry rearing operations at Methwold Farm;~~
- ~~• AS5 – Annual mean NH₃ concentrations and nitrogen/ acid deposition rates as a result of emissions associated with existing pig rearing operations at Feltwell Farm and Methwold Farm; and;~~
- ~~• AS6 – Annual mean NH₃ concentrations and nitrogen/ acid deposition rates as a result of emissions associated with the proposed pig and poultry rearing operations at Feltwell Farm and Methwold Farm, respectively.~~
- Stage 1 - Screening: Plans or projects with no likely significant effect on an ecological designation can be 'screened out' of the need for further assessment;
- Stage 2 - Appropriate Assessment: Detailed assessment to consider the likely significant effects of the proposal in more detail and identify ways to avoid or minimise any effects; and,
- Stage 3 - Derogation: To assess the likely significant effects of the proposal in more detail and identify ways to avoid or minimise any effects.

6.73 The methodology adopted for each stage is summarised in the following sections.

6.74 It should be noted that although the HRA methodology only applies to European sites, the approach has also been adopted when considering effects on SSSIs in lieu of alternative guidance. In addition, the Proposed Development is referred to as 'the project' throughout the NH3 emissions assessment in order to ensure consistency with the terminology provided in relevant guidance (DEFRA, 2021; Natural England (NE), 2018).

Stage 1: Screening

6.75 The Stage 1: Screening followed the steps outlined in 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' guidance (NE, 2018). Consideration of this document was requested by NE in a recent consultation response to the planning application for the Proposed Development (NE, 2022). Although the guidance has been developed for road traffic emissions, the general principles for assessment are considered equally relevant to agricultural emissions.

6.76 The Stage 1: Screening utilised the following steps, as derived from NE guidance (NE, 2018):

- Step 1: Does the proposal give rise to emissions which are likely to reach an international or national site? If there are no designations within the vicinity of the project, then a screening conclusion of no likely significant effect can be reached with regard to air quality;
- Step 2: Are the qualifying features of the designation sensitive to air pollution? If there are no sensitive qualifying features, then a screening conclusion of no likely significant effect on the Site can be reached with regard to air quality;

- Step 3: Could the sensitive qualifying features of the Site be exposed to emissions? If the qualifying features could not be exposed to emissions, then a screening conclusion of no likely significant effect on the Site can be reached with regard to air quality;
- Step 4: Application of the following screening thresholds to determine potential risk of effects alone and in-combination with emissions from other plans and projects:
 - 4a) Alone: Risk of significant effect if a predicted Process Contribution (PC) is 1% of the critical load or level or greater as a result of the proposal in isolation; and,
 - 4b) In-combination: Risk of significant effect if a predicted PC is 1% of the critical load or level, or greater for European sites and SSSIs as a result of the proposal in-combination with other relevant plans or projects.
- If the above criteria are not exceeded, then a screening conclusion of no likely significant effect on the Site can be reached with regard to air quality.

6.77 The guidance (NE, 2018) provides the following advice regarding how PCs should be derived and compared to the 1% screening criteria:

“If a proposal has not been screened out by steps 1-3, the next step is to consider the risk from the road traffic emissions associated with the plan or project. Depending on the information available, this could be expressed in terms of either the predicted average annual daily traffic flow (‘AADT’ as proxy for emissions) or the predicted emissions themselves (the actual process contribution). Each of these parameters have guideline thresholds to check whether the predicted change is likely to be significant (e.g. 1000 AADT for traffic numbers or 1% of critical load or level for emissions). This information should have been provided to the competent authority by the applicant.

[...]

Widely accepted Environmental Benchmarks for imperceptible impacts are set at 1% of the critical load or level, which is considered to be roughly equivalent to the DMRB thresholds for changes in traffic flow of 1000AADT and for HDV 200AADT. This has been confirmed by modelling using the DMRB Screening Tool that used average traffic flow and speed figures from Department of Transport data to calculate whether the NO_x outputs could result in a change of > 1% of critical/ load level on different road types. A change of >1000 AADT on a road was found to equate to a change in traffic flow which might increase emissions by 1% of the Critical Load or Level and might consequentially result in an environmental effect nearby (e.g. within 10 metres of roadside).”

6.78 It is clear from the above that the PC is derived based on the change in emissions as result of a project at ecological designations, with the resultant pollutant increase or decrease, compared to the 1% screening criteria.

6.79 The project as a whole includes proposals to rear different livestock types and develop new housing systems when compared to the existing situation. These have the potential to change the emission profile of the Site, as well as the associated dispersion potential, which may represent an increase or decrease in pollution levels at the ecological receptors dependent on how the releases change. This change is considered as the PC in accordance with above approach and definition provided by NE (NE, 2018) and was, therefore, treated as such throughout the assessment.

6.80 If the above steps indicate a screening conclusion of no likely significant effects on the relevant designations can be reached with regard to air quality, then the assessment can be concluded. If potential effects cannot be screened out, then the assessment should proceed to Stage 2: Appropriate Assessment.

6.81 It should be noted that Stage 1: Screening is undertaken with consideration to the change in project related emissions only, exclusive of baseline levels, in accordance with the guidance (NE, 2018).

Stage 2: Appropriate Assessment

6.82 Having identified a risk of a significant effect from a plan or project either alone or in-combination, the purpose of Stage 2: Appropriate Assessment is to more precisely assess the likely effects and to inform a conclusion as to whether an adverse effect on site integrity can be ruled out. It should be noted that the assessment should be 'appropriate' in terms of its scope, content, length and complexity to the plan or project under assessment. This was reiterated by the Supreme Court (UK Supreme Court, 2015), which clarified:

"Appropriate' is not a technical term. It indicates no more than that the assessment should be appropriate to the task in hand: that task being to satisfy the authority that the project will not adversely affect the integrity of the site concerned."

6.83 It should not be assumed that an Appropriate Assessment will necessarily involve detailed and complex monitoring or modelling work. Whilst this may be necessary in fully understanding what will happen to a site if the plan or project goes ahead, it is equally possible that a fairly concise and straightforward assessment might be entirely 'appropriate'.

6.84 A number of factors are identified in the NE guidance (NE, 2018) for further consideration during an Appropriate Assessment. These are summarised as follows:

- Consider whether the sensitive qualifying features of the Site would be exposed to emissions;
- Consider the European Site's Conservation Objectives;
- Consider background pollution;
- Consider the designated site in its national context;
- Consider the best available evidence on small incremental impacts from nitrogen deposition;
- Consider the spatial scale and duration of the predicted impact and the ecological functionality of the affected area;
- Consider site survey information;
- Consider national, regional and local initiatives or measures which can be relied upon to reduce background levels at the site;
- Consider measures to avoid or reduce the harmful effects of the plan or project on site integrity; and,
- Consider any likely in-combination effects with other live plans and projects from other sectors.

6.85 It should be noted that in accordance with the above definition of an Appropriate Assessment, not all factors may be relevant to a specific plan or project and only those which aid in forming a conclusion as to whether an adverse effect on site integrity can be ruled out need to be considered.

6.86 ~~There are no set criteria for categorising the impact magnitude due to a change in pollutant levels at ecological designations as result of emissions from a Proposed Development. Effects were therefore determined using professional judgement and the guidance provided in the following documents:-~~

- ~~• A guide to the assessment of air quality impacts on designated nature conservation sites, IAQM, 2020;~~
- ~~• Advisory Note: Ecological Assessment of Air Quality Impacts, Chartered Institute of Ecology and Environmental Management (CIEEM), 2021; and,~~
- ~~• Intensive farming risk assessment for your environmental permit, EA, 2016.~~

Bioaerosol Emissions

6.87 The Proposed Development has the potential to cause bioaerosol emission impacts at sensitive receptors in the vicinity of the Site. In the absence of guidance specific to intensive livestock rearing, a risk assessment was undertaken in accordance with the general principles of EA document 'Guidance on the evaluation of bioaerosol risk assessments for composting facilities' (EA, undated), as well as with reference to research undertaken by DEFRA 'Characterising poultry dust properties, assessing human health implications, quantifying emission levels and assessing the potential for abatement' (DEFRA, 2009).

Receptor

6.88 The first step was to consider how releases could harm the environment. This involved identifying 'receptors' that may be affected and included people, property, and the natural and physical environment. In accordance with EA guidance 'Intensive farming risk assessment for your environmental permit' (EA, 2016), these include any relevant location within 100m of the Site.

Source

6.89 The next step was to identify any potential bioaerosol emission sources at the Proposed Development that may affect ambient bioaerosol levels at the identified sensitive receptors during operation.

Probability of Exposure

6.90 The probability of exposure to bioaerosols was subsequently defined based on several factors, such as:

- Distance between source and receptor;
- Dispersion potential of emission;
- Duration of emission; and,
- Frequency of emission.

6.91 Probability was categorised in accordance with the following criteria:

- High - exposure is probable, direct exposure likely with no/few barriers between source and receptor;
- Moderate - exposure is fairly probable, barriers less controllable;
- Low - exposure unlikely, barriers exist to mitigate; or,
- Very low - exposure very unlikely, effective and multiple barriers.

Harm

6.92 The severity of harm from exposure to bioaerosols was determined based on the following factors:

- How much a person or part of the environment is exposed; and,
- How sensitive a person or part of the environment is.

6.93 Harm was categorised as follows:

- High - severe consequences, evidence that exposure may result in serious damage;
- Moderate - significant consequences, evidence that exposure may result in damage that is not severe and is reversible;
- Low - minor consequences, damage not apparent, reversible adverse changes possible; and,
- Very low - negligible consequences, no evidence for adverse changes.

Magnitude of Risk

6.94 The magnitude of risk was determined based on a combination of:

- The probability of exposure; and,
- The severity of harm.

6.95 The interaction between the above criteria to determine the magnitude of risk is outlined in **Table 6.18A**.

Table 6.18A: Operational Phase Bioaerosol Emissions: Magnitude of Risk

PROBABILITY OF EXPOSURE	POTENTIAL HARM			
	VERY LOW	LOW	MODERATE	HIGH
High	Minor	Moderate	Major	Major
Moderate	Minor	Moderate	Moderate	Major
Low	Minor	Minor	Moderate	Moderate
Very Low	Negligible	Minor	Minor	Moderate

6.96 Where the magnitude of risk is **moderate** or **major**, the effect is likely to be considered **significant**. Where the magnitude of risk is **minor** or **negligible**, the effect is likely to be considered not significant. It should be noted that this is a binary judgement of either it is **significant**, or it is **not significant**. This has been considered to determine the overall significance of potential bioaerosol emission effects associated with the Proposed Development.

Road Traffic Emissions

Human Receptors

6.97 The Proposed Development has the potential to increase pollutant concentrations at sensitive human receptor locations as a result of road traffic exhaust emissions associated with vehicles travelling to and from the Site during operation. An assessment was therefore undertaken using the criteria contained within the IAQM ‘Land-Use Planning & Development Control: Planning for Air Quality’ guidance (IAQM, 2017) to determine the potential for trips generated by the Proposed Development to affect local air quality.

6.98 The following criteria are provided to help establish when an assessment of potential impacts on the local area is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere; and,
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

6.99 Should these criteria not be met, then the IAQM guidance (IAQM, 2017) considers operational phase road traffic exhaust emission effects associated with a scheme on human receptors to be **negligible** and no further assessment is required. This effect is considered to be **not significant**.

Ecological Receptors

6.100 NE have produced 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' ([Natural England NE, 2018](#)) which describes how competent authorities and others will assess plans and projects likely to generate road traffic emissions and subsequently affect international ecological designations. This provides a staged assessment methodology to provide consideration of potential air quality impacts from a development both alone and in-combination. The approach can be summarised as follows:

- Stage 1 - Determine the predicted change in AADT flow on road links situated within the relevant distance of sensitive ecological receptors as a result of the project alone. If this is above 1,000 then there is a risk of a significant effect on air quality alone and an Appropriate Assessment is required. If the change is below 1,000 then the assessment should proceed to Stage 2; and,
- Stage 2 - If the change is below 1,000 then there is a risk of an appreciable effect on air quality is unlikely to be significant alone. As such, screening for in-combination effects should be undertaken. This requires the predicted change in AADT flow on road links within the vicinity of the sensitive ecological receptors as a result of the development and any other relevant plans or projects to be determined. If this is below 1,000 then it can be concluded that air quality impacts are not significant and an Appropriate Assessment is not required. If the change is greater than 1,000 then an Appropriate Assessment is necessary.

6.101 Should the criteria not be met, then the guidance note ([Natural England NE, 2018](#)) indicates road traffic emission impacts associated with a scheme on ecological receptors to be **negligible** and no further assessment is required. This effect is considered to be **not significant**.

6.102 It should be noted that although the NE guidance (NE, 2018) does not specifically cover nationally significant sites such as SSSIs, the general principles for assessment are considered equally relevant. However, an Appropriate Assessment is only required if significant effects on European designations are likely.

Existing Baseline Conditions

6.103 Existing air quality conditions in the vicinity of the Proposed Development were identified in order to provide a baseline for the assessment. These are detailed within the following Sections.

Local Air Quality Management

6.104 As required by the Environment Act (1995), KLWNBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean NO₂ concentrations are above the AQO within the district. As such, two AQMAs have been declared. The closest of these to the Site is described as follows:

“The properties to the east side of Railway Road between the junctions Blackfriars Road/Street and Stanley Street, and the properties to the west side between Blackfriars Street and up to but not including number 26a.”

- 6.105 The Site is located approximately 28.1km south of the AQMA. It is considered unlikely that the Proposed Development would significantly affect air quality conditions over a distance of this magnitude. As such, the designation was not considered further in the context of this chapter.
- 6.106 KLWNBC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMA have been designated.

Air Quality Monitoring

Local Authority Monitoring

- 6.107 Monitoring of annual mean PM₁₀ concentrations is undertaken by KLWNBC throughout their area of jurisdiction. Recent results recorded in the vicinity of the Site are shown in **Table 6.19A**.

Table 6.19A: Monitoring Results - Annual Mean PM₁₀

MONITORING SITE		MONITORED PM10 CONCENTRATIONS (MG/M3)		
		2018	2019	2020
OS4	Wretton Road, Stoke Ferry	13.2	11.0	11.0
OS5	Buckenham Drive, King's Lynn	12.7	10.0	12.8

- 6.108 As shown in **Table 6.19A**, annual mean PM₁₀ concentrations were below the AQO of 40µg/m³ at both monitoring locations during recent years.
- 6.109 The number of days with PM₁₀ concentrations above 50µg/m³ at the monitoring locations are summarised in **Table 6.20A**.

Table 6.20A: Monitoring Results - Number of Days with 24-hour Mean PM₁₀ Concentrations above 50µg/m³

MONITORING SITE		NUMBER OF DAYS WITH 24-HOUR MEAN PM10 CONCENTRATIONS ABOVE 50MG/M3		
		2018	2019	2020
OS4	Wretton Road, Stoke Ferry	0	0	0
OS5	Buckenham Drive, King's Lynn	0	0	0

- 6.110 As shown in **Table 6.20A**, the number of days with PM₁₀ concentrations above 50µg/m³ was below the permitted number of 35 at both monitoring locations during recent years.
- 6.111 KLWNBC do not undertake monitoring of annual mean NO₂ concentrations in the vicinity of the Site.
- 6.112 Reference should be made to **Figure 6.1A** for a map of the survey positions.



Figure 6.1A: Monitor Locations

Acid Gas Monitoring

6.113 Concentrations of NH₃ are monitored in the England through the UK Eutrophying and Acidifying Pollutants (UKEAP) network. The closest survey position to the Proposed Development is Stoke Ferry at National Grid Reference (NGR): 569982, 298730, approximately 7km north-west of the Site. An annual mean NH₃ concentration of 2.67µg/m³ was recorded at the monitor in 2020.

Background Concentrations

6.114 Predictions of background PM₁₀ concentrations on a 1km by 1km grid basis have been produced by DEFRA. These maps cover the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development is partially located in three grid squares. Data for these locations was downloaded from the DEFRA website (DEFRA, Background Mapping Data, 2024 2023) and are summarised in **Table 6.21A**.

Table 6.21A: Predicted Background Annual Mean PM₁₀ Concentrations: Proposed Development Site

NGR (M) (X,Y)	PREDICTED ANNUAL MEAN BACKGROUND 2024 2023 CONCENTRATION (MG/M3)	
	NO2	PM10
572500, 293500	5.8555	16.6328
572500, 292500	5.8757	16.3215.97
573500, 292500	6.22-5.92	16.0315.67

6.115 As shown in **Table 6.21A**, predicted background annual mean PM₁₀ concentrations are below the relevant AQO at the Site.

Meteorological Conditions

6.116 The potential for atmospheric emissions to impact at sensitive locations depends significantly on the meteorology, particularly wind direction, during release. In order to consider prevailing conditions at the Site review of historical weather data was undertaken. Records were obtained from RAF Lakenheath meteorological station. This is located at NGR: 574637, 282983, which is approximately 9.1km south of the Site. It is considered that conditions are likely to be similar over a distance of this magnitude. The information was therefore considered suitable for use in the assessment.

6.117 Meteorological data was obtained from RAF Lakenheath meteorological station over the period 1st January 2014 to 31st December 2018 (inclusive). This is summarised in **Table 6.22A**.

Table 6.22A: RAF Lakenheath Meteorological Station - Wind Frequency Data

WIND DIRECTION (°)	FREQUENCY OF WIND (%)
345 - 15	4.61
15 - 45	5.31
45 - 75	5.59
75 - 105	4.58
105 - 135	5.36
135 - 165	7.55
165 - 195	9.51
195 - 225	13.63
225 - 255	16.28
255 - 285	8.68
285 - 315	6.39
315 - 345	4.39
Sub-Total	91.87
Calms	7.34
Missing/Incomplete	0.79

6.118 As shown in **Table 6.22A**, the prevailing wind direction at the Site is from the south-west. Winds from the north and east are relatively infrequent.

6.119 All meteorological data used in the assessment was provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of meteorological data within the UK.

6.120 Reference should be made to **Figure 6.2A** for a wind rose of the meteorological data.

Sensitive Receptors

6.121 A sensitive receptor is defined as any location which may be affected by the changes in air quality as a result of the Proposed Development. These have been defined for construction and operational phase emission impacts in the following Sections.

Construction Phase Sensitive Receptors

6.122 Receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk-top study area up to 350m from the Site boundary. These are summarised in **Table 6.23A**.

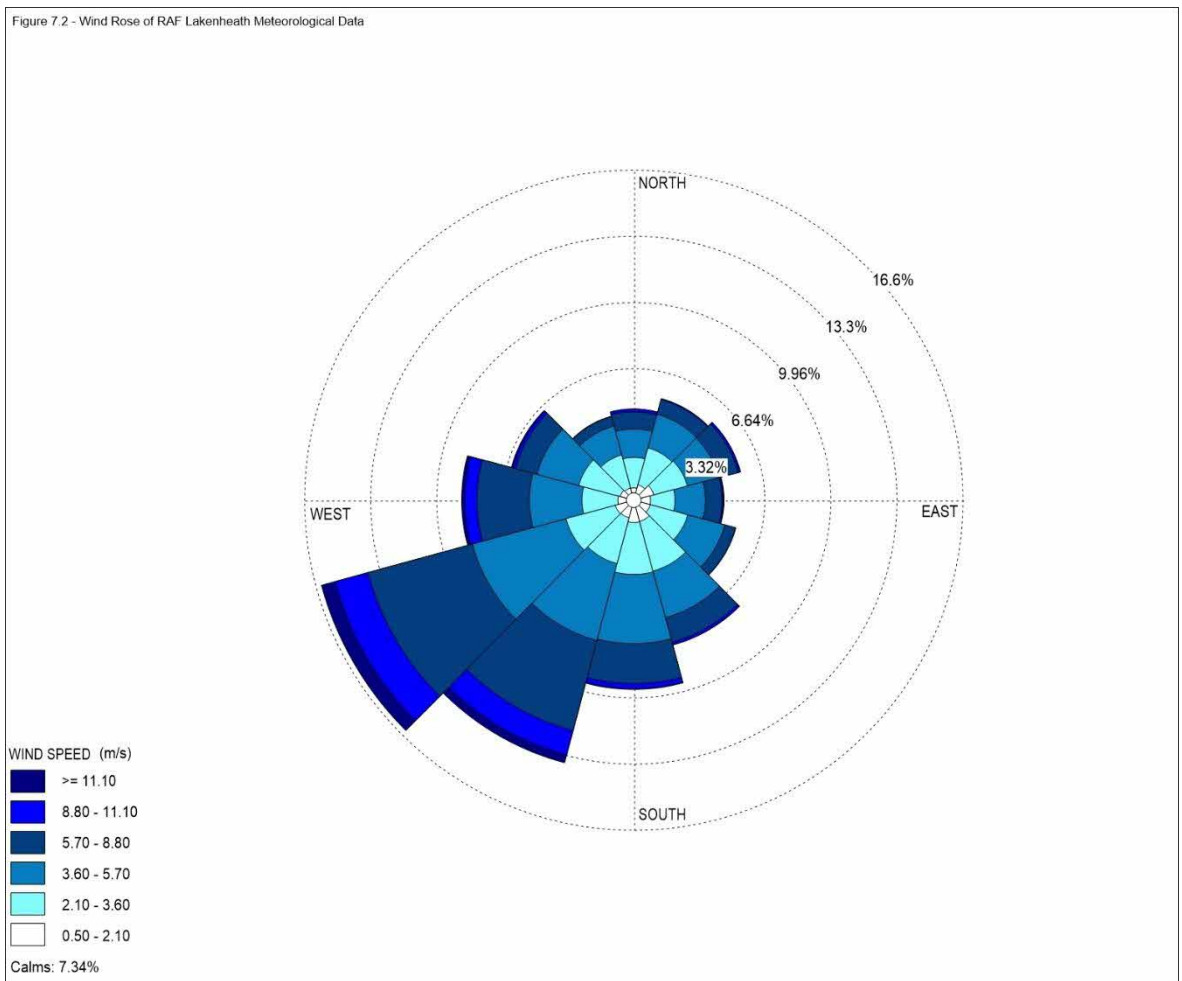


Figure 6.2A: Wind Rose of RAF Lakenheath Meteorological Data

Table 6.23A: Construction Phase Dust Emissions: Demolition, Earthworks and Construction Dust Sensitive Receptors

DISTANCE FROM SITE BOUNDARY (M)	APPROXIMATE NUMBER OF HUMAN RECEPTORS	APPROXIMATE NUMBER OF ECOLOGICAL RECEPTORS
Up to 20	1 - 10	2
Up to 50	1 - 10	2
Up to 100	10 - 100	-
Up to 350	10 - 100	-

6.123 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the Site access. These are summarised in **Table 6.24A**.

Table 6.24A: Construction Phase Dust Emissions: Trackout Dust Sensitive Receptors

DISTANCE FROM SITE ACCESS ROUTE (M)	APPROXIMATE NUMBER OF HUMAN RECEPTORS	APPROXIMATE NUMBER OF ECOLOGICAL RECEPTORS
Up to 20	1 - 10	0
Up to 50	10 - 100	0

6.124 Based on the criteria shown in **Table 6.4A**, the sensitivity of human receptors in the receiving environment to potential dust impacts is considered to be high. This was because the identified receptors included residential properties.

6.125 The ecological designations identified in **Table 6.23A** are Breckland SPA and Breckland SSSI. Based on the criteria shown in **Table 6.4A**, the sensitivity of ecological receptors to potential dust impacts is considered to be **high**, as a worst case.

6.126 The sensitivity of the receiving environment to specific construction dust emission impacts is shown in **Table 6.25A**.

Table 6.25A: Construction Phase Dust Emissions: Sensitivity of the Surrounding Area to Specific Dust Impacts

POTENTIAL IMPACT	SENSITIVITY OF THE SURROUNDING AREA			
	DEMOLITION	EARTHWORKS	CONSTRUCTION	TRACKOUT
Dust Soiling	Moderate	Moderate	Moderate	Moderate
Human Health	Low	Low	Low	Low
Ecological	High	High	High	-

Operational Phase Sensitive Receptors

Odour Emissions

6.127 Receptor locations sensitive to potential operational phase odour emission impacts were identified from a desk-top study and are summarised in **Table 6.26A**.

Table 6.26A: Operational Phase Odour Emissions: Sensitive Receptors

RECEPTOR		NGR (M)	
		X	Y
R1	Residential - Farm Access Track	573048.4	292881.4
R2	Residential - Farm Access Track	573035.6	292827.9
R3	Residential - Farm Access Track	573096.4	292851.3
R4	Residential - Farm Access Track	573080.3	292793.3
R5	Residential - Farm Access Track	573079.2	292751.3
R6	Residential - Farm Access Track	573067.9	292695.0
R7	Residential - Old Methwold Road	571948.7	291227.5
R8	Residential - Lodge Road	572283.9	291370.9
R9	Residential - Lodge Road	572738.8	291287.0
R10	Residential - Woodside Farm	573343.1	291482.9
R11	Residential - Feltwell Lodge Gate	574141.1	291945.7
R12	Residential - Lodge Road	574574.8	291924.5
R13	Residential - Brandon Road	574740.6	293056.3
R14	Residential - Brandon Road	574580.6	293121.2
R15	Residential - Brandon Road	574499.0	293217.5
R16	Residential - Brandon Road	574386.5	293357.9
R17	Residential - Dyke House	574005.9	293425.5
R18	Residential - Glebe Farm House	574098.5	293654.6
R19	Residential - Airfield Bungalow	573987.7	293976.9
R20	Residential - Brandon Road	573878.9	294291.0
R21	Residential - White Road	573444.0	294522.0
R22	Residential - Old Feltwell Road	573067.5	294383.5
R23	Residential - Bunting's Lane	572707.6	294288.2
R24	Residential - Methwold Airfield	572285.7	293481.2
R25	Residential - Hangar Bungalow	573894.8	293542.0

6.128 It should be noted that the residential dwellings included within the development proposals have not been considered as sensitive receptors in the context of the assessment as they will be occupied by farm workers ~~and are therefore unlikely to be adversely affected by odours associated with the scheme~~. As shown on the Site layout, these are positioned in close proximity to the poultry houses for operational reasons. As such, occupiers will be aware of what to expect from an odour perspective due to their job role and location of residence.

6.129 Reference should be made to **Figure 6.3A** for a map of the operational phase odour emissions sensitive receptor locations.

Dust Emissions

6.130 Receptor locations sensitive to potential operational phase dust emission impacts are summarised in **Table 6.27A**.

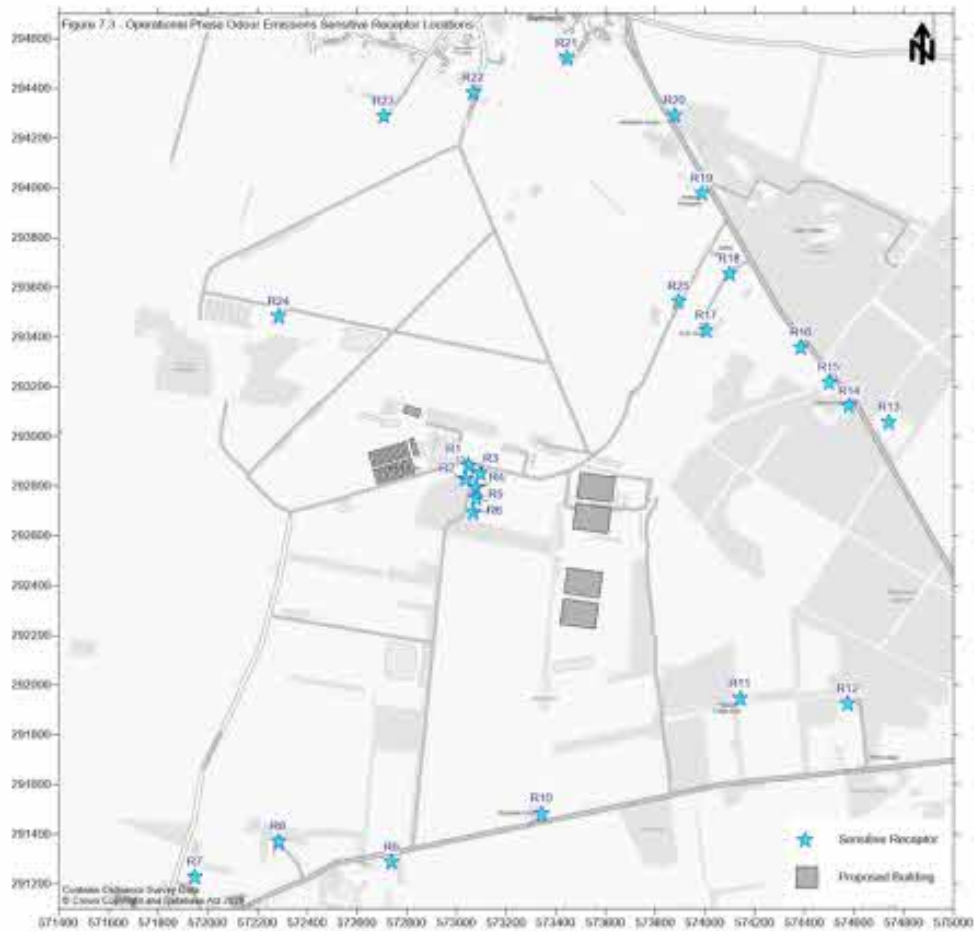


Figure 6.3A: Operational Phase Odour Emissions Sensitive Receptor Locations

Table 6.27A: Operational Phase Dust Emissions: Sensitive Receptors

RECEPTOR		NGR (M)	
		X	Y
R1	Residential - Farm Access Track	573048.4	292881.4
R2	Residential - Farm Access Track	573035.6	292827.9
R3	Residential - Farm Access Track	573096.4	292851.3
R4	Residential - Farm Access Track	573080.3	292793.3
R5	Residential - Farm Access Track	573079.2	292751.3
R6	Residential - Farm Access Track	573067.9	292695.0
R7	Residential - Old Methwold Road	571948.7	291227.5
R8	Residential - Lodge Road	572283.9	291370.9
R9	Residential - Lodge Road	572738.8	291287.0
R10	Residential - Woodside Farm	573343.1	291482.9
R11	Residential - Feltwell Lodge Gate	574141.1	291945.7
R12	Residential - Lodge Road	574574.8	291924.5
R13	Residential - Brandon Road	574740.6	293056.3

RECEPTOR		NGR (M)	
		X	Y
R14	Residential - Brandon Road	574580.6	293121.2
R15	Residential - Brandon Road	574499.0	293217.5
R16	Residential - Brandon Road	574386.5	293357.9
R17	Residential - Dyke House	574005.9	293425.5
R18	Residential - Glebe Farm House	574098.5	293654.6
R19	Residential - Airfield Bungalow	573987.7	293976.9
R20	Residential - Brandon Road	573878.9	294291.0
R21	Residential - White Road	573444.0	294522.0
R22	Residential - Old Feltwell Road	573067.5	294383.5
R23	Residential - Bunting's Lane	572707.6	294288.2
R24	Residential - Methwold Airfield	572285.7	293481.2
R25	Residential - Hangar Bungalow	573894.8	293542.0
R26	Residential - Proposed Farmworker Dwelling	573360.1	292673.6
R27	Residential - Proposed Farmworker Dwelling	573350.4	292614.8

6.131 Reference should be made to **Figure 6.4A** for a map of operational phase dust emissions sensitive receptor locations.

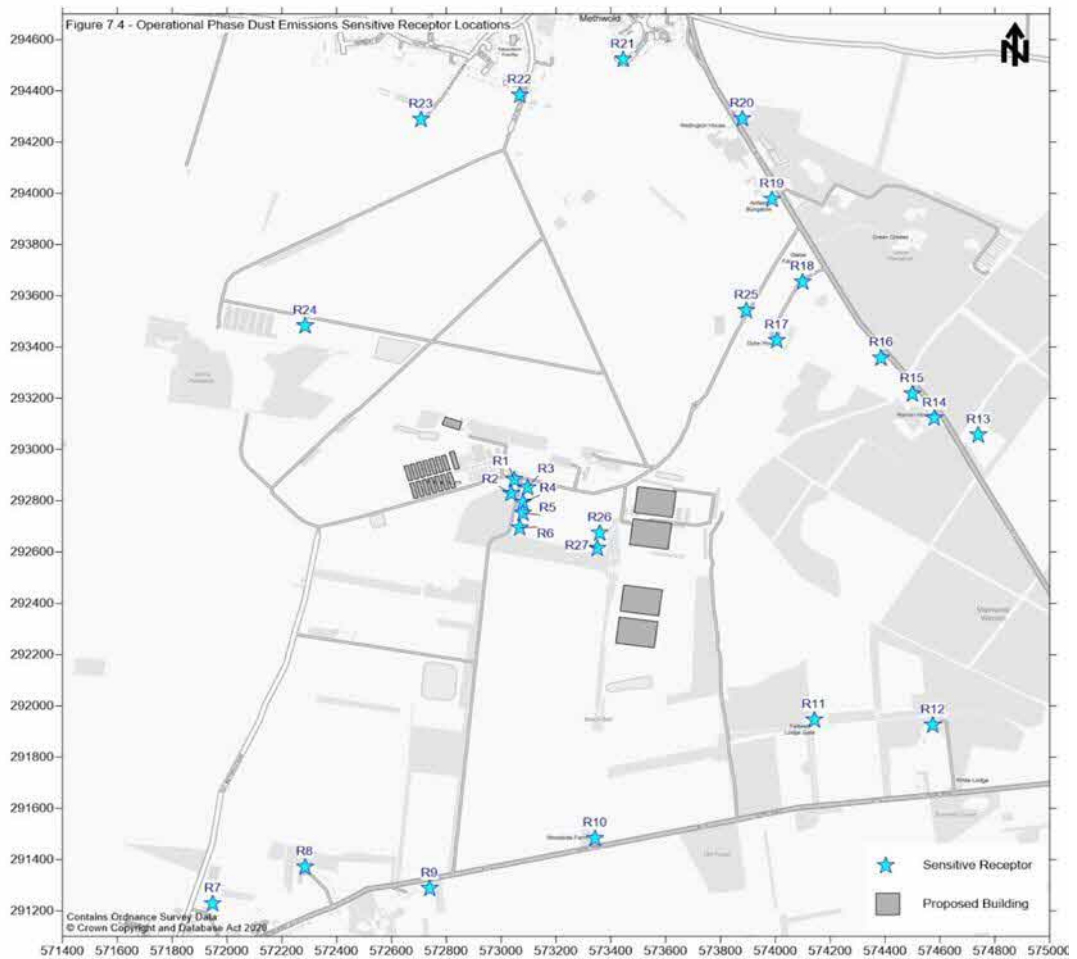


Figure 6.4A: Operational Phase Dust Emissions Sensitive Receptor Locations

6.132 Baseline annual mean PM₁₀ concentrations at each receptor were obtained from the DEFRA website (DEFRA, Background Mapping Data, 2021) and are summarised in **Table 6.28A**.

Table 6.28A: Operational Phase Dust Emissions: Baseline Annual Mean PM₁₀ Concentrations

RECEPTOR		BASELINE ANNUAL MEAN 2021-2023 PM10 CONCENTRATION (MG/M3)
R1	Residential - Farm Access Track	16.0315.67
R2	Residential - Farm Access Track	16.0315.67
R3	Residential - Farm Access Track	16.0315.67
R4	Residential - Farm Access Track	16.0315.67
R5	Residential - Farm Access Track	16.0315.67
R6	Residential - Farm Access Track	16.0315.67
R7	Residential - Old Methwold Road	15.9863
R8	Residential - Lodge Road	15.7337
R9	Residential - Lodge Road	15.7337
R10	Residential - Woodside Farm	15.6732
R11	Residential - Feltwell Lodge Gate	15.7741
R12	Residential - Lodge Road	15.7741
R13	Residential - Brandon Road	14.5015
R14	Residential - Brandon Road	14.5015
R15	Residential - Brandon Road	14.5015
R16	Residential - Brandon Road	14.5015
R17	Residential - Dyke House	14.5015
R18	Residential - Glebe Farm House	14.5015
R19	Residential - Airfield Bungalow	16.6025
R20	Residential - Brandon Road	15.4610
R21	Residential - White Road	15.4610
R22	Residential - Old Feltwell Road	15.4610
R23	Residential - Bunting's Lane	16.2115.85
R24	Residential - Methwold Airfield	16.6328
R25	Residential - Hangar Bungalow	14.5015
R26	Residential - Proposed Farmworker Dwelling	16.0315.67
R27	Residential - Proposed Farmworker Dwelling	16.0315.67

Ammonia Emissions

6.133 A consultation response prepared by NE on 27th May 2021 (NE, 2021) in relation to the proposals identified several ecological designations in the vicinity of the Site that are sensitive to potential changes in NH₃ concentrations as result of emissions associated with pig and poultry rearing operations. These are as follows:

- Breckland SAC;
- Breckland SPA;
- Breckland Farmland SSSI;
- Breckland Forest SSSI;
- Cranwich Camp SSSI;

- Foulden Common SSSI;
- Gooderstone Warren SSSI;
- Grime’s Graves SSSI;
- RAF Lakenheath SSSI;
- Stanford Training Area SSSI;
- The Brinks, Northwold SSSI;
- Wangford Warren & Carr SSSI; and,
- Weeting Heath SSSI.

6.134 Discrete receptors were identified to represent the closest points of the ecological designations to the Site to allow maximum impacts to be predicted. These are summarised in **Table 6.29A**.

Table 6.29A: Operational Phase NH₃ Emissions: Sensitive Receptors

RECEPTOR		NGR (M)	
		X	Y
E1	Breckland SAC/Wangford Warren and Carr SSSI	575402.7	284329.1
E2	Breckland SAC/Weeting Heath SSSI	575988.0	290373.6
E3	Breckland SAC/Weeting Heath SSSI	575543.9	288225.6
E4	Breckland SAC/Grime’s Graves SSSI	580506.2	290105.4
E5	Breckland SAC/Cranwich Camp SSSI	577248.3	294045.8
E6	Breckland SAC/Gooderstone Warren SSSI	578799.0	300655.3
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	574651.6	300111.6
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	575588.9	299890.8
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	576122.2	299298.7
E10	Breckland SPA/Breckland Farmland SSSI	569728.8	289872.5
E11	Breckland SPA/Breckland Farmland SSSI	572095.4	290622.5
E12	Breckland SPA/Breckland Farmland SSSI	572780.1	290627.3
E13	Breckland SPA/Breckland Farmland SSSI	573575.0	290696.8
E14	Breckland SPA/Breckland Forest SSSI	573903.8	290753.0
E15	Breckland SPA/Breckland Forest SSSI	574657.9	290912.3
E16	Breckland SPA/Breckland Forest SSSI	575327.0	291704.3
E17	Breckland SPA/Breckland Forest SSSI	573866.3	292790.0
E18	Breckland SPA/Breckland Forest SSSI	574569.8	292003.5
E19	Breckland SPA/Breckland Forest SSSI	574407.3	292317.6
E20	Breckland SPA/Breckland Forest SSSI	574060.7	292561.3
E21	Breckland SPA/Breckland Forest SSSI	574016.7	292975.4
E22	Breckland SPA/Breckland Forest SSSI	574503.8	293284.5
E23	Breckland SPA/Breckland Forest SSSI	575168.5	294465.4
E24	Breckland SPA/Breckland Forest SSSI	575142.0	295015.3
E25	Breckland SPA/Breckland Forest SSSI	578267.9	298733.6
E26	Breckland SPA/Breckland Forest SSSI	577976.9	300110.7
E27	Breckland SPA/Breckland Farmland SSSI	577329.2	300884.9
E28	Breckland SPA/Breckland Farmland SSSI	576141.5	300295.6
E29	The Brinks, Northwold SSSI	575049.7	295459.8

RECEPTOR		NGR (M)	
		X	Y
E30	Breckland SPA/Breckland Farmland SSSI	575938.9	288865.7
E31	Breckland SPA/Breckland Farmland SSSI	576279.8	290005.5
E32	Breckland SAC/Gooderstone Warren SSSI	579149.4	301187.7
E33	Breckland SAC/RAF Lakenheath SSSI	575508.6	283322.9
E34	Wangford Warren and Carr SSSI	574835.5	284647.8
E35	Didlington Park Lakes SSSI	577497.9	296118.0
E36	Stanford Training Area SSSI	582853.9	294409.0

6.135 Reference should be made to **Figure 6.5A** for a map of operational phase NH₃ emissions sensitive receptor locations.

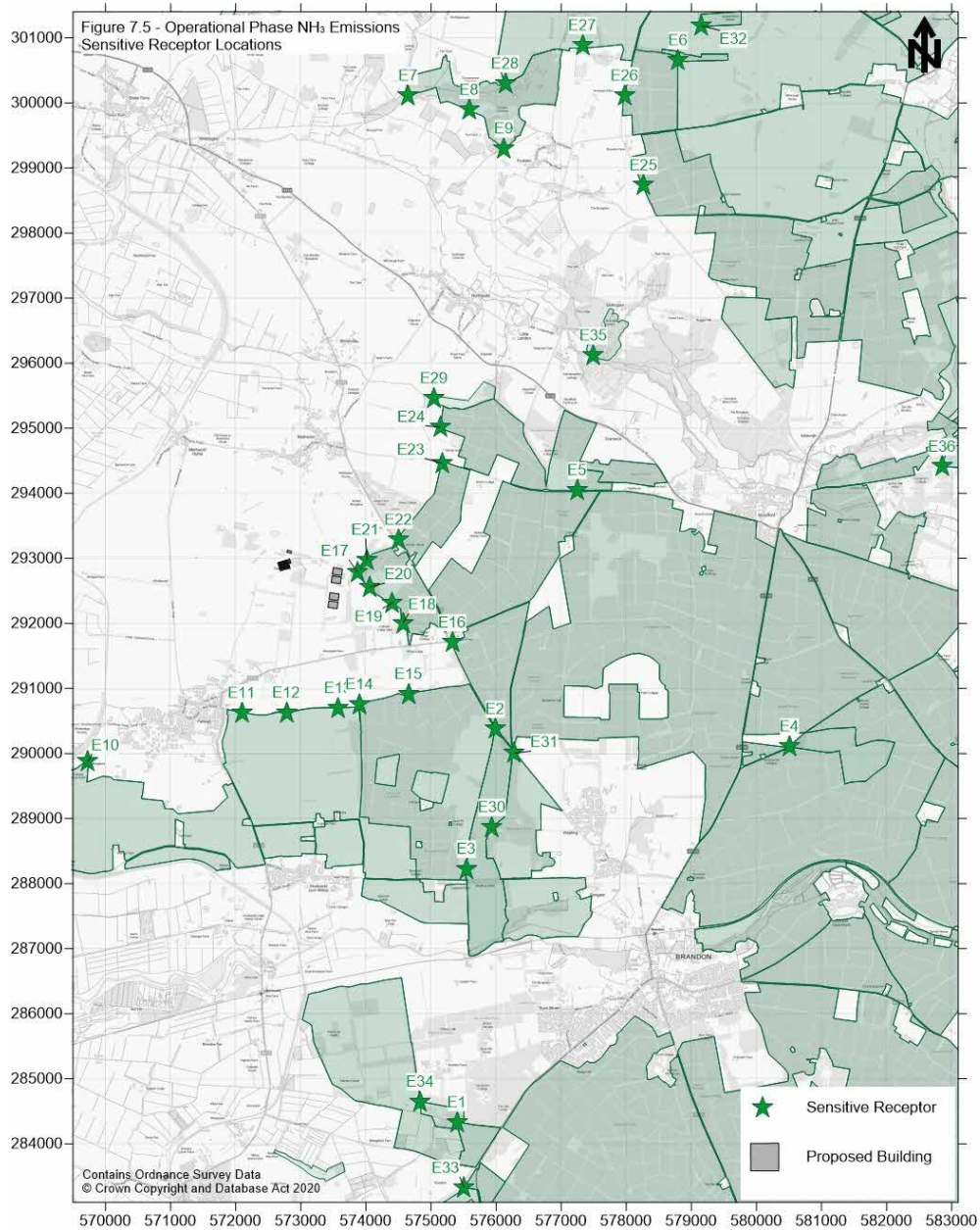


Figure 6.5A: Operational Phase NH₃ Emissions Sensitive Receptor Locations

6.136 Critical loads and levels have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the APIS website (APIS, 2021), as well as the relevant site designations and publicly available information, was undertaken in order to identify the most sensitive habitats within each designation to NH₃ emissions and nitrogen and acid deposition, as well as the associated critical levels and loads.

6.137 The relevant critical levels are summarised in **Table 6.30A**.

Table 6.30A: Operational Phase NH₃ Emissions: Critical Levels

RECEPTOR		CRITICAL LEVEL FOR NH3 (MG/M3)
E1	Breckland SAC/Wangford Warren and Carr SSSI	1
E2	Breckland SAC/Weeting Heath SSSI	1
E3	Breckland SAC/Weeting Heath SSSI	1
E4	Breckland SAC/Grime's Graves SSSI	1
E5	Breckland SAC/Cranwich Camp SSSI	1
E6	Breckland SAC/Gooderstone Warren SSSI	1
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	1
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	1
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	1
E10	Breckland SPA/Breckland Farmland SSSI	3
E11	Breckland SPA/Breckland Farmland SSSI	3
E12	Breckland SPA/Breckland Farmland SSSI	3
E13	Breckland SPA/Breckland Farmland SSSI	3
E14	Breckland SPA/Breckland Forest SSSI	3
E15	Breckland SPA/Breckland Forest SSSI	3
E16	Breckland SPA/Breckland Forest SSSI	3
E17	Breckland SPA/Breckland Forest SSSI	3
E18	Breckland SPA/Breckland Forest SSSI	3
E19	Breckland SPA/Breckland Forest SSSI	3
E20	Breckland SPA/Breckland Forest SSSI	3
E21	Breckland SPA/Breckland Forest SSSI	3
E22	Breckland SPA/Breckland Forest SSSI	3
E23	Breckland SPA/Breckland Forest SSSI	3
E24	Breckland SPA/Breckland Forest SSSI	3
E25	Breckland SPA/Breckland Forest SSSI	3
E26	Breckland SPA/Breckland Forest SSSI	3
E27	Breckland SPA/Breckland Farmland SSSI	3
E28	Breckland SPA/Breckland Farmland SSSI	3
E29	The Brinks, Northwold SSSI	3
E30	Breckland SPA/Breckland Farmland SSSI	3
E31	Breckland SPA/Breckland Farmland SSSI	3
E32	Breckland SAC/Gooderstone Warren SSSI	1
E33	Breckland SAC/RAF Lakenheath SSSI	1
E34	Wangford Warren and Carr SSSI	1
E35	Didlington Park Lakes SSSI	3
E36	Stanford Training Area SSSI	1

6.138 The relevant critical loads for nitrogen deposition are presented in **Table 6.31A**.

Table 6.31A: Operational Phase NH₃ Emissions: Critical Loads for Nitrogen Deposition

RECEPTOR		FEATURE	RELEVANT NITROGEN CRITICAL LOAD CLASS	CRITICAL LOAD (KGN/HA/YR)	
				LOW	HIGH
E1	Breckland SAC/Wangford Warren and Carr SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E2	Breckland SAC/Weeting Heath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E3	Breckland SAC/Weeting Heath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E4	Breckland SAC/Grime's Graves SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E5	Breckland SAC/Cranwich Camp SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E6	Breckland SAC/Gooderstone Warren SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	Fen, marsh and swamp (Carex rostrata - Potentilla palustris swamp)	Valley mires, poor fens and transition mires	10	15
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	Fen, marsh and swamp (Carex rostrata - Potentilla palustris swamp)	Valley mires, poor fens and transition mires	10	15
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	Fen, marsh and swamp (Carex rostrata - Potentilla palustris swamp)	Valley mires, poor fens and transition mires	10	15
E10	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E11	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E12	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E13	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E14	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15

RECEPTOR		FEATURE	RELEVANT NITROGEN CRITICAL LOAD CLASS	CRITICAL LOAD (KGN/HA/YR)	
				LOW	HIGH
E15	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E16	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E17	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E18	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E19	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E20	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E21	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E22	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E23	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E24	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E25	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E26	Breckland SPA/Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E27	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E28	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E29	The Brinks, Northwold SSSI	Calcareous grassland (Dry grassland/ scrub transitions)	Sub-atlantic semi-dry calcareous grassland	15	25
E30	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E31	Breckland SPA/Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Coniferous woodland	5	15
E32	Breckland SAC/ Gooderstone Warren SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E33	Breckland SAC/RAF Lakenheath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Inland dune pioneer grasslands	8	15
E34	Wangford Warren and Carr SSSI	Supralittoral sediment (Carex arenaria - Cornicularia aculeata dune community)	Coastal stable dune grasslands	8	15

RECEPTOR		FEATURE	RELEVANT NITROGEN CRITICAL LOAD CLASS	CRITICAL LOAD (KGN/HA/YR)	
				LOW	HIGH
E35	Didlington Park Lakes SSSI	Anas strepera - Gadwall	Standing open water and canals	-(a)	-(a)
E36	Stanford Training Area SSSI	Acid grassland (Festuca Ovina - Agrostis Capillaris - Rumex Acetosella Grassland)	Inland dune siliceous grasslands	8	15

Note: (a) No established critical load estimate available.

6.139 The relevant critical loads for acid deposition are presented in **Table 6.32A**.

Table 6.32A: Operational Phase NH₃ Emissions: Critical Loads for Acid Deposition

RECEPTOR		FEATURE	RELEVANT ACIDITY CRITICAL LOAD CLASS	ACID CRITICAL LOAD (KEQ/HA/YR)		
				CLMAXS	CLMINN	CLMAXN
E1	Breckland SAC/Wangford Warren and Carr SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E2	Breckland SAC/ Weeting Heath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E3	Breckland SAC/ Weeting Heath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E4	Breckland SAC/ Grime's Graves SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E5	Breckland SAC/ Cranwich Camp SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558

RECEPTOR		FEATURE	RELEVANT ACIDITY CRITICAL LOAD CLASS	ACID CRITICAL LOAD (KEQ/HA/YR)		
				CLMAXS	CLMINN	CLMAXN
E6	Breckland SAC/ Gooderstone Warren SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E7	Norfolk Valley Fens SAC/ Fouldon Common SSSI	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Acid grassland	0.23	0.223	0.606
E8	Norfolk Valley Fens SAC/ Fouldon Common SSSI	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Acid grassland	0.23	0.223	0.606
E9	Norfolk Valley Fens SAC/ Fouldon Common SSSI	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Acid grassland	0.23	0.223	0.606
E10	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleaved/ Coniferous Woodland	0.251	0.142	0.536
E11	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleaved/ Coniferous Woodland	0.251	0.142	0.536
E12	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleaved/ Coniferous Woodland	0.251	0.142	0.536
E13	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleaved/ Coniferous Woodland	0.251	0.142	0.536
E14	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleaved/ Coniferous Woodland	0.251	0.142	0.536

RECEPTOR		FEATURE	RELEVANT ACIDITY CRITICAL LOAD CLASS	ACID CRITICAL LOAD (KEQ/HA/YR)		
				CLMAXS	CLMINN	CLMAXN
E15	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E16	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E17	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E18	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E19	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E20	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E21	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E22	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E23	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E24	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E25	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536

RECEPTOR		FEATURE	RELEVANT ACIDITY CRITICAL LOAD CLASS	ACID CRITICAL LOAD (KEQ/HA/YR)		
				CLMAXS	CLMINN	CLMAXN
E26	Breckland SPA/ Breckland Forest SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E27	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E28	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E29	The Brinks, Northwold SSSI	Neutral grassland (Cynosurus cristatus - Centaurea nigra grassland)	Acid grassland	4.13	0.223	4.353
E30	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E31	Breckland SPA/ Breckland Farmland SSSI	Caprimulgus europaeus - European nightjar	Unmanaged Broadleafed/ Coniferous Woodland	0.251	0.142	0.536
E32	Breckland SAC/ Gooderstone Warren SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E33	Breckland SAC/ RAF Lakenheath SSSI	Inland dunes with open Corynephorus and Agrostis grasslands	Acid grassland	0.192	0.223	0.558
E34	Wangford Warren and Carr SSSI	Acid grassland (Festuca Ovina - Agrostis Capillaris - Rumex Acetosella Grassland)	Acid grassland	0.22	0.223	0.658
E35	Didlington Park Lakes SSSI	Anas strepera - Gadwall	Standing open water and canals	-(a)	-(a)	-(a)

RECEPTOR		FEATURE	RELEVANT ACIDITY CRITICAL LOAD CLASS	ACID CRITICAL LOAD (KEQ/HA/YR)		
				CLMAXS	CLMINN	CLMAXN
E36	Stanford Training Area SSSI	Neutral grassland (Cynosurus cristatus - Centaurea nigra grassland)	Acid grassland	0.23	0.223	0.668

Note: ^(a) No established critical load estimate available.

6.140 Baseline annual mean NH₃ concentrations and deposition rates at each receptor were obtained from the APIS website (APIS, [2021-2023](#)) and are summarised in **Table 6.33**.

Table 6.33: Operational Phase NH₃ Emissions: Background Pollutant Levels

RECEPTOR		ANNUAL MEAN NH ₃ CONC. (MG/M ³)	BASELINE DEPOSITION RATE		
			NITROGEN (KGN/HA/YR)	ACID (KEQ/HA/YR)	
				N	S
E1	Breckland SAC/Wangford Warren and Carr SSSI	1.29	14.60	1.00	0.10
E2	Breckland SAC/Weeting Heath SSSI	2.01	18.80	1.30	0.20
E3	Breckland SAC/Weeting Heath SSSI	1.91	18.80	1.30	0.20
E4	Breckland SAC/Grime's Graves SSSI	2.71	21.00	1.50	0.20
E5	Breckland SAC/Cranwich Camp SSSI	2.01	18.80	1.30	0.20
E6	Breckland SAC/Gooderstone Warren SSSI	3.00	23.00	1.60	0.20
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	2.28	20.30	1.50	0.20
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	2.47	20.70	1.50	0.20
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	2.47	20.70	1.50	0.20
E10	Breckland SPA/Breckland Farmland SSSI	1.88	16.90	1.20	0.10
E11	Breckland SPA/Breckland Farmland SSSI	2.88	24.20	1.70	0.20
E12	Breckland SPA/Breckland Farmland SSSI	2.88	24.20	1.70	0.20
E13	Breckland SPA/Breckland Farmland SSSI	2.88	24.20	1.70	0.20
E14	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E15	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20

RECEPTOR		ANNUAL MEAN NH ₃ CONC. (MG/M ³)	BASELINE DEPOSITION RATE		
			NITROGEN (KGN/HA/YR)	ACID (KEQ/HA/YR)	
				N	S
E16	Breckland SPA/Breckland Forest SSSI	2.01	18.80	1.30	0.20
E17	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E18	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E19	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E20	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E21	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E22	Breckland SPA/Breckland Forest SSSI	2.88	24.20	1.70	0.20
E23	Breckland SPA/Breckland Forest SSSI	2.01	18.80	1.30	0.20
E24	Breckland SPA/Breckland Forest SSSI	2.47	20.70	1.50	0.20
E25	Breckland SPA/Breckland Forest SSSI	2.47	20.70	1.50	0.20
E26	Breckland SPA/Breckland Forest SSSI	3.00	23.00	1.60	0.20
E27	Breckland SPA/Breckland Farmland SSSI	3.00	23.00	1.60	0.20
E28	Breckland SPA/Breckland Farmland SSSI	3.00	23.00	1.60	0.20
E29	The Brinks, Northwold SSSI	2.47	20.70	1.50	0.20
E30	Breckland SPA/Breckland Farmland SSSI	1.91	18.80	1.30	0.20
E31	Breckland SPA/Breckland Farmland SSSI	2.01	18.80	1.30	0.20
E32	Breckland SAC/Gooderstone Warren SSSI	3.00	23.00	1.60	0.20
E33	Breckland SAC/RAF Lakenheath SSSI	1.29	14.60	1.00	0.10
E34	Wangford Warren and Carr SSSI	2.04	17.50	1.30	0.10
E35	Didlington Park Lakes SSSI	2.47	20.70	1.50	0.20
E36	Stanford Training Area SSSI	2.71	21.00	1.50	0.20

Table 6.33A: Operational Phase NH₃ Emissions: Background Pollutant Levels

RECEPTOR		ANNUAL MEAN NH ₃ CONC. (µg/m ³)	BASELINE DEPOSITION RATE	
			NITROGEN (kgN/ha/yr)	ACID (keq/ha/yr)
E1	Breckland SAC/Wangford Warren and Carr SSSI	2.1	19.6	1.4
E2	Breckland SAC/Weeting Heath SSSI	2.5	21.6	1.6
E3	Breckland SAC/Weeting Heath SSSI	2.4	20.0	1.5
E4	Breckland SAC/Grime's Graves SSSI	2.7	22.4	1.6
E5	Breckland SAC/Cranwich Camp SSSI	2.5	21.6	1.6
E6	Breckland SAC/Gooderstone Warren SSSI	3.3	26.0	1.9

RECEPTOR		ANNUAL MEAN NH ₃ CONC. (µg/m ³)	BASELINE DEPOSITION RATE	
			NITROGEN (kgN/ha/yr)	ACID (keq/ha/yr)
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	3.1	24.2	1.7
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	2.9	23.7	1.7
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	2.9	23.7	1.7
E10	Breckland SPA/Breckland Farmland SSSI	2.3	34.2	2.5
E11	Breckland SPA/Breckland Farmland SSSI	2.5	37.2	2.7
E12	Breckland SPA/Breckland Farmland SSSI	2.5	37.2	2.7
E13	Breckland SPA/Breckland Farmland SSSI	2.5	37.2	2.7
E14	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E15	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E16	Breckland SPA/Breckland Forest SSSI	2.5	37.8	2.7
E17	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E18	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E19	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E20	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E21	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E22	Breckland SPA/Breckland Forest SSSI	2.5	37.2	2.7
E23	Breckland SPA/Breckland Forest SSSI	2.5	37.8	2.7
E24	Breckland SPA/Breckland Forest SSSI	2.9	41.7	3.0
E25	Breckland SPA/Breckland Forest SSSI	2.9	41.7	3.0
E26	Breckland SPA/Breckland Forest SSSI	3.3	45.8	3.3
E27	Breckland SPA/Breckland Farmland SSSI	3.3	45.8	3.3
E28	Breckland SPA/Breckland Farmland SSSI	3.3	45.8	3.3
E29	The Brinks, Northwold SSSI	2.9	23.7	1.7
E30	Breckland SPA/Breckland Farmland SSSI	2.4	35.4	2.6
E31	Breckland SPA/Breckland Farmland SSSI	2.5	37.8	2.7
E32	Breckland SAC/Gooderstone Warren SSSI	3.3	26.0	1.9
E33	Breckland SAC/RAF Lakenheath SSSI	2.1	19.6	1.4
E34	Wangford Warren and Carr SSSI	2.5	20.6	1.5
E35	Didlington Park Lakes SSSI	2.9	23.7	1.7
E36	Stanford Training Area SSSI	2.7	22.4	1.6

Bioaerosol Emissions

- 6.141 Receptor locations sensitive to potential operational phase bioaerosol emission impacts within 100m of the Site were identified from a desk top study. These are as follows:
- Existing residential properties situated to the south-east of the pig development; and,
 - Proposed farm worker dwellings situated within the western part of the poultry development.
- 6.142 Reference should be made to **Figure 6.6A** for a map of operational phase bioaerosol emissions sensitive receptor locations.

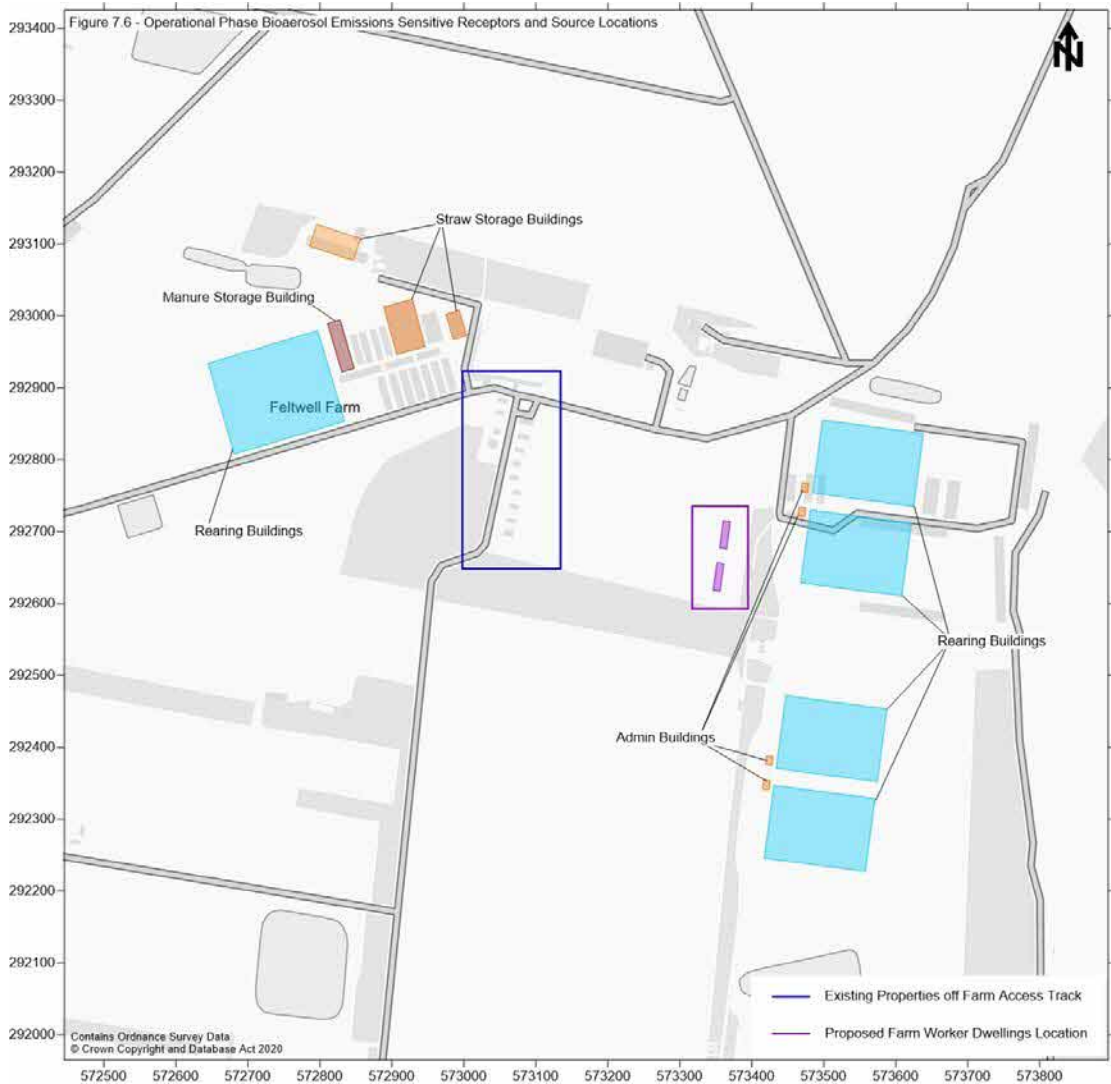


Figure 6.6A: Operational Phase Bioaerosol Emissions Sensitive Receptors and Source Locations

Road Traffic Emissions

- 6.143 Canon Consulting, the Transport Consultants for the project, confirmed vehicles travelling to and from the Site are anticipated to utilise the following road links:
- B1112, north of existing farm access track;
 - A134, south of B112/A134 roundabout;

- A11, east of the A134; and,
- A1066, east of the A134.

6.144 A desktop study indicated there are human and ecological receptors located in the vicinity of the above road links. These were therefore considered as sensitive locations in the operational phase road traffic exhaust emissions assessment.

Evolution of the Baseline Conditions without Development

6.145 It is considered unlikely that future air quality conditions will change significantly in the absence of the Proposed Development based on the rural nature of the area. As such, the data provided in the previous Section is considered to be representative of baseline conditions without the scheme in place.

Predicted Impacts

Construction Phase

6.146 The undertaking of activities such as demolition, excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions. Vehicles movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul roads and highway surfaces.

6.147 The potential for impacts at sensitive locations depends significantly on local meteorology during that undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

6.148 The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the Site boundary. As such, a detailed assessment of potential construction phase emission dust impacts was undertaken.

6.149 It should be noted that the assessment assumed that construction works at Methwold and Feltwell Farm are undertaken concurrently in order to provide a worst-case analysis of potential fugitive dust emission impacts.

Demolition

6.150 Demolition will involve clearance of existing structures. It is estimated that the total building volume to be demolished is greater than 50,000m³. In accordance with the criteria outlined in **Table 6.8A**, the magnitude of potential dust emissions from demolition is therefore **major**.

6.151 **Table 6.25A** indicates the sensitivity of the area to dust soiling impacts is **moderate**. In accordance with the criteria outlined in **Table 6.9A**, the significance of unmitigated dust soiling effects as a result of demolition activities is predicted to be **moderate adverse**.

6.152 **Table 6.25A** indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in **Table 6.9A**, the significance of unmitigated effects at human health receptors as a result of demolition activities is predicted to be **minor adverse**.

6.153 **Table 6.25A** indicates the sensitivity of the area to ecological impacts is **high**. In accordance with the criteria outlined in **Table 6.9A**, the significance of unmitigated effects at ecological receptors as a result of demolition activities is predicted to be **major adverse**.

Earthworks

- 6.154 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The Site covers an area greater than 10,000m². In accordance with the criteria outlined in **Table 6.8A**, the magnitude of potential dust emissions from earthworks is therefore **major**.
- 6.155 **Table 6.25A** indicates the sensitivity of the area to dust soiling effects is **moderate**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated dust soiling effects as a result of earthworks is predicted to be **moderate adverse**.
- 6.156 **Table 6.25A** indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated effects at human health receptors as a result of earthworks is predicted to be **minor adverse**.
- 6.157 **Table 6.25A** indicates the sensitivity of the area to ecological impacts is **high**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated effects at ecological receptors as a result of earthworks is predicted to be **major adverse**.

Construction

- 6.158 Based on initial Site layout design, the new pig and poultry buildings are anticipated to have a total volume greater than 100,000m³. In accordance with the criteria outlined in **Table 6.8A**, the magnitude of potential dust emissions from construction is therefore **major**.
- 6.159 **Table 6.25A** indicates the sensitivity of the area to dust soiling effects is **moderate**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated dust soiling effects as a result of construction activities is predicted to be **moderate adverse**.
- 6.160 **Table 6.25A** indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated effects at human health receptors as a result of construction activities is predicted to be **minor adverse**.
- 6.161 **Table 6.25A** indicates the sensitivity of the area to ecological impacts is **high**. In accordance with the criteria outlined in **Table 6.10A**, the significance of unmitigated effects at ecological receptors as a result of construction activities is predicted to be **major adverse**.

Trackout

- 6.162 Based on the Site area, it is anticipated that the unpaved road length is likely to be between 50m and 100m. In accordance with the criteria outlined in **Table 6.8A**, the magnitude of potential dust emissions from trackout is therefore **moderate**.
- 6.163 **Table 6.25A** indicates the sensitivity of the area to dust soiling effects is **moderate**. In accordance with the criteria outlined in **Table 6.11A**, the significance of unmitigated dust soiling effects as a result of trackout activities is predicted to be **minor adverse**.
- 6.164 **Table 6.25A** indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in **Table 6.11A**, the significance of unmitigated effects at human health receptors as a result of trackout activities is predicted to be **minor adverse**.

Summary of Dust Effects during Construction

- 6.165 A summary of the effect significance from each dust generating activity during the construction phase is provided in **Table 6.34A**.

Table 6.34A Construction Phase Dust Emissions: Summary of Dust Effects

POTENTIAL IMPACT	DUST EFFECT			
	DEMOLITION	EARTHWORKS	CONSTRUCTION	TRACKOUT
Dust Soiling	Moderate	Moderate	Moderate	Minor
Human Health	Minor	Minor	Minor	Minor
Ecological	Major	Major	Major	-

6.166 As indicated in **Table 6.34A**, effects associated with the dust generating activities were predicted to range between minor adverse and **major adverse**. These are considered to be short-term, temporary, reversible, direct and avoidable. Overall effects are considered to be **significant**. Mitigation has therefore been identified in **Table 6.64A**.

Operational Phase

Odour Emissions

6.167 There is the potential for odour impacts during the operational phase of the Proposed Development. Dispersion modelling was therefore undertaken with the inputs described in **Appendix 6.1A** in order to quantify the odour exposure level at sensitive receptor locations as a result of emissions from the Site. The results are outlined in the following sections.

6.168 It should be noted that the odour exposure level at each receptor is presented as a 98th %ile of 1-hour mean concentrations over the relevant assessment year in accordance with standard industry requirements. The maximum concentration across the five years of results is highlighted in bold.

Pig Rearing Operations

6.169 Predicted odour concentrations at the sensitive receptor locations as a result of emissions associated with the proposed pig rearing operations, OS1, are summarised in **Table 6.35A**.

Table 6.35A: OS1: Predicted Odour Concentrations

RECEPTOR		PREDICTED 98TH %ILE 1-HOUR MEAN ODOUR CONCENTRATION (OUE/M3)				
		2014	2015	2016	2017	2017
R1	Residential - Farm Access Track	2.15	2.33	2.27	2.61	2.37
R2	Residential - Farm Access Track	2.15	2.39	2.33	2.58	2.30
R3	Residential - Farm Access Track	1.75	1.91	1.83	2.20	1.87
R4	Residential - Farm Access Track	1.75	1.96	1.91	2.11	1.80
R5	Residential - Farm Access Track	1.61	1.83	1.94	2.07	1.83
R6	Residential - Farm Access Track	1.46	1.68	1.96	1.89	1.72
R7	Residential - Old Methwold Road	0.17	0.16	0.19	0.08	0.23
R8	Residential - Lodge Road	0.19	0.19	0.21	0.09	0.25
R9	Residential - Lodge Road	0.17	0.18	0.20	0.08	0.20
R10	Residential - Woodside Farm	0.18	0.16	0.14	0.15	0.18
R11	Residential - Feltwell Lodge Gate	0.13	0.18	0.24	0.24	0.17
R12	Residential - Lodge Road	0.10	0.13	0.17	0.19	0.13
R13	Residential - Brandon Road	0.13	0.16	0.15	0.19	0.17
R14	Residential - Brandon Road	0.15	0.18	0.18	0.21	0.19
R15	Residential - Brandon Road	0.16	0.20	0.19	0.22	0.19

RECEPTOR		PREDICTED 98TH %ILE 1-HOUR MEAN ODOUR CONCENTRATION (OUE/M3)				
		2014	2015	2016	2017	2017
R16	Residential - Brandon Road	0.19	0.23	0.22	0.27	0.22
R17	Residential - Dyke House	0.30	0.34	0.34	0.39	0.34
R18	Residential - Glebe Farm House	0.26	0.30	0.31	0.35	0.30
R19	Residential - Airfield Bungalow	0.26	0.28	0.32	0.38	0.28
R20	Residential - Brandon Road	0.23	0.26	0.27	0.30	0.24
R21	Residential - White Road	0.24	0.25	0.23	0.26	0.26
R22	Residential - Old Feltwell Road	0.32	0.31	0.32	0.35	0.34
R23	Residential - Bunting's Lane	0.40	0.33	0.38	0.43	0.40
R24	Residential - Methwold Airfield	0.85	0.76	0.90	1.00	0.94
R25	Residential - Hangar Bungalow	0.33	0.38	0.40	0.44	0.38

6.170 The effect significance of predicted odour concentrations at the sensitive receptor locations as a result of emissions associated with the proposed pig rearing operations, OS1, is summarised in **Table 6.36A**.

Table 6.36A: OS1: Predicted Odour Effects

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R2	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R3	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R4	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R5	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R6	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R7	Residential - Old Methwold Road	Less than 0.5	High	Negligible
R8	Residential - Lodge Road	Less than 0.5	High	Negligible
R9	Residential - Lodge Road	Less than 0.5	High	Negligible
R10	Residential - Woodside Farm	Less than 0.5	High	Negligible
R11	Residential - Feltwell Lodge Gate	Less than 0.5	High	Negligible
R12	Residential - Lodge Road	Less than 0.5	High	Negligible

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R13	Residential - Brandon Road	Less than 0.5	High	Negligible
R14	Residential - Brandon Road	Less than 0.5	High	Negligible
R15	Residential - Brandon Road	Less than 0.5	High	Negligible
R16	Residential - Brandon Road	Less than 0.5	High	Negligible
R17	Residential - Dyke House	Less than 0.5	High	Negligible
R18	Residential - Glebe Farm House	Less than 0.5	High	Negligible
R19	Residential - Airfield Bungalow	Less than 0.5	High	Negligible
R20	Residential - Brandon Road	Less than 0.5	High	Negligible
R21	Residential - White Road	Less than 0.5	High	Negligible
R22	Residential - Old Feltwell Road	Less than 0.5	High	Negligible
R23	Residential - Bunting's Lane	Less than 0.5	High	Negligible
R24	Residential - Methwold Airfield	0.5 - 1.5	High	Negligible
R25	Residential - Hangar Bungalow	Less than 0.5	High	Negligible

6.171 As indicated in **Table 6.36A**, odour effects as a result of emissions associated with the proposed pig rearing operations were predicted to be **minor adverse** at six receptors and **negligible** at 19 positions.

Poultry Rearing Operations

6.172 Predicted odour concentrations at the sensitive receptor locations as result of emissions associated with the proposed poultry rearing operations, OS2, are summarised in **Table 6.37A**.

Table 6.37A: OS2: Predicted Odour Concentrations

RECEPTOR		PREDICTED 98TH %ILE 1-HOUR MEAN ODOUR CONCENTRATION (OUE/M3)				
		2014	2015	2016	2017	2018
R1	Residential - Farm Access Track	1.7470	1.5554	1.7675	1.7473	1.8988
R2	Residential - Farm Access Track	1.68	1.5150	1.7069	1.6766	1.8079
R3	Residential - Farm Access Track	1.8786	1.6665	1.9089	1.9291	1.9897
R4	Residential - Farm Access Track	1.83	1.6261	1.8382	1.8685	1.9089
R5	Residential - Farm Access Track	1.8887	1.64	1.7978	1.8480	1.9089
R6	Residential - Farm Access Track	1.8584	1.6160	1.7978	1.7877	1.9089

RECEPTOR		PREDICTED 98TH %ILE 1-HOUR MEAN ODOUR CONCENTRATION (OUE/M3)				
		2014	2015	2016	2017	2018
R7	Residential - Old Methwold Road	0.4948	0.4645	0.53	0.30	0.4645
R8	Residential - Lodge Road	0.6059	0.59	0.6968	0.41	0.6261
R9	Residential - Lodge Road	0.7069	0.72	0.80	0.3635	0.82
R10	Residential - Woodside Farm	0.9291	0.94	0.9392	0.47	1.16
R11	Residential - Feltwell Lodge Gate	0.92	1.07	1.1514	1.3433	1.03
R12	Residential - Lodge Road	0.54	0.66	0.77	0.92	0.65
R13	Residential - Brandon Road	0.6362	0.7170	0.7372	0.86	0.6968
R14	Residential - Brandon Road	0.79	0.8382	0.90	1.10	0.8180
R15	Residential - Brandon Road	0.83	0.9190	0.98	1.27	0.8988
R16	Residential - Brandon Road	0.9291	0.99	1.1009	1.2928	0.98
R17	Residential - Dyke House	1.28	1.3534	1.3231	1.4443	1.3736
R18	Residential - Glebe Farm House	0.9493	0.97	0.95	1.07	0.9998
R19	Residential - Airfield Bungalow	0.83	0.78	0.78	0.94	0.88
R20	Residential - Brandon Road	0.71	0.6059	0.66	0.7069	0.69
R21	Residential - White Road	0.63	0.48	0.6160	0.66	0.60
R22	Residential - Old Feltwell Road	0.64	0.48	0.63	0.6564	0.57
R23	Residential - Bunting's Lane	0.5958	0.47	0.6059	0.75	0.60
R24	Residential - Methwold Airfield	0.6362	0.52	0.61	0.6766	0.76
R25	Residential - Hangar Bungalow	1.2928	1.29	1.2221	1.41	1.4342

6.173 The effect significance of predicted odour concentrations at the sensitive receptor locations as a result of emissions associated with the proposed poultry rearing operations, OS2, is summarised in **Table 6.38A**.

Table 6.38A: OS2: Predicted Odour Effects

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R2	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R3	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R4	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R5	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R6	Residential - Farm Access Track	1.5 - 3	High	Minor adverse

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R7	Residential - Old Methwold Road	0.5 - 1.5	High	Negligible
R8	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R9	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R10	Residential - Woodside Farm	0.5 - 1.5	High	Negligible
R11	Residential - Feltwell Lodge Gate	0.5 - 1.5	High	Negligible
R12	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R13	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R14	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R15	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R16	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R17	Residential - Dyke House	0.5 - 1.5	High	Negligible
R18	Residential - Glebe Farm House	0.5 - 1.5	High	Negligible
R19	Residential - Airfield Bungalow	0.5 - 1.5	High	Negligible
R20	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R21	Residential - White Road	0.5 - 1.5	High	Negligible
R22	Residential - Old Feltwell Road	0.5 - 1.5	High	Negligible
R23	Residential - Bunting's Lane	0.5 - 1.5	High	Negligible
R24	Residential - Methwold Airfield	0.5 - 1.5	High	Negligible
R25	Residential - Hangar Bungalow	0.5 - 1.5	High	Negligible

6.174 As indicated in **Table 6.38A**, odour effects as a result of emissions associated with the proposed poultry rearing operations were predicted to be **minor adverse** at six receptors and **negligible** at 19 positions.

Pig and Poultry Rearing Operations

6.175 Predicted odour concentrations at the sensitive receptor locations as a result of emissions associated with the proposed pig and poultry rearing operations, OS3, are summarised in **Table 6.39A**.

Table 6.39A OS3: Predicted Odour Concentrations

RECEPTOR		PREDICTED 98TH %ILE 1-HOUR MEAN ODOUR CONCENTRATION (OUE/M3)				
		2014	2015	2016	2017	2018
R1	Residential - Farm Access Track	2.39	2.51	2.52	2.72	2.60
R2	Residential - Farm Access Track	2.41	2.50	2.50	2.7271	2.52
R3	Residential - Farm Access Track	2.2322	2.30	2.33	2.44	2.37
R4	Residential - Farm Access Track	2.2423	2.25	2.3130	2.45	2.3130
R5	Residential - Farm Access Track	2.2019	2.19	2.30	2.4039	2.3231
R6	Residential - Farm Access Track	2.2322	2.08	2.24	2.2423	2.2928
R7	Residential - Old Methwold Road	0.58	0.5756	0.67	0.35	0.60
R8	Residential - Lodge Road	0.7470	0.70	0.80	0.45	0.72
R9	Residential - Lodge Road	0.79	0.77	0.84	0.43	0.8584
R10	Residential - Woodside Farm	0.9998	0.97	0.9998	0.53	1.18
R11	Residential - Feltwell Lodge Gate	1.05	1.20	1.38	1.5655	1.2524
R12	Residential - Lodge Road	0.65	0.8079	0.94	1.4413	0.77
R13	Residential - Brandon Road	0.70	0.79	0.78	0.9796	0.7877
R14	Residential - Brandon Road	0.84	0.90	1.000.99	1.24	0.9089
R15	Residential - Brandon Road	0.9089	0.9897	1.09	1.3837	0.9695
R16	Residential - Brandon Road	0.9897	1.04	1.1918	1.3332	1.04
R17	Residential - Dyke House	1.29	1.3635	1.35	1.4544	1.39
R18	Residential - Glebe Farm House	1.00	1.02	1.0201	1.09	1.03
R19	Residential - Airfield Bungalow	0.93	0.86	0.86	1.00	0.9695
R20	Residential - Brandon Road	0.7776	0.69	0.78	0.76	0.75
R21	Residential - White Road	0.71	0.60	0.7473	0.80	0.7372
R22	Residential - Old Feltwell Road	0.8281	0.6564	0.7978	0.81	0.83
R23	Residential - Bunting's Lane	0.85	0.63	0.90	1.03	0.83
R24	Residential - Methwold Airfield	1.3736	1.27	1.53	1.51	1.49
R25	Residential - Hangar Bungalow	1.3130	1.33	1.26	1.44	1.4847

6.176 The effect significance of predicted odour concentrations at the sensitive receptor locations as a result of emissions associated with the proposed pig and poultry rearing operations, OS3, is summarised in **Table 6.40A**.

Table 6.40A: OS3: Predicted Odour Effects

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	1.5 - 3	High	Minor adverse

RECEPTOR		ODOUR EXPOSURE LEVEL AS 98TH %ILE OF 1-HOUR MEANS (OUE/M3)	RECEPTOR SENSITIVITY	EFFECT SIGNIFICANCE
R2	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R3	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R4	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R5	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R6	Residential - Farm Access Track	1.5 - 3	High	Minor adverse
R7	Residential - Old Methwold Road	0.5 - 1.5	High	Negligible
R8	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R9	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R10	Residential - Woodside Farm	0.5 - 1.5	High	Negligible
R11	Residential - Feltwell Lodge Gate	1.5 - 3	High	Minor adverse
R12	Residential - Lodge Road	0.5 - 1.5	High	Negligible
R13	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R14	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R15	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R16	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R17	Residential - Dyke House	0.5 - 1.5	High	Negligible
R18	Residential - Glebe Farm House	0.5 - 1.5	High	Negligible
R19	Residential - Airfield Bungalow	0.5 - 1.5	High	Negligible
R20	Residential - Brandon Road	0.5 - 1.5	High	Negligible
R21	Residential - White Road	0.5 - 1.5	High	Negligible
R22	Residential - Old Feltwell Road	0.5 - 1.5	High	Negligible
R23	Residential - Bunting's Lane	0.5 - 1.5	High	Negligible
R24	Residential - Methwold Airfield	1.5 - 3	High	Minor adverse
R25	Residential - Hangar Bungalow	0.5 - 1.5	High	Negligible

6.177 As indicated in **Table 6.40A**, odour effects as a result of emissions associated with the proposed pig and poultry rearing operations were predicted to be **minor adverse** at eight receptors and **negligible** at 17 positions.

Summary

6.178 Effects associated with operational phase odour emission impacts were predicted to range between **negligible** and **minor adverse**. These are considered to be long-term, permanent, irreversible, direct and unavoidable.

6.179

Reference should be made to **Figure 6.7A** for a graphical representation of predicted odour concentrations throughout the assessment extents as result of emissions from the Proposed Development. These are predictions from 2017 meteorological data, which resulted in maximum odour impacts at receptors.

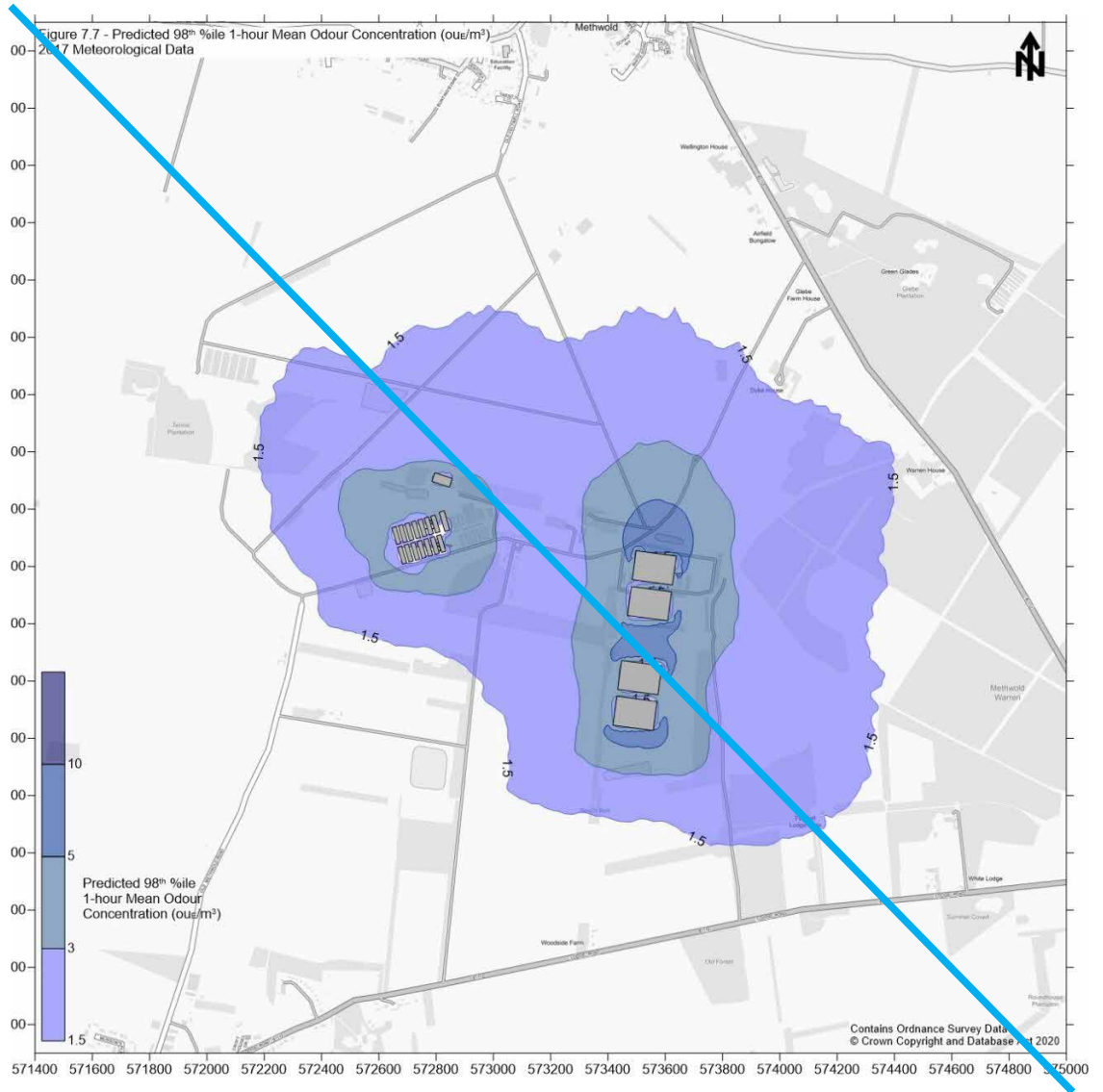


Figure 6.7: Predicted 98th %ile 1-Hour Mean Odour Concentration (OUe/m³) 2017 Meteorological Data

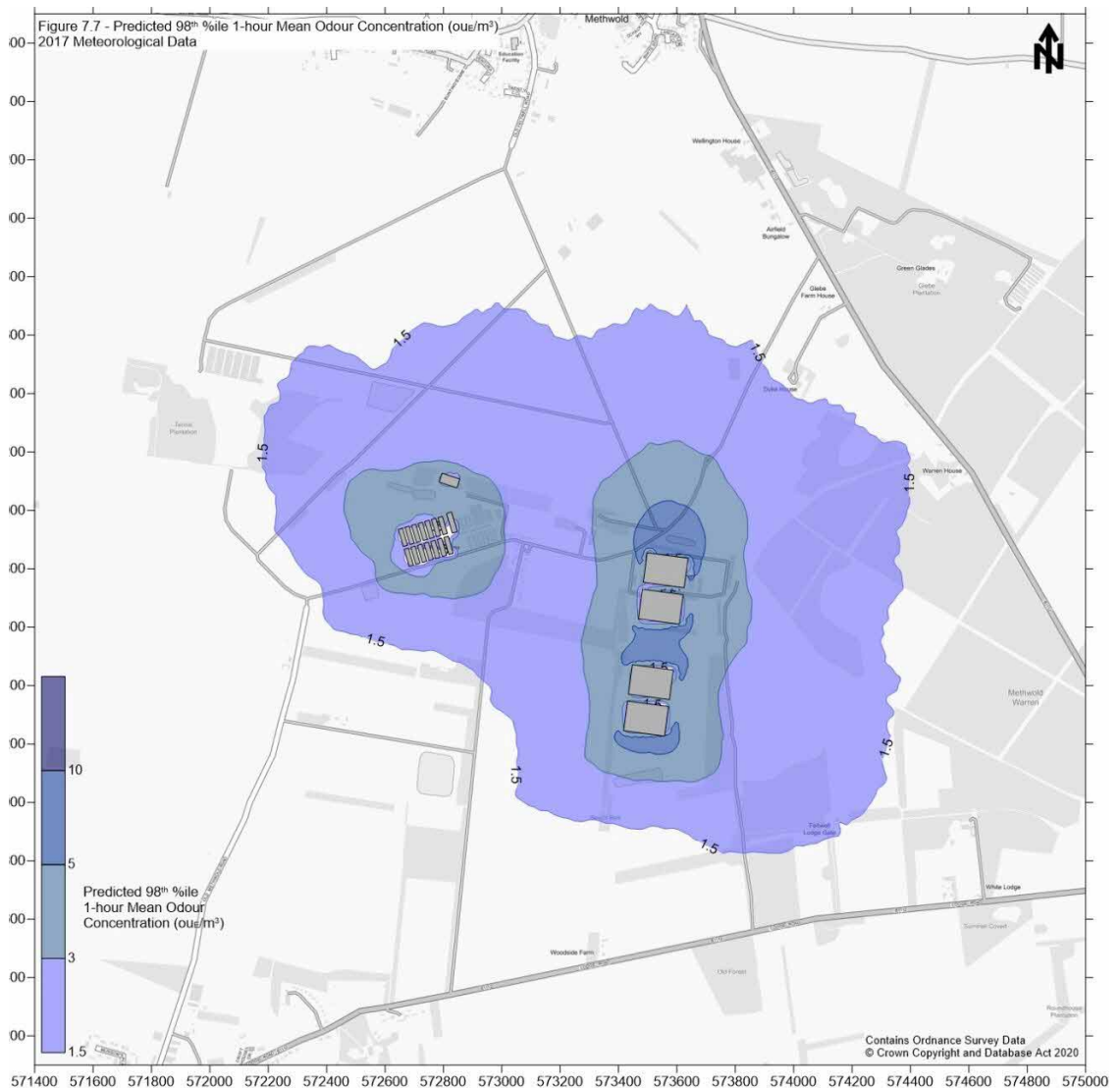


Figure 6.7A: Predicted 98th %ile 1-Hour Mean Odour Concentration (OUE/m³) 2017 Meteorological Data

Dust Emissions

6.180 There is the potential for dust impacts during the operational phase of the Proposed Development. Dispersion modelling was therefore undertaken with the inputs described in **Appendix 6.1A** in order to quantify changes in PM₁₀ concentrations at sensitive receptor locations as a result of emissions from the Site. The results are outlined in the following Sections.

6.181 It should be noted that the assessment is based on the maximum predicted impact from five years of meteorological data to ensure a worst case analysis.

Pig Rearing Operations

6.182 Predicted annual mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS2 scenarios are summarised in **Table 6.41A**.

Table 6.41A: Pig Rearing Operations: Predicted Concentrations - Annual Mean PM₁₀

RECEPTOR		PREDICTED ANNUAL MEAN PM10 CONCENTRATIONS (MG/M3)		
		DS1	DS2	CHANGE
R1	Residential - Farm Access Track	16.0315.67	16.4711	0.44
R2	Residential - Farm Access Track	16.0315.67	16.7107	0.68 40
R3	Residential - Farm Access Track	16.0315.67	16.7100	0.6833
R4	Residential - Farm Access Track	16.0315.67	16.6815.97	0.6530
R5	Residential - Farm Access Track	16.0315.67	16.6715.94	0.6427
R6	Residential - Farm Access Track	16.0315.67	16.6415.91	0.6024
R7	Residential - Old Methwold Road	15.9863	16.1015.65	0.1202
R8	Residential - Lodge Road	15.7337	15.8740	0.1503
R9	Residential - Lodge Road	15.7337	15.8839	0.1502
R10	Residential - Woodside Farm	15.6732	15.8434	0.1702
R11	Residential - Feltwell Lodge Gate	15.7741	16.0415.44	0.2703
R12	Residential - Lodge Road	15.7741	15.9444	0.1702
R13	Residential - Brandon Road	14.5015	14.7717	0.2703
R14	Residential - Brandon Road	14.5015	14.8518	0.3403
R15	Residential - Brandon Road	14.5015	14.8918	0.3903
R16	Residential - Brandon Road	14.5015	14.9319	0.4304
R17	Residential - Dyke House	14.5015	15.0414.21	0.5406
R18	Residential - Glebe Farm House	14.5015	14.8821	0.3806
R19	Residential - Airfield Bungalow	16.6025	16.8631	0.2506
R20	Residential - Brandon Road	15.4610	15.6515	0.1904
R21	Residential - White Road	15.4610	15.6114	0.1403
R22	Residential - Old Feltwell Road	15.4610	15.6115	0.1404
R23	Residential - Bunting's Lane	16.2115.85	16.3515.90	0.1405
R24	Residential - Methwold Airfield	16.6328	16.8138	0.1810
R25	Residential - Hangar Bungalow	14.5015	14.9422	0.4408
R26	Residential - Proposed Farmworker Dwelling	16.03-	17.4415.79	1.41-
R27	Residential - Proposed Farmworker Dwelling	16.03-	17.4615.78	1.43-

6.183 As indicated in **Table 6.41A**, predicted annual mean PM₁₀ concentrations were well below the AQO of 40µg/m³ at all sensitive receptors in both scenarios.

6.184 Predicted effects on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.42A**.

Table 6.42A :Pig Rearing Operations: Predicted Effects - Annual Mean PM₁₀

RECEPTOR	IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE	
R1	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R2	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R3	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R4	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R5	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R6	Residential - Farm Access Track	Very Minor	Very Low	Negligible

RECEPTOR		IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE
R7	Residential - Old Methwold Road	Negligible	Very Low	Negligible
R8	Residential - Lodge Road	Negligible	Very Low	Negligible
R9	Residential - Lodge Road	Negligible	Very Low	Negligible
R10	Residential - Woodside Farm	Negligible	Very Low	Negligible
R11	Residential - Feltwell Lodge Gate	Negligible Very-Minor	Very Low	Negligible
R12	Residential - Lodge Road	Negligible	Very Low	Negligible
R13	Residential - Brandon Road	Negligible Very-Minor	Very Low	Negligible
R14	Residential - Brandon Road	Negligible Very-Minor	Very Low	Negligible
R15	Residential - Brandon Road	Negligible Very-Minor	Very Low	Negligible
R16	Residential - Brandon Road	Negligible Very-Minor	Very Low	Negligible
R17	Residential - Dyke House	Negligible Very-Minor	Very Low	Negligible
R18	Residential - Glebe Farm House	Negligible Very-Minor	Very Low	Negligible
R19	Residential - Airfield Bungalow	Negligible Very-Minor	Very Low	Negligible
R20	Residential - Brandon Road	Negligible	Very Low	Negligible
R21	Residential - White Road	Negligible	Very Low	Negligible
R22	Residential - Old Feltwell Road	Negligible	Very Low	Negligible
R23	Residential - Bunting's Lane	Negligible	Very Low	Negligible
R24	Residential - Methwold Airfield	Negligible	Very Low	Negligible
R25	Residential - Hangar Bungalow	Negligible Very-Minor	Very Low	Negligible
R26	Residential - Proposed Farmworker Dwelling	Minor	Very Low	Negligible
R27	Residential - Proposed Farmworker Dwelling	Minor	Very Low	Negligible

- 6.185 As indicated in **Table 6.42A**, effects on annual mean PM₁₀ concentrations as a result of emissions associated with the proposed pig rearing operations were predicted to be **negligible** at all sensitive receptors.
- 6.186 Predicted 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS2 scenarios are summarised in **Table 6.43A**.

Table 6.43A: Pig Rearing Operations: Predicted Concentrations - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR DS1		PREDICTED 90.4TH%ILE 24-HOUR MEAN PM10 CONCENTRATIONS (MG/ M ³) (µg/m ³)		
		DS1	DS2	CHANGE
R1	Residential - Farm Access Track	32.0631.35	33.2532.54	1.19
R2	Residential - Farm Access Track	32.0631.35	33.32.61	1.26
R3	Residential - Farm Access Track	32.0631.35	33.0032.29	0.94
R4	Residential - Farm Access Track	32.0631.35	33.0732.36	1.01
R5	Residential - Farm Access Track	32.0631.35	32.9928	0.93
R6	Residential - Farm Access Track	32.0631.35	32.9927	0.93
R7	Residential - Old Methwold Road	31.9726	32.0631.36	0.10
R8	Residential - Lodge Road	31.4630.75	31.5930.88	0.13
R9	Residential - Lodge Road	31.4630.75	31.5430.83	0.08
R10	Residential - Woodside Farm	31.3430.64	31.4130.71	0.07
R11	Residential - Feltwell Lodge Gate	31.5430.83	31.6530.94	0.11
R12	Residential - Lodge Road	31.5430.83	31.6230.91	0.08
R13	Residential - Brandon Road	28.29.00	29.0828.37	0.08
R14	Residential - Brandon Road	28.29.00	29.0928.38	0.09
R15	Residential - Brandon Road	28.29.00	29.1028.39	0.09
R16	Residential - Brandon Road	28.29.00	29.1128.40	0.11
R17	Residential - Dyke House	28.29.00	29.1628.45	0.16
R18	Residential - Glebe Farm House	28.29.00	29.1628.45	0.16
R19	Residential - Airfield Bungalow	33.2132.50	33.3732.66	0.16
R20	Residential - Brandon Road	30.9321	31.0530.33	0.12
R21	Residential - White Road	30.9321	30.31.03	0.10
R22	Residential - Old Feltwell Road	30.9321	31.0830.36	0.15
R23	Residential - Bunting's Lane	32.4131.70	32.5731.86	0.16
R24	Residential - Methwold Airfield	33.2732.56	33.6632.95	0.39
R25	Residential - Hangar Bungalow	28.29.00	29.2028.49	0.19
R26	Residential - Proposed Farmworker Dwelling	32.06-	32.4431.73	0.38
R27	Residential - Proposed Farmworker Dwelling	32.06-	32.4631.74	0.40

6.187 As indicated in **Table 6.43A** predicted 90.4th%ile 24-hour mean PM₁₀ concentrations were below the AQO of 50µg/m³ at all sensitive receptors in both scenarios.

6.188 Predicted effects on 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.44A**.

Table 6.44A: Pig Rearing Operations: Predicted Effects - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR		IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	Negligible	Negligible
R2	Residential - Farm Access Track	Negligible	Negligible
R3	Residential - Farm Access Track	Negligible	Negligible
R4	Residential - Farm Access Track	Negligible	Negligible

RECEPTOR		IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
R5	Residential - Farm Access Track	Negligible	Negligible
R6	Residential - Farm Access Track	Negligible	Negligible
R7	Residential - Old Methwold Road	Negligible	Negligible
R8	Residential - Lodge Road	Negligible	Negligible
R9	Residential - Lodge Road	Negligible	Negligible
R10	Residential - Woodside Farm	Negligible	Negligible
R11	Residential - Feltwell Lodge Gate	Negligible	Negligible
R12	Residential - Lodge Road	Negligible	Negligible
R13	Residential - Brandon Road	Negligible	Negligible
R14	Residential - Brandon Road	Negligible	Negligible
R15	Residential - Brandon Road	Negligible	Negligible
R16	Residential - Brandon Road	Negligible	Negligible
R17	Residential - Dyke House	Negligible	Negligible
R18	Residential - Glebe Farm House	Negligible	Negligible
R19	Residential - Airfield Bungalow	Negligible	Negligible
R20	Residential - Brandon Road	Negligible	Negligible
R21	Residential - White Road	Negligible	Negligible
R22	Residential - Old Feltwell Road	Negligible	Negligible
R23	Residential - Bunting's Lane	Negligible	Negligible
R24	Residential - Methwold Airfield	Negligible	Negligible
R25	Residential - Hangar Bungalow	Negligible	Negligible
R26	Residential - Proposed Farmworker Dwelling	Negligible	Negligible
R27	Residential - Proposed Farmworker Dwelling	Negligible	Negligible

6.189 As indicated in **Table 6.44A**, effects on 90.4th %ile 24-hour mean PM₁₀ concentrations as a result of emissions associated with the proposed pig rearing operations were predicted to be negligible at all receptor locations.

Poultry Rearing Operations

6.190 Predicted annual mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS3 scenarios are summarised in **Table 6.45A**.

Table 6.45A: Poultry Rearing Operations: Predicted Concentrations - Annual Mean PM₁₀

RECEPTOR		PREDICTED ANNUAL MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m ³)		
		DS1	DS3	CHANGE
R1	Residential - Farm Access Track	16.0315.67	16.5915	0.5648
R2	Residential - Farm Access Track	16.0315.67	16.5815	0.5547
R3	Residential - Farm Access Track	16.0315.67	16.6722	0.6454
R4	Residential - Farm Access Track	16.0315.67	16.6521	0.6253
R5	Residential - Farm Access Track	16.0315.67	16.6722	0.6354
R6	Residential - Farm Access Track	16.0315.67	16.6722	0.6354
R7	Residential - Old Methwold Road	15.9863	16.1015.73	0.4110

RECEPTOR		PREDICTED ANNUAL MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m³)		
		DS1	DS3	CHANGE
R8	Residential - Lodge Road	15.7337	15.8750	0.1412
R9	Residential - Lodge Road	15.7337	15.9952	0.1715
R10	Residential - Woodside Farm	15.6732	15.9253	0.2521
R11	Residential - Feltwell Lodge Gate	15.7741	16.1015.70	0.3328
R12	Residential - Lodge Road	15.7741	15.9960	0.2219
R13	Residential - Brandon Road	14.5015	14.8342	0.3328
R14	Residential - Brandon Road	14.5015	14.9150	0.4135
R15	Residential - Brandon Road	14.5015	14.9654	0.4639
R16	Residential - Brandon Road	14.5015	14.9755	0.4740
R17	Residential - Dyke House	14.5015	14.9956	0.4942
R18	Residential - Glebe Farm House	14.5015	14.8343	0.3328
R19	Residential - Airfield Bungalow	16.6025	16.8244	0.2219
R20	Residential - Brandon Road	15.4610	15.6426	0.1815
R21	Residential - White Road	15.4610	15.6224	0.1613
R22	Residential - Old Feltwell Road	15.4610	15.6324	0.1614
R23	Residential - Bunting's Lane	16.2115.85	16.3615.98	0.1513
R24	Residential - Methwold Airfield	16.6328	16.8043	0.1714
R25	Residential - Hangar Bungalow	14.5015	14.8847	0.3833
R26	Residential - Proposed Farmworker Dwelling	-	17.8926	-
R27	Residential - Proposed Farmworker Dwelling	-	17.9228	-

6.191 As indicated in **Table 6.45A**, predicted annual mean PM₁₀ concentrations were well below the AQO of 40µg/m³ at all sensitive receptors in both scenarios.

6.192 Predicted effects on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.46A**.

Table 6.46A: Poultry Rearing Operations: Predicted Effects - Annual Mean PM₁₀

RECEPTOR		IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R2	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R3	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R4	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R5	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R6	Residential - Farm Access Track	Very Minor	Very Low	Negligible
R7	Residential - Old Methwold Road	Negligible	Very Low	Negligible
R8	Residential - Lodge Road	Negligible	Very Low	Negligible
R9	Residential - Lodge Road	Negligible	Very Low	Negligible
R10	Residential - Woodside Farm	Very Minor	Very Low	Negligible
R11	Residential - Feltwell Lodge Gate	Very Minor	Very Low	Negligible
R12	Residential - Lodge Road	Very Minor Negligible	Very Low	Negligible

RECEPTOR		IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE
R13	Residential - Brandon Road	Very Minor	Very Low	Negligible
R14	Residential - Brandon Road	Very Minor	Very Low	Negligible
R15	Residential - Brandon Road	Very Minor	Very Low	Negligible
R16	Residential - Brandon Road	Very Minor	Very Low	Negligible
R17	Residential - Dyke House	Very Minor	Very Low	Negligible
R18	Residential - Glebe Farm House	Very Minor	Very Low	Negligible
R19	Residential - Airfield Bungalow	Very Minor Negligible	Very Low	Negligible
R20	Residential - Brandon Road	Negligible	Very Low	Negligible
R21	Residential - White Road	Negligible	Very Low	Negligible
R22	Residential - Old Feltwell Road	Negligible	Very Low	Negligible
R23	Residential - Bunting's Lane	Negligible	Very Low	Negligible
R24	Residential - Methwold Airfield	Negligible	Very Low	Negligible
R25	Residential - Hangar Bungalow	Very Minor	Very Low	Negligible

6.193 As indicated in **Table 6.46A**, effects on annual mean PM₁₀ concentrations as a result of emissions associated with the proposed poultry rearing operations were predicted to be negligible at all sensitive receptors.

6.194 Predicted 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS3 scenarios are summarised in **Table 6.47A**.

Table 6.47A: Poultry Rearing Operations: Predicted Concentrations - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR		PREDICTED 90.4TH%ILE 24-HOUR MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m³)		
		DS1	DS3	CHANGE
R1	Residential - Farm Access Track	32.0631.35	34.1833.15	2.111.81
R2	Residential - Farm Access Track	32.0631.35	34.1533.13	2.091.78
R3	Residential - Farm Access Track	32.0631.35	34.4733.40	2.4106
R4	Residential - Farm Access Track	32.0631.35	34.33.28	2.261.93
R5	Residential - Farm Access Track	32.0631.35	34.2533.22	2.191.87
R6	Residential - Farm Access Track	32.0631.35	34.2133.19	2.151.84
R7	Residential - Old Methwold Road	31.9726	32.4631.68	0.4942
R8	Residential - Lodge Road	31.4630.75	32.0731.28	0.6253
R9	Residential - Lodge Road	31.4630.75	32.2031.38	0.7463
R10	Residential - Woodside Farm	31.3430.64	32.5731.69	1.2305
R11	Residential - Feltwell Lodge Gate	31.5430.83	32.9100	1.3717
R12	Residential - Lodge Road	31.5430.83	32.3931.55	0.8573
R13	Residential - Brandon Road	28.29.00	29.8703	0.8674
R14	Residential - Brandon Road	28.29.00	30.0629.19	1.050.90
R15	Residential - Brandon Road	28.29.00	30.1429.26	1.140.97
R16	Residential - Brandon Road	28.29.00	30.2329.34	1.2305
R17	Residential - Dyke House	28.29.00	30.3929.48	1.3918

RECEPTOR		PREDICTED 90.4TH%ILE 24-HOUR MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m ³)		
		DS1	DS3	CHANGE
R18	Residential - Glebe Farm House	28.2900	29.9410	0.9480
R19	Residential - Airfield Bungalow	33.2132.50	33.9514	0.7463
R20	Residential - Brandon Road	30.9321	31.5430.73	0.6152
R21	Residential - White Road	30.9321	31.4830.68	0.5547
R22	Residential - Old Feltwell Road	30.9321	31.5130.70	0.5849
R23	Residential - Bunting's Lane	32.4131.70	32.9920	0.5849
R24	Residential - Methwold Airfield	33.2732.56	33.9615	0.6959
R25	Residential - Hangar Bungalow	28.2900	30.1929.31	1.4901
R26	Residential - Proposed Farmworker Dwelling	-	37.1235.66	-
R27	Residential - Proposed Farmworker Dwelling	-	37.1535.69	-

6.195 As indicated in **Table 6.47A**, predicted 90.4th%ile 24-hour mean PM₁₀ concentrations were below the AQO of 50µg/m³ at all sensitive receptors in both scenarios.

6.196 Predicted effects on 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.48A**.

Table 6.48A: Poultry Rearing Operations: Predicted Effects - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR		IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	Negligible	Negligible
R2	Residential - Farm Access Track	Negligible	Negligible
R3	Residential - Farm Access Track	Negligible	Negligible
R4	Residential - Farm Access Track	Negligible	Negligible
R5	Residential - Farm Access Track	Negligible	Negligible
R6	Residential - Farm Access Track	Negligible	Negligible
R7	Residential - Old Methwold Road	Negligible	Negligible
R8	Residential - Lodge Road	Negligible	Negligible
R9	Residential - Lodge Road	Negligible	Negligible
R10	Residential - Woodside Farm	Negligible	Negligible
R11	Residential - Feltwell Lodge Gate	Negligible	Negligible
R12	Residential - Lodge Road	Negligible	Negligible
R13	Residential - Brandon Road	Negligible	Negligible
R14	Residential - Brandon Road	Negligible	Negligible
R15	Residential - Brandon Road	Negligible	Negligible
R16	Residential - Brandon Road	Negligible	Negligible
R17	Residential - Dyke House	Negligible	Negligible
R18	Residential - Glebe Farm House	Negligible	Negligible
R19	Residential - Airfield Bungalow	Negligible	Negligible
R20	Residential - Brandon Road	Negligible	Negligible

RECEPTOR		IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
R21	Residential - White Road	Negligible	Negligible
R22	Residential - Old Feltwell Road	Negligible	Negligible
R23	Residential - Bunting's Lane	Negligible	Negligible
R24	Residential - Methwold Airfield	Negligible	Negligible
R25	Residential - Hangar Bungalow	Negligible	Negligible

6.197 As indicated in **Table 6.48A**, effects on 90.4th %ile 24-hour mean PM₁₀ concentrations as a result of emissions associated with the proposed poultry rearing operations were predicted to be negligible at all receptor locations.

Pig and Poultry Rearing Operations

6.198 Predicted annual mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS4 scenarios are summarised in **Table 6.49A**.

Table 6.49A: Pig and Poultry Rearing Operations: Predicted Concentrations - Annual Mean PM₁₀

RECEPTOR		PREDICTED ANNUAL MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m³)		
		DS1	DS4	CHANGE
R1	Residential - Farm Access Track	16.0315.67	16.9452	0.9184
R2	Residential - Farm Access Track	16.0315.67	16.8946	0.8679
R3	Residential - Farm Access Track	16.0315.67	16.9046	0.8779
R4	Residential - Farm Access Track	16.0315.67	16.8742	0.8475
R5	Residential - Farm Access Track	16.0315.67	16.8641	0.8374
R6	Residential - Farm Access Track	16.0315.67	16.8439	0.8172
R7	Residential - Old Methwold Road	15.9863	16.1115.74	0.1311
R8	Residential - Lodge Road	15.7337	15.8952	0.1614
R9	Residential - Lodge Road	15.7337	15.9254	0.1917
R10	Residential - Woodside Farm	15.6732	15.9355	0.2623
R11	Residential - Feltwell Lodge Gate	15.7741	16.1315.73	0.3631
R12	Residential - Lodge Road	15.7741	16.0115.63	0.2421
R13	Residential - Brandon Road	14.5015	14.8545	0.3530
R14	Residential - Brandon Road	14.5015	14.9453	0.4438
R15	Residential - Brandon Road	14.5015	14.9957	0.4942
R16	Residential - Brandon Road	14.5015	15.0114.59	0.5144
R17	Residential - Dyke House	14.5015	15.0414.61	0.5447
R18	Residential - Glebe Farm House	14.5015	14.8848	0.3833
R19	Residential - Airfield Bungalow	16.6025	16.8749	0.2724
R20	Residential - Brandon Road	15.4610	15.6829	0.2119
R21	Residential - White Road	15.4610	15.6527	0.1917
R22	Residential - Old Feltwell Road	15.4610	15.6728	0.2018
R23	Residential - Bunting's Lane	16.2115.85	16.4103	0.2018
R24	Residential - Methwold Airfield	16.6328	16.9052	0.2724

RECEPTOR		PREDICTED ANNUAL MEAN PM10 CONCENTRATIONS (MG/M3) (µg/m ³)		
		DS1	DS4	CHANGE
R25	Residential - Hangar Bungalow	16.03 14.15	16.48 14.54	0.4539
R26	Residential - Proposed Farmworker Dwelling	16.03	17.9633	1.92
R27	Residential - Proposed Farmworker Dwelling	16.03	17.9936	1.96

6.199 As indicated in **Table 6.49A**, predicted annual mean PM₁₀ concentrations were well below the AQO of 40µg/m³ at all sensitive receptors in both scenarios.

6.200 Predicted effects on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.50A**.

Table 6.50A: Pig and Poultry Rearing Operations: Predicted Effects - Annual Mean PM₁₀

RECEPTOR		IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	Minor	Very Low	Negligible
R2	Residential - Farm Access Track	Minor	Very Low	Negligible
R3	Residential - Farm Access Track	Minor	Very Low	Negligible
R4	Residential - Farm Access Track	Minor	Very Low	Negligible
R5	Residential - Farm Access Track	Minor	Very Low	Negligible
R6	Residential - Farm Access Track	Minor	Very Low	Negligible
R7	Residential - Old Methwold Road	Negligible	Very Low	Negligible
R8	Residential - Lodge Road	Negligible	Very Low	Negligible
R9	Residential - Lodge Road	Negligible	Very Low	Negligible
R10	Residential - Woodside Farm	Very Minor	Very Low	Negligible
R11	Residential - Feltwell Lodge Gate	Very Minor	Very Low	Negligible
R12	Residential - Lodge Road	Very Minor	Very Low	Negligible
R13	Residential - Brandon Road	Very Minor	Very Low	Negligible
R14	Residential - Brandon Road	Very Minor	Very Low	Negligible
R15	Residential - Brandon Road	Very Minor	Very Low	Negligible
R16	Residential - Brandon Road	Very Minor	Very Low	Negligible
R17	Residential - Dyke House	Very Minor	Very Low	Negligible
R18	Residential - Glebe Farm House	Very Minor	Very Low	Negligible
R19	Residential - Airfield Bungalow	Very Minor	Very Low	Negligible
R20	Residential - Brandon Road	Very Minor Negligible	Very Low	Negligible
R21	Residential - White Road	Negligible	Very Low	Negligible
R22	Residential - Old Feltwell Road	Very Minor Negligible	Very Low	Negligible
R23	Residential - Bunting's Lane	Very Minor Negligible	Very Low	Negligible
R24	Residential - Methwold Airfield	Very Minor	Very Low	Negligible
R25	Residential - Hangar Bungalow	Very Minor	Very Low	Negligible
R25	Residential - Proposed Farmworker Dwelling	Negligible	Very Low	Negligible

RECEPTOR		IMPACT MAGNITUDE	SENSITIVITY	EFFECT SIGNIFICANCE
R26	Residential - Proposed Farmworker Dwelling	Negligible	Very Low	Negligible

6.201 As indicated in **Table 6.50A**, effects on annual mean PM₁₀ concentrations as a result of emissions associated with the proposed pig and poultry rearing operations were predicted to be **negligible** at all sensitive receptors.

6.202 Predicted 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptors for the DS1 and DS4 scenarios are summarised in **Table 6.51A**.

Table 6.51A: Pig and Poultry Rearing Operations: Predicted Concentrations - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR		PREDICTED 90.4TH%ILE 24-HOUR MEAN PM10 CONCENTRATIONS (MG/ M3)		
		DS1	DS4	CHANGE
R1	Residential - Farm Access Track	32.0631.35	34.4233.47	2.3613
R2	Residential - Farm Access Track	32.0631.35	34.3833.35	2.3200
R3	Residential - Farm Access Track	32.0631.35	34.4833.42	2.4207
R4	Residential - Farm Access Track	32.0631.35	34.3933.38	2.3304
R5	Residential - Farm Access Track	32.0631.35	34.3833.35	2.3200
R6	Residential - Farm Access Track	32.0631.35	34.3033.28	2.241.93
R7	Residential - Old Methwold Road	31.9726	32.5031.73	0.5447
R8	Residential - Lodge Road	31.4630.75	32.1531.34	0.7060
R9	Residential - Lodge Road	31.4630.75	32.2431.43	0.7968
R10	Residential - Woodside Farm	31.3430.64	32.6431.74	1.3011
R11	Residential - Feltwell Lodge Gate	31.5430.83	33.0332.12	1.4929
R12	Residential - Lodge Road	31.5430.83	32.4631.63	0.9280
R13	Residential - Brandon Road	28.29.00	29.9410	0.9381
R14	Residential - Brandon Road	28.29.00	30.1329.27	1.130.97
R15	Residential - Brandon Road	28.29.00	30.2429.36	1.2306
R16	Residential - Brandon Road	28.29.00	30.3129.41	1.3112
R17	Residential - Dyke House	28.29.00	30.4129.50	1.4121
R18	Residential - Glebe Farm House	28.29.00	29.9714	0.9784
R19	Residential - Airfield Bungalow	33.2132.50	33.9918	0.7968
R20	Residential - Brandon Road	30.9321	31.6030.79	0.6758
R21	Residential - White Road	30.9321	31.5330.74	0.6053
R22	Residential - Old Feltwell Road	30.9321	31.5630.75	0.6355
R23	Residential - Bunting's Lane	32.4131.70	33.0732.28	0.6658
R24	Residential - Methwold Airfield	33.2732.56	34.3033.52	1.040.96
R25	Residential - Hangar Bungalow	28.29.00	30.2529.37	1.2507
R26	Residential - Proposed Farmworker Dwelling	32.06-	37.1235.67	5.06-
R27	Residential - Proposed Farmworker Dwelling	32.06-	37.1535.69	5.09-

- 6.203 As indicated in **Table 6.51A**, predicted 90.4th%ile 24-hour mean PM₁₀ concentrations were below the AQO of 50µg/m³ at all sensitive receptors in both scenarios.
- 6.204 Predicted effects on 90.4th %ile 24-hour mean PM₁₀ concentrations at the sensitive receptor locations are summarised in **Table 6.52A**.

Table 6.52A: Pig and Poultry Rearing Operations: Predicted Effects - 90.4th %ile 24-hour Mean PM₁₀

RECEPTOR		IMPACT MAGNITUDE	EFFECT SIGNIFICANCE
R1	Residential - Farm Access Track	Negligible	Negligible
R2	Residential - Farm Access Track	Negligible	Negligible
R3	Residential - Farm Access Track	Negligible	Negligible
R4	Residential - Farm Access Track	Negligible	Negligible
R5	Residential - Farm Access Track	Negligible	Negligible
R6	Residential - Farm Access Track	Negligible	Negligible
R7	Residential - Old Methwold Road	Negligible	Negligible
R8	Residential - Lodge Road	Negligible	Negligible
R9	Residential - Lodge Road	Negligible	Negligible
R10	Residential - Woodside Farm	Negligible	Negligible
R11	Residential - Feltwell Lodge Gate	Negligible	Negligible
R12	Residential - Lodge Road	Negligible	Negligible
R13	Residential - Brandon Road	Negligible	Negligible
R14	Residential - Brandon Road	Negligible	Negligible
R15	Residential - Brandon Road	Negligible	Negligible
R16	Residential - Brandon Road	Negligible	Negligible
R17	Residential - Dyke House	Negligible	Negligible
R18	Residential - Glebe Farm House	Negligible	Negligible
R19	Residential - Airfield Bungalow	Negligible	Negligible
R20	Residential - Brandon Road	Negligible	Negligible
R21	Residential - White Road	Negligible	Negligible
R22	Residential - Old Feltwell Road	Negligible	Negligible
R23	Residential - Bunting's Lane	Negligible	Negligible
R24	Residential - Methwold Airfield	Negligible	Negligible
R25	Residential - Hangar Bungalow	Negligible	Negligible
R26	Residential - Proposed Farmworker Dwelling	Negligible	Negligible
R27	Residential - Proposed Farmworker Dwelling	Negligible	Negligible

- 6.205 As indicated in **Table 6.52A**, effects on 90.4th %ile 24-hour mean PM₁₀ concentrations as a result of emissions associated with the proposed pig and poultry rearing operations were predicted to be **negligible** at all receptor locations.

Summary

- 6.206 Effects associated with operational phase dust emission impacts were predicted to be negligible, long-term, permanent, irreversible, direct and unavoidable at all sensitive receptors.

6.207 Reference should be made to **Figure 6.8A** for a graphical representation of annual mean PM₁₀ concentrations throughout the assessment extents as result of emissions from the Proposed Development. These are predictions from 2017 meteorological data, which resulted in maximum impacts on pollutant levels at receptors.

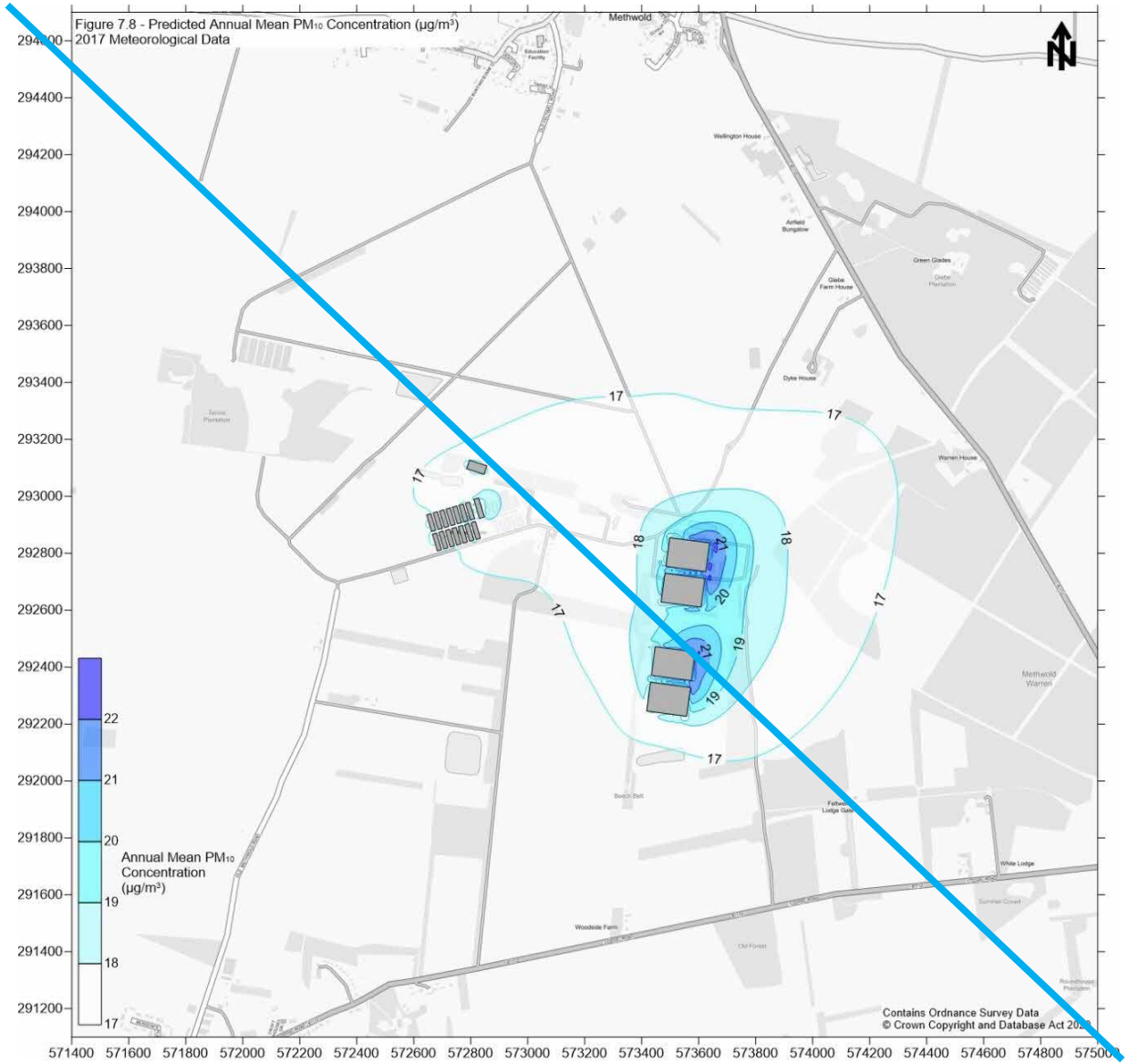


Figure 6.8A: Predicted Annual Mean PM₁₀ Concentration (µg/m³) 2019 Meteorological Data

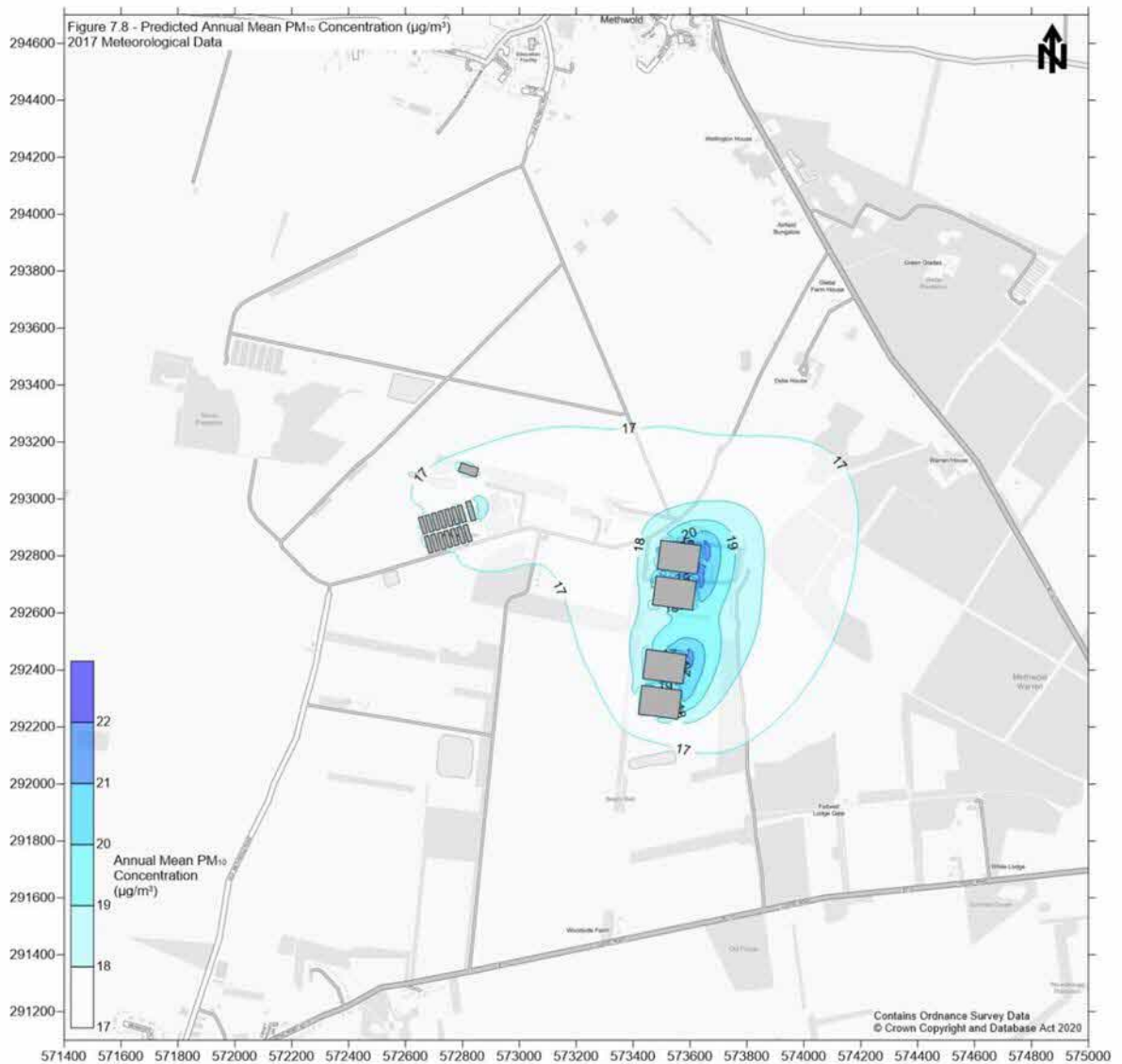


Figure 6.8A: Predicted Annual Mean PM₁₀ Concentration (µg/m³) 2019 Meteorological Data

6.208 Reference should be made to **Figure 6.9A** for a graphical representation of 24-hour mean PM₁₀ concentrations throughout the assessment extents as result of emissions from the Proposed Development. These are predictions from 2017 meteorological data, which resulted in maximum impacts on pollutant levels at receptors.

Ammonia Emissions

6.209 ~~There is the~~An assessment of potential ~~for impacts~~ effects on sensitive ecological designations as a result of NH₃ emissions ~~during~~ associated with the operational phase of the ~~Proposed Development~~ project has been undertaken. The results are provided in the following sections.

Stage 1: Screening

Step 1

6.210 Step 1 required identification of any ecological designations within the vicinity of the Site that may be affected by emissions from the project. As outlined above, a number of ecological designations were identified that may be affected by emissions. As such, the assessment proceeded to Step 2.

6.211 Step 2 required review of qualifying features in order to determine whether they are sensitive to air pollution. As outlined in **Table 6.30A**, **Table 6.31A** and **Table 6.32A**, critical loads and levels have been defined for the qualifying features present within all identified ecological designations. As such, they are considered sensitive to air pollution and the assessment proceeded to Step 3.

Step 3

6.212 Step 3 required review of the sensitive qualifying feature locations in order to identify whether they could be exposed to emissions. The assessment assumed the most sensitive feature within each site is located at the closest designation boundary to the Site in order facilitate a worst case appraisal of potential impacts. The relevant positions are summarised in **Table 6.29A**.

6.213 Based on the above, the sensitive qualifying features could be exposed to emissions and the assessment proceeded to Stage 4.

Stage 4a

6.214 Dispersion modelling was ~~therefore~~ undertaken with the inputs described in **Appendix 6.1A** in order to quantify ~~changes in~~ predicted annual mean NH_3 concentrations and nitrogen and acid deposition rates PCs at sensitive the ecological receptor locations as a result of ~~emissions from the Site. The results are outlined~~ project alone.

6.215 Pollutant levels were predicted at the discrete receptor locations shown in **Table 6.29A** for the following scenarios:

- Ammonia Scenario (AS) 1 - Annual mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with existing pig rearing operations at Feltwell Farm and Airfield Farm;
- AS2 - Annual mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with the proposed pig rearing operations at Feltwell Farm;
- AS3 - Annual mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with existing pig rearing operations at Methwold Farm;
- AS4 - Annual mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with the proposed poultry rearing operations at Methwold Farm;
- AS5 - Annual mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with existing pig rearing operations at Feltwell Farm, Methwold Farm and Airfield Farm; and,
- AS6 - Annal mean NH_3 concentrations and nitrogen / acid deposition rates as a result of emissions associated with the proposed pig and poultry rearing operations at Feltwell Farm and Methwold Farm, respectively.

- 6.216 **Sections:** The relevant scenarios were compared in order to determine the pollutant increase, or decrease, and associated PC for comparison against the 1% screening criteria, as required by the relevant guidance (NE, 2018).
- 6.217 It should be noted that the assessment is based on the maximum predicted impact from five years of meteorological data to ensure a worst case analysis and NH₃ concentrations and nitrogen/ acid deposition are exclusive of baseline levels, as required by the relevant guidance (NE, 2018).

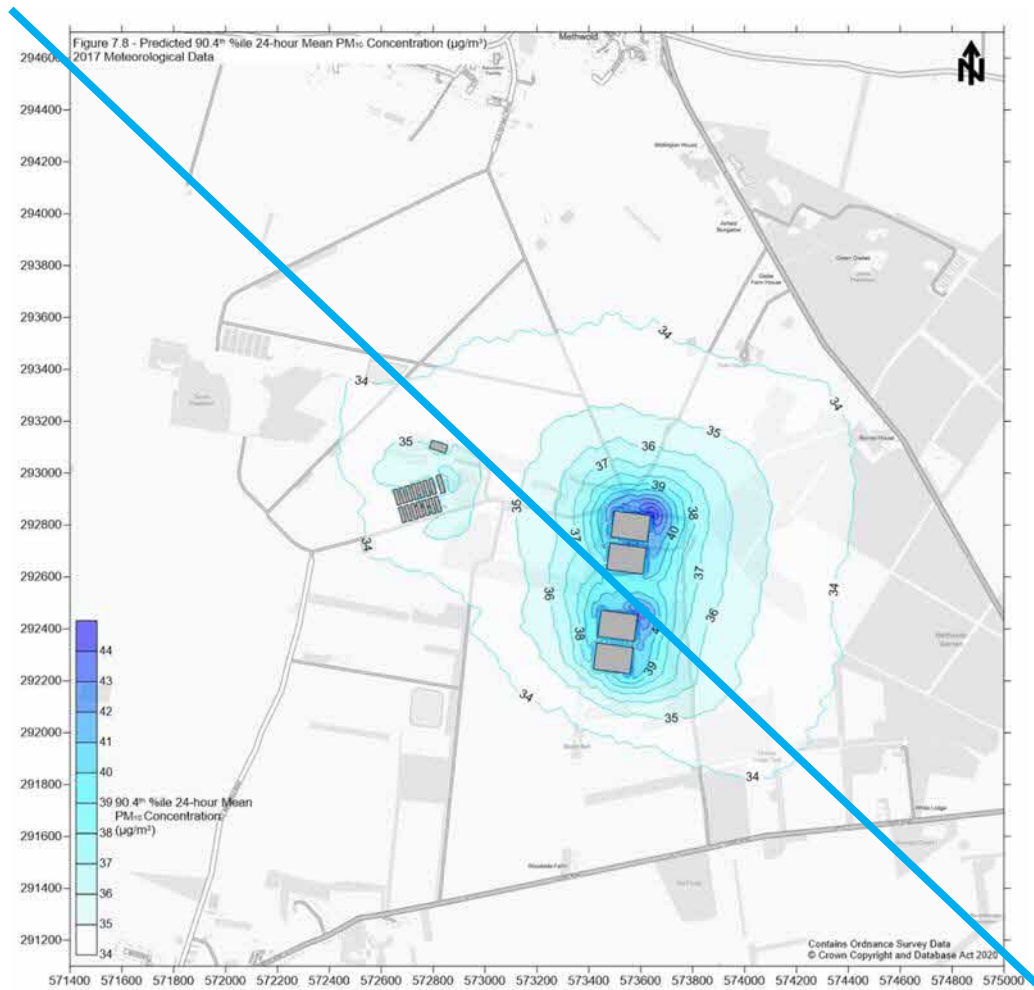


Figure 6.9A: Predicted 90.4th %ile 24-hour Mean PM₁₀ Concentration (µg/m³) 2017 Meteorological Data

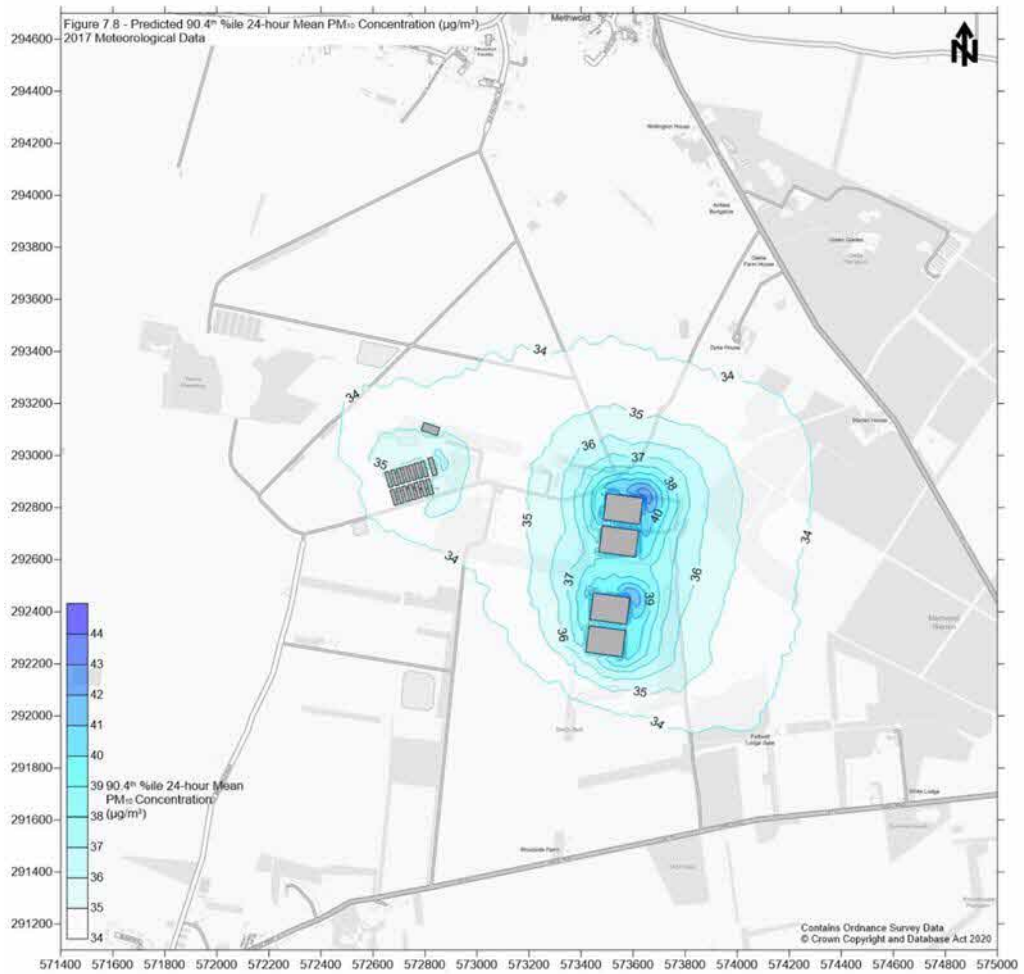


Figure 6.9A: Predicted 90.4th%ile 24-hour Mean PM₁₀ Concentration (µg/m³) 2017 Meteorological Data

Pig Rearing Operations

6.218 Predicted annual mean NH₃ concentrations at the sensitive receptors as result of emissions associated with the AS1 and AS2 scenarios are summarised in **Table 6.53A**.

Table 6.53A: Pig Rearing Operations: Predicted Annual Mean NH₃ Concentrations

RECEPTOR		PREDICTED ANNUAL MEAN NH ₃ CONCENTRATIONS (MG/M ³) (µg/m ³)			
		AS1	AS2	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.0709	0.02	-0.0507	-7.1
E2	Breckland SAC/Weeting Heath SSSI	0.2330	0.05	-0.1824	-24.3
E3	Breckland SAC/Weeting Heath SSSI	0.1418	0.03	-0.1115	-15.1
E4	Breckland SAC/Grime's Graves SSSI	0.0810	0.02	-0.0508	-7.5
E5	Breckland SAC/Cranwich Camp SSSI	0.2834	0.06	-0.2229	-28.9

RECEPTOR		PREDICTED ANNUAL MEAN NH3 CONCENTRATIONS (MG/M3) (µg/m³)			
		AS1	AS2	CHANGE PC	PC AS PROP OF CL (%)
E6	Breckland SAC/Gooderstone Warren SSSI	0.4115	0.03	-0.0812	-11.6
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.4822	0.04	-0.1418	-18.2
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.4418	0.03	-0.1014	-14.3
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.4520	0.04	-0.4116	-16.2
E10	Breckland SPA/Breckland Farmland SSSI	0.4155	0.07	-0.3548	-16.1
E11	Breckland SPA/Breckland Farmland SSSI	0.7496	0.11	-0.6385	-28.3
E12	Breckland SPA/Breckland Farmland SSSI	0.7494	0.09	-0.6685	-28.3
E13	Breckland SPA/Breckland Farmland SSSI	0.5872	0.07	-0.5064	-21.4
E14	Breckland SPA/Breckland Forest SSSI	0.5264	0.07	-0.4557	-19.1
E15	Breckland SPA/Breckland Forest SSSI	0.4152	0.08	-0.3344	-14.7
E16	Breckland SPA/Breckland Forest SSSI	0.4555	0.10	-0.3545	-15.1
E17	Breckland SPA/Breckland Forest SSSI	2.3976	0.39	-2.0037	-79.0
E18	Breckland SPA/Breckland Forest SSSI	0.8197	0.15	-0.6582	-27.3
E19	Breckland SPA/Breckland Forest SSSI	1.0424	0.19	-0.851.05	-35.2
E20	Breckland SPA/Breckland Forest SSSI	1.722.01	0.28	-1.4473	-57.7
E21	Breckland SPA/Breckland Forest SSSI	2.0637	0.35	-1.712.02	-67.3
E22	Breckland SPA/Breckland Forest SSSI	1.4064	0.22	-1.1742	-47.3
E23	Breckland SPA/Breckland Forest SSSI	0.7491	0.17	-0.5774	-24.6
E24	Breckland SPA/Breckland Forest SSSI	0.6985	0.15	-0.5370	-23.2
E25	Breckland SPA/Breckland Forest SSSI	0.4620	0.04	-0.1216	-5.3
E26	Breckland SPA/Breckland Forest SSSI	0.4317	0.03	-0.1014	-4.5
E27	Breckland SPA/Breckland Farmland SSSI	0.4114	0.03	-0.0811	-3.8
E28	Breckland SPA/Breckland Farmland SSSI	0.4216	0.03	-0.0913	-4.2
E29	The Brinks, Northwold SSSI	0.6480	0.13	-0.5167	-22.4
E30	Breckland SPA/Breckland Farmland SSSI	0.4418	0.03	-0.1216	-5.2
E31	Breckland SPA/Breckland Farmland SSSI	0.2025	0.04	-0.1520	-6.8
E32	Breckland SAC/Gooderstone Warren SSSI	0.4013	0.03	-0.0710	-10.5
E33	Breckland SAC/RAF Lakenheath SSSI	0.0608	0.02	-0.0406	-6.1
E34	Wangford Warren and Carr SSSI	0.0810	0.02	-0.0608	-8.2
E35	Didlington Park Lakes SSSI	0.2329	0.07	-0.1723	-7.6
E36	Stanford Training Area SSSI	0.0709	0.02	-0.0507	-6.8

6.219 As indicated in **Table 6.53A**, ~~annual mean NH3 concentrations are the predicted to PC was below 1% of the critical level at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at Feltwell Farm.~~ pig element of the project alone can be reached with regard to annual mean NH3 concentrations. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.220 Predicted annual nitrogen deposition rates at the sensitive receptors for the AS1 and AS2 scenarios are summarised in **Table 6.54A**.

Table 6.54A: Pig Rearing Operations: Predicted Annual Nitrogen Deposition Rates

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (kgN/HA/YR) (kgN/ha/yr)			
		AS1	AS2	CHANGE PC	PC AS PROP OF LOW CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.3646	0.09	-0.2737	-4.6
E2	Breckland SAC/Weeting Heath SSSI	1.2254	0.27	-0.951.27	-15.8
E3	Breckland SAC/Weeting Heath SSSI	0.7392	0.14	-0.5978	-9.8
E4	Breckland SAC/Grime's Graves SSSI	0.4051	0.12	-0.2839	-4.9
E5	Breckland SAC/Cranwich Camp SSSI	1.4479	0.29	-1.1550	-18.8
E6	Breckland SAC/Gooderstone Warren SSSI	0.5977	0.16	-0.4361	-7.6
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.911.15	0.20	-0.7195	-9.5
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.7092	0.17	-0.5374	-7.4
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.791.04	0.20	-0.5984	-8.4
E10	Breckland SPA/Breckland Farmland SSSI	3.234.27	0.51	-2.72-3.76	-75.2.72
E11	Breckland SPA/Breckland Farmland SSSI	5.767.47	0.84	-4.926.62	-132.5
E12	Breckland SPA/Breckland Farmland SSSI	5.817.32	0.69	-5.12-6.63	-132.5
E13	Breckland SPA/Breckland Farmland SSSI	4.515.60	0.58	-3.93-5.02	100.3
E14	Breckland SPA/Breckland Forest SSSI	4.025.00	0.53	-3.49-4.46	-89.3
E15	Breckland SPA/Breckland Forest SSSI	3.224.06	0.62	-2.613.44	-68.8
E16	Breckland SPA/Breckland Forest SSSI	3.494.28	0.76	-2.733.52	-70.5
E17	Breckland SPA/Breckland Forest SSSI	18.6521.53	3.04	-15.618.49	-369.8
E18	Breckland SPA/Breckland Forest SSSI	6.307.60	1.20	-5.106.40	-128.0
E19	Breckland SPA/Breckland Forest SSSI	8.109.70	1.48	-6.628.23	-164.5
E20	Breckland SPA/Breckland Forest SSSI	13.3815.67	2.17	-11.2113.50	-270.0
E21	Breckland SPA/Breckland Forest SSSI	16.0618.46	2.71	-13.3615.75	-315.0
E22	Breckland SPA/Breckland Forest SSSI	10.8912.81	1.75	-9.1411.07	-221.3
E23	Breckland SPA/Breckland Forest SSSI	5.777.08	1.32	-4.455.76	-115.1
E24	Breckland SPA/Breckland Forest SSSI	5.376.63	1.21	-4.17-5.42	-108.4
E25	Breckland SPA/Breckland Forest SSSI	1.2357	0.32	-0.911.25	-25.0
E26	Breckland SPA/Breckland Forest SSSI	1.0232	0.27	-0.751.05	-21.1
E27	Breckland SPA/Breckland Farmland SSSI	0.851.11	0.23	-0.6288	-17.6
E28	Breckland SPA/Breckland Farmland SSSI	0.951.23	0.24	-0.7199	-19.8
E29	The Brinks, Northwold SSSI	3.324.14	0.65	-2.663.49	-23.3
E30	Breckland SPA/Breckland Farmland SSSI	1.1244	0.21	-0.911.22	-24.5

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (kgN/ha/yr) (kgN/ha/yr)			
		AS1	AS2	CHANGE PC	PC AS PROP OF LOW CL (%)
E31	Breckland SPA/Breckland Farmland SSSI	1.5293	0.35	-1.4858	-31.6
E32	Breckland SAC/Gooderstone Warren SSSI	0.5470	0.19	-0.3551	-6.3
E33	Breckland SAC/RAF Lakenheath SSSI	0.3139	0.08	-0.2332	-4.0
E34	Wangford Warren and Carr SSSI	0.4152	0.09	-0.3243	-5.3
E35	Didlington Park Lakes SSSI	1.2453	0.34	-0.871.19	-
E36	Stanford Training Area SSSI	0.3545	0.10	-0.2535	-4.4

6.221 As indicated in **Table 6.54A**, ~~annual mean nitrogen deposition rates are~~ the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease ~~at all sensitive receptors as~~ in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the ~~proposed change in rearing operations at Feltwell Farm~~ pig element of the project alone can be reached with regard to annual nitrogen deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.222 Predicted annual acid deposition rates at the sensitive receptors for the AS1 and AS2 scenarios are summarised in **Table 6.55A**.

Table 6.55A: Pig Rearing Operations: Predicted Annual Acid Deposition Rates

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (keq/ha/yr) (keq/ha/yr)			
		AS1	AS2	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.03	0.01	-0.0203	-4.7
E2	Breckland SAC/Weeting Heath SSSI	0.0911	0.02	-0.0709	-16.1
E3	Breckland SAC/Weeting Heath SSSI	0.0507	0.01	-0.0406	-10.0
E4	Breckland SAC/Grime's Graves SSSI	0.0304	0.01	-0.0203	-5.0
E5	Breckland SAC/Cranwich Camp SSSI	0.1013	0.02	-0.0811	-19.1
E6	Breckland SAC/Gooderstone Warren SSSI	0.0405	0.01	-0.0304	-7.7
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0708	0.01	-0.0507	-11.1
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0507	0.01	-0.0405	-8.7
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0607	0.01	-0.0406	-9.9
E10	Breckland SPA/Breckland Farmland SSSI	0.2330	0.04	-0.1927	-49.9
E11	Breckland SPA/Breckland Farmland SSSI	0.4153	0.06	-0.3547	-87.9
E12	Breckland SPA/Breckland Farmland SSSI	0.4152	0.05	-0.3647	-88.0

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (KEQ/HA/YR) (keq/ha/yr)			
		AS1	AS2	CHANGE PC	PC AS PROP OF CL (%)
E13	Breckland SPA/Breckland Farmland SSSI	0.3240	0.04	-0.2836	-66.6
E14	Breckland SPA/Breckland Forest SSSI	0.2936	0.04	-0.2532	-59.3
E15	Breckland SPA/Breckland Forest SSSI	0.2329	0.04	-0.1924	-45.7
E16	Breckland SPA/Breckland Forest SSSI	0.2530	0.05	-0.1925	-46.8
E17	Breckland SPA/Breckland Forest SSSI	1.3353	0.22	-1.1132	-245.4
E18	Breckland SPA/Breckland Forest SSSI	0.4554	0.09	-0.3646	-84.9
E19	Breckland SPA/Breckland Forest SSSI	0.5869	0.11	-0.4759	-109.2
E20	Breckland SPA/Breckland Forest SSSI	0.951.12	0.15	-0.8096	-179.2
E21	Breckland SPA/Breckland Forest SSSI	1.1431	0.19	-0.951.12	-209.1
E22	Breckland SPA/Breckland Forest SSSI	0.7791	0.12	-0.6579	-146.9
E23	Breckland SPA/Breckland Forest SSSI	0.4150	0.09	-0.3241	-76.4
E24	Breckland SPA/Breckland Forest SSSI	0.3847	0.09	-0.3039	-72.0
E25	Breckland SPA/Breckland Forest SSSI	0.0911	0.02	-0.0609	-16.6
E26	Breckland SPA/Breckland Forest SSSI	0.0709	0.02	-0.0507	-14.0
E27	Breckland SPA/Breckland Farmland SSSI	0.0608	0.02	-0.0406	-11.7
E28	Breckland SPA/Breckland Farmland SSSI	0.0709	0.02	-0.0507	-13.2
E29	The Brinks, Northwold SSSI	0.2429	0.05	-0.1925	-5.7
E30	Breckland SPA/Breckland Farmland SSSI	0.0810	0.02	-0.0609	-16.1
E31	Breckland SPA/Breckland Farmland SSSI	0.1114	0.02	-0.0811	-21.0
E32	Breckland SAC/Gooderstone Warren SSSI	0.0405	0.01	-0.0304	-6.9
E33	Breckland SAC/RAF Lakenheath SSSI	0.0203	0.01	-0.02	-4.0
E34	Wangford Warren and Carr SSSI	0.0304	0.01	-0.0203	-4.6
E35	Didlington Park Lakes SSSI	0.0911	0.02	-0.0608	-
E36	Stanford Training Area SSSI	0.03	0.01	-0.02	-3.7

6.223 As indicated in **Table 6.55A**, ~~annual mean acid deposition rates are the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at Feltwell Farm: pig element of the project alone can be reached with regard to annual acid deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.~~

Poultry Rearing Operations

6.224 Predicted annual mean NH₃ concentrations at the sensitive receptors as result of emissions associated with the AS3 and AS4 scenarios are summarised in **Table 6.56A**.

Table 6.56A: Poultry Rearing Operations: Predicted Annual Mean NH₃ Concentrations

RECEPTOR		PREDICTED ANNUAL MEAN NH ₃ CONCENTRATIONS (MG/M ³) (µg/m ³)			
		AS3	AS4	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.03	0.02	-0.01	-1.3
E2	Breckland SAC/Weeting Heath SSSI	0.1213	0.0506	-0.07	-7.0
E3	Breckland SAC/Weeting Heath SSSI	0.07	0.03	-0.04	-3.9
E4	Breckland SAC/Grime's Graves SSSI	0.03	0.02	-0.01	-1.2
E5	Breckland SAC/Cranwich Camp SSSI	0.13	0.07	-0.06	-6.4
E6	Breckland SAC/Gooderstone Warren SSSI	0.04	0.0203	-0.01	-1.4
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.07	0.04	-0.03	-3.2
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.06	0.03	-0.0302	-2.5
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.05	0.03	-0.02	-2.1
E10	Breckland SPA/Breckland Farmland SSSI	0.1314	0.05	-0.09	-2.9
E11	Breckland SPA/Breckland Farmland SSSI	0.42	0.10	-0.32	-10.6
E12	Breckland SPA/Breckland Farmland SSSI	0.4647	0.1112	-0.35	-11.7
E13	Breckland SPA/Breckland Farmland SSSI	0.48	0.09	-0.39	-12.9
E14	Breckland SPA/Breckland Forest SSSI	0.41	0.0809	-0.33	-11.0
E15	Breckland SPA/Breckland Forest SSSI	0.29	0.08	-0.2021	-6.8
E16	Breckland SPA/Breckland Forest SSSI	0.2829	0.13	-0.16	-5.2
E17	Breckland SPA/Breckland Forest SSSI	13.2241	2.0712	-11.1429	-376.3
E18	Breckland SPA/Breckland Forest SSSI	0.6667	0.26	-0.4041	-13.5
E19	Breckland SPA/Breckland Forest SSSI	1.2425	0.4041	-0.84	-28.1
E20	Breckland SPA/Breckland Forest SSSI	3.0307	1.0406	-1.99 -2.01	-67.1
E21	Breckland SPA/Breckland Forest SSSI	4.5258	1.2325	-3.3033	-110.9
E22	Breckland SPA/Breckland Forest SSSI	1.1920	0.4849	-0.71	-23.7
E23	Breckland SPA/Breckland Forest SSSI	0.37	0.1516	-0.22	-7.2
E24	Breckland SPA/Breckland Forest SSSI	0.27	0.11	-0.16	-5.2
E25	Breckland SPA/Breckland Forest SSSI	0.06	0.0304	-0.02	-0.8
E26	Breckland SPA/Breckland Forest SSSI	0.04	0.03	-0.02	-0.5
E27	Breckland SPA/Breckland Farmland SSSI	0.04	0.02	-0.01	-0.4
E28	Breckland SPA/Breckland Farmland SSSI	0.05	0.03	-0.02	-0.6
E29	The Brinks, Northwold SSSI	0.20	0.09	-0.11	-3.7
E30	Breckland SPA/Breckland Farmland SSSI	0.07	0.03	-0.04	-1.4
E31	Breckland SPA/Breckland Farmland SSSI	0.10	0.0405	-0.05	-1.8
E32	Breckland SAC/Gooderstone Warren SSSI	0.04	0.02	-0.01	-1.2
E33	Breckland SAC/RAF Lakenheath SSSI	0.03	0.02	-0.01	-1.1
E34	Wangford Warren and Carr SSSI	0.04	0.02	-0.02	-1.6

RECEPTOR		PREDICTED ANNUAL MEAN NH3 CONCENTRATIONS (MG/M3) (µg/m³)			
		AS3	AS4	CHANGE PC	PC AS PROP OF CL (%)
E35	Didlington Park Lakes SSSI	0.10	0.06	-0.04	-1.4
E36	Stanford Training Area SSSI	0.03	0.02	-0.01	-1.1

6.225 As indicated in **Table 6.56A**, ~~annual mean NH3 concentrations are the~~ predicted ~~to PC was~~ below 1% of the critical level at all receptor positions, with a decrease ~~at all sensitive receptors~~ as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the ~~proposed change in rearing operations at Methwold Farm~~: poultry element of the project alone can be reached with regard to annual mean NH3 concentrations. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.226 Predicted annual nitrogen deposition rates at the sensitive receptors for the AS3 and AS4 scenarios are summarised in **Table 6.57A**.

Table 6.57A: Poultry Rearing Operations: Predicted Annual Nitrogen Deposition Rates

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (KGN/HA/YR)			
		AS3	AS4	CHANGE PC	PC AS PROP OF LOW (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.16	0.09	-0.07	-0.9
E2	Breckland SAC/Weeting Heath SSSI	0.6465	0.2829	-0.36	-4.5
E3	Breckland SAC/Weeting Heath SSSI	0.3435	0.14	-0.20	-2.5
E4	Breckland SAC/Grime's Graves SSSI	0.17	0.11	-0.06	-0.8
E5	Breckland SAC/Cranwich Camp SSSI	0.6869	0.35	-0.33	-4.2
E6	Breckland SAC/Gooderstone Warren SSSI	0.20	0.13	-0.07	-0.9
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.36	0.1920	-0.17	-1.7
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.30	0.17	-0.13	-1.3
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.27	0.16	-0.11	-1.1
E10	Breckland SPA/Breckland Farmland SSSI	1.0506	0.3839	-0.67	-13.4
E11	Breckland SPA/Breckland Farmland SSSI	3.2528	0.7880	-2.4748	-49.6
E12	Breckland SPA/Breckland Farmland SSSI	3.6164	0.8890	-2.7374	-54.8
E13	Breckland SPA/Breckland Farmland SSSI	3.7477	0.7274	-3.0403	-60.6
E14	Breckland SPA/Breckland Forest SSSI	3.2124	0.6667	-2.5557	-51.3
E15	Breckland SPA/Breckland Forest SSSI	2.2325	0.6365	-1.5960	-32.0
E16	Breckland SPA/Breckland Forest SSSI	2.2123	0.991.01	-1.22	-24.4

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (KGN/HA/YR)			
		AS3	AS4	CHANGE PC	PC AS PROP OF LOW (%)
E17	Breckland SPA/Breckland Forest SSSI	103.08 104.57	16.1751	-86.91 88.05	-1,761.0
E18	Breckland SPA/Breckland Forest SSSI	5.4622	2.0406	-3.4416	-63.2
E19	Breckland SPA/Breckland Forest SSSI	9.6374	3.4017	-6.5357	-131.3
E20	Breckland SPA/Breckland Forest SSSI	23.6096	8.0825	-15.5270	-314.1
E21	Breckland SPA/Breckland Forest SSSI	35.2873	9.5777	-25.7495	-519.1
E22	Breckland SPA/Breckland Forest SSSI	9.2436	3.7482	-5.5054	-110.8
E23	Breckland SPA/Breckland Forest SSSI	2.8891	1.2023	-1.68	-33.7
E24	Breckland SPA/Breckland Forest SSSI	2.0709	0.8587	-1.22	-24.4
E25	Breckland SPA/Breckland Forest SSSI	0.46	0.2728	-0.18	-3.7
E26	Breckland SPA/Breckland Forest SSSI	0.3334	0.21	-0.13	-2.5
E27	Breckland SPA/Breckland Farmland SSSI	0.28	0.18	-0.10	-2.0
E28	Breckland SPA/Breckland Farmland SSSI	0.36	0.2422	-0.14	-2.8
E29	The Brinks, Northwold SSSI	1.0304	0.4445	-0.58	-3.9
E30	Breckland SPA/Breckland Farmland SSSI	0.5556	0.2223	-0.33	-6.7
E31	Breckland SPA/Breckland Farmland SSSI	0.7778	0.35	-0.42	-8.5
E32	Breckland SAC/Gooderstone Warren SSSI	0.18	0.1314	-0.05	-0.6
E33	Breckland SAC/RAF Lakenheath SSSI	0.13	0.08	-0.0605	-0.7
E34	Wangford Warren and Carr SSSI	0.18	0.10	-0.09	-1.1
E35	Didlington Park Lakes SSSI	0.53	0.31	-0.21	-
E36	Stanford Training Area SSSI	0.15	0.10	-0.06	-0.7

6.227 As indicated in **Table 6.57A**, ~~annual mean nitrogen deposition rates are the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at Methwold Farm~~ poultry element of the project alone can be reached with regard to annual nitrogen deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.228 Predicted annual acid deposition rates at the sensitive receptors for the AS3 and AS4 scenarios are summarised in **Table 6.58A**.

Table 6.58A: Poultry Rearing Operations: Predicted Annual Acid Deposition Rates

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (KEQ/HA/YR) (keq/ha/yr)			
		AS3	AS4	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.011	0.006	-0.005	-0.9

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (KEQ/HA/YR) (keq/ha/yr)			
		AS3	AS4	CHANGE PC	PC AS PROP OF CL (%)
E2	Breckland SAC/Weeting Heath SSSI	0.046	0.02921	-0.026	-4.6
E3	Breckland SAC/Weeting Heath SSSI	0.02425	0.010	-0.014	-2.6
E4	Breckland SAC/Grime's Graves SSSI	0.012	0.008	-0.004	-0.8
E5	Breckland SAC/Cranwich Camp SSSI	0.04849	0.025	-0.024	-4.3
E6	Breckland SAC/Gooderstone Warren SSSI	0.01415	0.009	-0.005	-0.9
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.02526	0.014	-0.012	-1.9
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.021	0.012	-0.009	-1.5
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.019	0.0112	-0.008	-1.3
E10	Breckland SPA/Breckland Farmland SSSI	0.075	0.02728	-0.048	-8.9
E11	Breckland SPA/Breckland Farmland SSSI	0.23133	0.05557	-0.17677	-33.0
E12	Breckland SPA/Breckland Farmland SSSI	0.25759	0.06364	-0.19495	-36.4
E13	Breckland SPA/Breckland Farmland SSSI	0.26668	0.05152	-0.21516	-40.2
E14	Breckland SPA/Breckland Forest SSSI	0.22830	0.04748	-0.18283	-34.1
E15	Breckland SPA/Breckland Forest SSSI	0.15860	0.04546	-0.11314	-21.2
E16	Breckland SPA/Breckland Forest SSSI	0.15759	0.07072	-0.087	-16.2
E17	Breckland SPA/Breckland Forest SSSI	7.335440	1.15175	-6.184265	-1,168.9
E18	Breckland SPA/Breckland Forest SSSI	0.36771	0.14346	-0.22425	-42.0
E19	Breckland SPA/Breckland Forest SSSI	0.68693	0.22126	-0.46567	-87.2
E20	Breckland SPA/Breckland Forest SSSI	1.679704	0.57587	-1.104117	-208.5
E21	Breckland SPA/Breckland Forest SSSI	2.51042	0.68196	-1.82947	-344.5
E22	Breckland SPA/Breckland Forest SSSI	0.65866	0.26672	-0.39294	-73.5
E23	Breckland SPA/Breckland Forest SSSI	0.20507	0.08587	-0.11920	-22.4
E24	Breckland SPA/Breckland Forest SSSI	0.14749	0.06162	-0.087	-16.2
E25	Breckland SPA/Breckland Forest SSSI	0.03233	0.01920	-0.013	-2.4
E26	Breckland SPA/Breckland Forest SSSI	0.024	0.015	-0.009	-1.7
E27	Breckland SPA/Breckland Farmland SSSI	0.020	0.013	-0.007	-1.3
E28	Breckland SPA/Breckland Farmland SSSI	0.02526	0.01516	-0.010	-1.9
E29	The Brinks, Northwold SSSI	0.07374	0.032	-0.041	-1.0
E30	Breckland SPA/Breckland Farmland SSSI	0.03940	0.016	-0.024	-4.4
E31	Breckland SPA/Breckland Farmland SSSI	0.055	0.025	-0.030	-5.6
E32	Breckland SAC/Gooderstone Warren SSSI	0.013	0.009	-0.004	-0.8
E33	Breckland SAC/RAF Lakenheath SSSI	0.00910	0.006	-0.004	-0.7
E34	Wangford Warren and Carr SSSI	0.013	0.007	-0.006	-0.9
E35	Didlington Park Lakes SSSI	0.038	0.02223	-0.015	-
E36	Stanford Training Area SSSI	0.011	0.007	-0.004	0.596

6.229 As indicated in **Table 6.58A**, ~~annual mean acid deposition rates are the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at Methwold Farm.~~ poultry element of the project alone can be reached with regard to annual acid deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.

Pig and Poultry Rearing Operations

6.230 Predicted annual mean NH₃ concentrations at the sensitive receptors as result of emissions associated with the AS5 and AS6 scenarios are summarised in **Table 6.59A**.

Table 6.59A: Pig and Poultry Rearing Operations: Predicted Annual Mean NH₃ Concentrations

RECEPTOR		PREDICTED ANNUAL MEAN NH ₃ CONCENTRATIONS (MG/M ³) (µg/m ³)			
		AS5	AS6	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.1012	0.03	-0.0708	-8.4
E2	Breckland SAC/Weeting Heath SSSI	0.3642	0.11	-0.2531	-31.3
E3	Breckland SAC/Weeting Heath SSSI	0.2424	0.05	-0.4519	-18.9
E4	Breckland SAC/Grime's Graves SSSI	0.1113	0.04	-0.0709	-8.8
E5	Breckland SAC/Cranwich Camp SSSI	0.4148	0.12	-0.2835	-35.3
E6	Breckland SAC/Gooderstone Warren SSSI	0.4519	0.06	-0.1013	-13.0
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.2429	0.08	-0.1721	-21.4
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.1923	0.0607	-0.1216	-16.2
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.2025	0.07	-0.1418	-18.5
E10	Breckland SPA/Breckland Farmland SSSI	0.5568	0.11	-0.4357	-18.9
E11	Breckland SPA/Breckland Farmland SSSI	1.1436	0.2021	-0.941.16	-38.6
E12	Breckland SPA/Breckland Farmland SSSI	1.2140	0.20	-1.0121	-40.2
E13	Breckland SPA/Breckland Farmland SSSI	1.0620	0.16	-0.891.04	-34.5
E14	Breckland SPA/Breckland Forest SSSI	0.931.06	0.15	-0.7890	-30.1
E15	Breckland SPA/Breckland Forest SSSI	0.7081	0.16	-0.5465	-21.5
E16	Breckland SPA/Breckland Forest SSSI	0.7282	0.2223	-0.5060	-19.9
E17	Breckland SPA/Breckland Forest SSSI	16.15.59	2.4651	-13.1264	-454.8
E18	Breckland SPA/Breckland Forest SSSI	1.4764	0.4142	-1.0623	-40.9
E19	Breckland SPA/Breckland Forest SSSI	2.2444	0.5960	-1.6585	-61.5
E20	Breckland SPA/Breckland Forest SSSI	4.715.05	1.3134	-3.3971	-123.8
E21	Breckland SPA/Breckland Forest SSSI	6.5895	1.5760	-5.0135	-178.2
E22	Breckland SPA/Breckland Forest SSSI	2.5682	0.7071	-1.85 -2.11	-70.2
E23	Breckland SPA/Breckland Forest SSSI	1.1128	0.3233	-0.7995	-31.8
E24	Breckland SPA/Breckland Forest SSSI	0.951.12	0.26	-0.7086	-28.7

RECEPTOR		PREDICTED ANNUAL MEAN NH3 CONCENTRATIONS (MG/M3) (µg/m³)			
		AS5	AS6	CHANGE PC	PC AS PROP OF CL (%)
E25	Breckland SPA/Breckland Forest SSSI	0.2226	0.08	-0.1418	-6.1
E26	Breckland SPA/Breckland Forest SSSI	0.1721	0.06	-0.1115	-5.0
E27	Breckland SPA/Breckland Farmland SSSI	0.1418	0.05	-0.0913	-4.2
E28	Breckland SPA/Breckland Farmland SSSI	0.1620	0.06	-0.1114	-4.8
E29	The Brinks, Northwold SSSI	0.831.00	0.2021	-0.6379	-26.4
E30	Breckland SPA/Breckland Farmland SSSI	0.2125	0.06	-0.1620	-6.6
E31	Breckland SPA/Breckland Farmland SSSI	0.2935	0.09	-0.2126	-8.6
E32	Breckland SAC/Gooderstone Warren SSSI	0.1417	0.05	-0.0912	-11.6
E33	Breckland SAC/RAF Lakenheath SSSI	0.0810	0.03	-0.0507	-7.1
E34	Wangford Warren and Carr SSSI	0.1114	0.04	-0.0810	-9.9
E35	Didlington Park Lakes SSSI	0.3340	0.13	-0.2127	-9.0
E36	Stanford Training Area SSSI	0.1012	0.04	-0.0608	-7.9

6.231 As indicated in **Table 6.59A**, ~~annual mean NH3 concentrations are the~~ predicted ~~to PC was~~ below 1% of the critical level at all receptor positions, with a decrease ~~at all sensitive receptors~~ ~~as~~ in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the ~~proposed change in rearing operations at the Site.~~ project alone can be reached with regard to annual mean NH3 concentrations. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.232 Predicted annual nitrogen deposition rates at the sensitive receptors for the AS5 and AS6 scenarios are summarised in **Table 6.60A**.

Table 6.60A: Pig and Poultry Rearing Operations: Predicted Annual Nitrogen Deposition Rates

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (KGN/HA/YR) (kgN/ha/yr)			
		AS5	AS6	CHANGE PC	PC AS PROP OF LOW CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.5161	0.1718	-0.3444	-5.5
E2	Breckland SAC/Weeting Heath SSSI	1.872.19	0.56	-1.3163	-20.3
E3	Breckland SAC/Weeting Heath SSSI	1.0727	0.28	-0.7998	-12.3
E4	Breckland SAC/Grime's Graves SSSI	0.5768	0.23	-0.3546	-5.7
E5	Breckland SAC/Cranwich Camp SSSI	2.1248	0.64	-1.4884	-22.9
E6	Breckland SAC/Gooderstone Warren SSSI	0.8097	0.2930	-0.5068	-8.5
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	1.2751	0.40	-0.881.11	-11.1
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.981.18	0.34	-0.6484	-8.4

RECEPTOR		PREDICTED ANNUAL NITROGEN DEPOSITION RATES (kgN/ha/yr) (kgN/ha/yr)			
		AS5	AS6	CHANGE PC	PC AS PROP OF LOW CL (%)
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	1.0631	0.35	-0.7196	-9.6
E10	Breckland SPA/Breckland Farmland SSSI	4.28 5.33	0.8990	-3.39 -4.43	-88.6
E11	Breckland SPA/Breckland Farmland SSSI	8.8910.62	1.5860	-7.309.02	-180.5
E12	Breckland SPA/Breckland Farmland SSSI	9.4210.96	1.5355	-7.899.41	-188.2
E13	Breckland SPA/Breckland Farmland SSSI	8.249.36	1.2729	-6.978.08	-161.5
E14	Breckland SPA/Breckland Forest SSSI	78.23	1.4718	-6.077.05	-141.1
E15	Breckland SPA/Breckland Forest SSSI	5.456.30	1.2526	-4.205.04	-100.8
E16	Breckland SPA/Breckland Forest SSSI	5.616.43	1.7577	-3.874.66	-93.2
E17	Breckland SPA/Breckland Forest SSSI	121.57 125.97	19.2455	102.35 106.41	-2,128.3
E18	Breckland SPA/Breckland Forest SSSI	11.4612.82	3.2125	-8.249.56	-191.2
E19	Breckland SPA/Breckland Forest SSSI	17.4519.05	4.5865	-12.8714.40	-288.0
E20	Breckland SPA/Breckland Forest SSSI	36.7339.40	10.2643	-26.4728.97	-579.4
E21	Breckland SPA/Breckland Forest SSSI	51.3554.19	12.2848	-39.0741.71	-834.1
E22	Breckland SPA/Breckland Forest SSSI	19.9521.99	5.4956	-14.4716.42	-328.5
E23	Breckland SPA/Breckland Forest SSSI	8.659.99	2.5255	-6.127.44	-148.8
E24	Breckland SPA/Breckland Forest SSSI	7.448.72	2.0001	-5.456.71	-134.1
E25	Breckland SPA/Breckland Forest SSSI	1.692.03	0.5960	-1.1043	-28.7
E26	Breckland SPA/Breckland Forest SSSI	1.3565	0.4748	-0.881.18	-23.6
E27	Breckland SPA/Breckland Farmland SSSI	1.4239	0.41	-0.7298	-19.6
E28	Breckland SPA/Breckland Farmland SSSI	1.2857	0.45	-0.831.12	-22.4
E29	The Brinks, Northwold SSSI	4.34 5.18	1.06 1.07	-3.28 4.11	-27.4
E30	Breckland SPA/Breckland Farmland SSSI	1.6799	0.4243	-1.2556	-31.2
E31	Breckland SPA/Breckland Farmland SSSI	2.2971	0.70	-1.602.01	-40.1
E32	Breckland SAC/Gooderstone Warren SSSI	0.7288	0.3233	-0.4055	-6.9
E33	Breckland SAC/RAF Lakenheath SSSI	0.4453	0.16	-0.2837	-4.6
E34	Wangford Warren and Carr SSSI	0.5971	0.19	-0.4051	-6.4
E35	Didlington Park Lakes SSSI	1.742.06	0.6566	-1.0940	-
E36	Stanford Training Area SSSI	0.5161	0.4920	-0.3441	-5.1

6.233 As indicated in **Table 6.60A**, ~~annual mean nitrogen deposition rates are the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at the Site.~~ project alone can be reached with regard to annual nitrogen deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.

6.234 Predicted annual acid deposition rates at the sensitive receptors for the AS5 and AS6 scenarios are summarised in **Table 6.61A**.

Table 6.61A: Pig and Poultry Rearing Operations: Predicted Annual Acid Deposition Rates

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (KEQ/HA/YR) (keq/ha/yr)			
		AS5	AS6	CHANGE PC	PC AS PROP OF CL (%)
E1	Breckland SAC/Wangford Warren and Carr SSSI	0.04	0.01	-0.0203	-5.6
E2	Breckland SAC/Weeting Heath SSSI	0.1316	0.04	-0.0912	-20.7
E3	Breckland SAC/Weeting Heath SSSI	0.0809	0.02	-0.0607	-12.5
E4	Breckland SAC/Grime's Graves SSSI	0.0405	0.02	-0.0203	-5.8
E5	Breckland SAC/Cranwich Camp SSSI	0.1518	0.05	-0.1113	-23.4
E6	Breckland SAC/Gooderstone Warren SSSI	0.0607	0.02	-0.0405	-8.6
E7	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0911	0.03	-0.0608	-13.0
E8	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0708	0.02	-0.0506	-9.9
E9	Norfolk Valley Fens SAC/Fouldon Common SSSI	0.0809	0.02	-0.0507	-11.3
E10	Breckland SPA/Breckland Farmland SSSI	0.3038	0.06	-0.2432	-58.8
E11	Breckland SPA/Breckland Farmland SSSI	0.6376	0.11	-0.5264	-119.8
E12	Breckland SPA/Breckland Farmland SSSI	0.6778	0.11	-0.5667	-124.9
E13	Breckland SPA/Breckland Farmland SSSI	0.5967	0.09	-0.5057	-107.2
E14	Breckland SPA/Breckland Forest SSSI	0.5159	0.08	-0.4350	-93.6
E15	Breckland SPA/Breckland Forest SSSI	0.3945	0.09	-0.3036	-66.9
E16	Breckland SPA/Breckland Forest SSSI	0.4046	0.1213	-0.2833	-61.9
E17	Breckland SPA/Breckland Forest SSSI	8.6596	1.3739	-7.2857	-1,412.6
E18	Breckland SPA/Breckland Forest SSSI	0.8291	0.23	-0.5968	-126.9
E19	Breckland SPA/Breckland Forest SSSI	1.2436	0.33	-0.921.02	-191.2
E20	Breckland SPA/Breckland Forest SSSI	2.6480	0.7374	-1.882.06	-384.6
E21	Breckland SPA/Breckland Forest SSSI	3.6586	0.8789	-2.7897	-553.6
E22	Breckland SPA/Breckland Forest SSSI	1.4256	0.3940	-1.0317	-218.0
E23	Breckland SPA/Breckland Forest SSSI	0.6271	0.18	-0.4453	-98.8
E24	Breckland SPA/Breckland Forest SSSI	0.5362	0.14	-0.3948	-89.0
E25	Breckland SPA/Breckland Forest SSSI	0.1214	0.04	-0.0810	-19.0
E26	Breckland SPA/Breckland Forest SSSI	0.1012	0.03	-0.0608	-15.7
E27	Breckland SPA/Breckland Farmland SSSI	0.0810	0.03	-0.0507	-13.0
E28	Breckland SPA/Breckland Farmland SSSI	0.0911	0.03	-0.0608	-14.9
E29	The Brinks, Northwold SSSI	0.3137	0.08	-0.2329	-6.7
E30	Breckland SPA/Breckland Farmland SSSI	0.1214	0.03	-0.0911	-20.6
E31	Breckland SPA/Breckland Farmland SSSI	0.1619	0.05	-0.1114	-26.6
E32	Breckland SAC/Gooderstone Warren SSSI	0.0506	0.02	-0.0304	-7.7
E33	Breckland SAC/RAF Lakenheath SSSI	0.0304	0.01	-0.0203	-4.7

RECEPTOR		PREDICTED ANNUAL ACID DEPOSITION RATES (KEQ/HA/YR) (keq/ha/yr)			
		AS5	AS6	CHANGE PC	PC AS PROP OF CL (%)
E34	Wangford Warren and Carr SSSI	0.0405	0.01	-0.0304	-5.6
E35	Didlington Park Lakes SSSI	0.1215	0.05	-0.0810	-
E36	Stanford Training Area SSSI	0.04	0.01	-0.0203	-4.4

6.235 As indicated in **Table 6.61 A**, ~~annual mean acid deposition rates are the predicted to PC was below 1% of the critical load at all receptor positions, with a decrease at all sensitive receptors as in concentration modelled at all locations. As such, a screening conclusion of no likely significant effect on all designations as a result of the proposed change in rearing operations at the Site.~~ project alone can be reached with regard to annual acid deposition rates. This is supported by the predicted improvement in air quality conditions as a result of the project.

Stage 4b

6.236 Emissions from other plans or projects may result in-combination impacts at the identified designations. However, as the project is predicted to result in a decrease in pollution levels alone, any adverse in-combination effect would be solely related to the other plan or project. These would be subject to a separate HRA process and any significant impacts mitigated accordingly.

6.237 Based on the above, a screening conclusion of no likely significant effect, as a result of the development in-combination can be reached with regards to annual mean NH₃ concentrations and nitrogen/acid deposition rates on all designations.

Summary

6.238 The results ~~indicate there is predicted to~~ of Stage 1: Screening can be summarised as follows: ~~a decrease in NH₃ concentrations and nitrogen/ acid deposition rates at all sensitive ecological receptorssummarised as result of the proposed change in rearing operations at the Site. As outlined previously, there is no set criteria for categorising the impact magnitude due to a change in pollutant levels at follows:-~~

- 13 ecological designations ~~as a result of~~ were identified that may be affected by emissions from ~~a scheme. However, due to the predicted reduction in~~ the project;
- Of the identified designations, all are considered sensitive to air pollution levels. As such, these sites were progressed through the assessment;
- A screening conclusion of no likely significant effect, as a result of the project alone was reached with regards to annual mean NH₃ concentrations and nitrogen/acid deposition on all designations; and,
- A screening conclusion of no likely significant effect as a result of the **Development** project in-combination was reached with regards to annual mean NH₃ concentrations and nitrogen/ acid deposition on all designations.

6.239 Due to the above findings, overall effects ~~were determined~~ on annual mean NH₃ concentrations and nitrogen/acid deposition rates are considered to be **negligible**, which is considered not significant.

Stage 2: Appropriate Assessment

6.240 The results of Stage 1: Screening indicated a screening conclusion of no likely significant effect as a result of the project in relation to annual mean NH₃ concentrations and nitrogen/acid deposition both alone and in-combination can be reached for all ecological designations. An Appropriate Assessment is, therefore, not required.

Bioaerosol Emissions

6.241 The Proposed Development has the potential to cause impacts as a result of bioaerosol emissions associated with pig and poultry rearing activities at the Site. An assessment was therefore undertaken in accordance with the general principles of EA document 'Guidance on the evaluation of bioaerosol risk assessments for composting facilities' (EA, undated), as summarised in the following Sections.

Pig Rearing Operations

6.242 A review of the proposed Site layout for the pig development identified the following potential bioaerosol emission sources:

- Atmospheric releases from the stacks serving the proposed pig rearing buildings;
- Fugitive releases from the straw storage buildings;
- Fugitive releases from the FYM storage building; and,
- Atmospheric releases from feed silos during filling.

6.243 Reference should be made to **Figure 6.6A** for the bioaerosol emission source locations.

6.244 The potential magnitude of risk to sensitive receptors as result of releases from each of the identified sources is shown in **Table 6.62A**.

6.245 It should be noted that the proposed farm worker dwellings will be situated approximately 400m to the south-east of the pig development. Bioaerosols associated with the proposed pig rearing operations are not anticipated to significantly affect ambient levels at these locations due to the separation distance involved. As such, they were not considered as receptors in the following assessment.

Table 6.62A: Pig Rearing Operations: Bioaerosol Risk Assessment

RECEPTOR	SOURCE	PROBABILITY OF EXPOSURE		HARM	RISK MAGNITUDE
		CATEGORY	JUSTIFICATION		
Existing residential properties situated off farm access track	Atmospheric releases from the stacks serving the proposed pig rearing buildings	Very low	<ul style="list-style-type: none"> Distance - Receptors are distanced from sources, positioned approximately 200m south-east of the closest proposed pig rearing building Dispersion potential - Air will be extracted from the proposed pig rearing buildings and exhausted to atmosphere via extended chimneys at a height of circa 12.25m. The high level of release is anticipated to aid dilution and dispersion of bioaerosols Duration - Releases are anticipated to be constant over the rearing period. However, concentrations are likely to vary throughout, with maximum emissions occurring towards the end of a growth cycle when there is a greater amount of manure in the buildings Frequency - Low frequency of winds between source and receptors (15.07%) 	Moderate	Minor
Existing residential properties situated off farm access track	Fugitive releases from the straw storage buildings	Very low	<ul style="list-style-type: none"> Distance - Receptors are local to sources, positioned approximately 90m south-east of the closest straw building Dispersion potential - Straw will be stored within enclosed structures. This is anticipated to contain emissions and limit releases to atmosphere Duration - Emissions assumed to be constant during storage Frequency of emission - Very low frequency of winds between source and receptors (10.78%) 	Moderate	Minor
	Fugitive releases from the FYM storage building	Very low	<ul style="list-style-type: none"> Distance - Receptors are distanced from sources, positioned approximately 200m south-east of the FYM storage building Dispersion potential - Manure will be stored within an enclosed structure. This is anticipated to contain emissions and limit releases to atmosphere Duration - Emissions assumed to be constant during storage Frequency - Very low frequency of winds between source and receptors (6.39%) 		

RECEPTOR	SOURCE	PROBABILITY OF EXPOSURE		HARM	RISK MAGNITUDE
		CATEGORY	JUSTIFICATION		
	Atmospheric releases from feed silos during filling	Very low	<ul style="list-style-type: none"> Distance - Receptors are distanced from sources, positioned approximately 215m east of the closest feed silo Dispersion potential - Poor dispersion of emissions from the exhaust outlet on each silo due to the adjacent poultry sheds Duration - Releases are anticipated to be short in-duration and limited to filling periods Frequency - Low frequency of winds between source and receptors (15.07%) 	Moderate	Minor

6.246 As indicated in **Table 6.62A**, the magnitude of risk was determined to be minor at the sensitive receptor locations as result of operational phase bioaerosol emissions associated with the proposed pig rearing operations.

Poultry Rearing Operations

6.247 A review of the proposed Site layout for the poultry development indicated the following potential bioaerosol emission sources:

- Atmospheric releases from the stacks serving the proposed poultry rearing buildings;
- Fugitive releases from the administrative buildings containing bedding material; and,
- Atmospheric releases from the feed silos during filling.

6.248 As there will be no long-term storage of poultry litter at the Site this was not considered as a potential bioaerosol emission source in the assessment.

6.249 Reference should be made to **Figure 6.6A** for the bioaerosol emission source locations.

6.250 The potential magnitude of risk to sensitive receptors as result of releases from each of the identified bioaerosol sources is shown in **Table 6.63A**.

6.251 As indicated in **Table 6.63A**, the risk magnitude was determined to be minor at the sensitive receptor locations as result of operational phase bioaerosol emissions associated with the proposed poultry rearing operations

Pig and Poultry Rearing Operations

6.252 There is not anticipated to be cumulative pig and poultry bioaerosol emission impacts as there is sufficient distance between sources and receptors to allow bioaerosols to reduce to ambient baseline levels. As such, further assessment was not considered necessary.

Summary

6.253 Effects associated with operational phase bioaerosol emission impacts were predicted to be minor, long-term, permanent, irreversible, direct and unavoidable at all sensitive receptors.

Road Traffic Emissions

6.254 Any vehicle movements associated with the Proposed Development will generate exhaust emissions on the local and regional road networks. A road traffic exhaust emissions assessment was therefore undertaken using the criteria contained within the IAQM (IAQM, 2017) and NE (NE, 2018) guidance to determine the potential for trips generated by the scheme to affect local air quality at sensitive human and ecological receptors. The results are summarised in the following Section.

Pig Rearing Operations

6.255 The proposed pig rearing operations are predicted to produce the following vehicle movements:

- 6 AADT LDV movements; and,
- 3 AADT HDV movements.

6.256 Based on the above, vehicle movements associated with the proposed pig rearing operations are not predicted to exceed the IAQM or NE Stage 1 assessment criteria. As such, potential air quality effects as result of operational phase road traffic exhaust emission impacts on human and ecological receptors are predicted to be negligible.

Table 6.63A: Poultry Rearing Operations: Bioaerosol Risk Assessment

RECEPTOR	SOURCE	PROBABILITY OF EXPOSURE		HARM	RISK MAGNITUDE
		CATEGORY	JUSTIFICATION		
Proposed farm worker dwellings situated within the western part of the poultry development	Atmospheric releases from the stacks serving the proposed poultry sheds	Very low	<ul style="list-style-type: none"> Distance - Receptors are local to sources, positioned approximately 95m west of the closest proposed poultry shed Dispersion potential - Air will be extracted from the proposed poultry sheds and exhausted to atmosphere via stacks at a height of circa 7.5m. The relatively high level of release is anticipated to aid dilution and dispersion of bioaerosols Duration - Releases are anticipated to be constant over the rearing period. However, concentrations are likely to vary throughout, with maximum emissions occurring towards the end of a growth cycle when there is a greater amount of litter in the buildings Frequency - Relatively low frequency of winds between source and receptors (28.39%) 	Moderate	Minor
	Fugitive releases from the administrative buildings containing bedding material	Very low	<ul style="list-style-type: none"> Distance - Receptors are local to sources, positioned approximately 85m east of the closest admin building containing bedding material Dispersion potential - Bedding will be stored within enclosed structures. This is anticipated to contain emissions and limit releases to atmosphere Duration - Emissions assumed to be constant during storage Frequency of emission - Low frequency of winds between source and receptors (15.53%) 	Moderate	Minor
	Atmospheric releases from feed silos during filling	Very low	<ul style="list-style-type: none"> Distance - Receptors are distanced from sources, positioned approximately 125m west of the closest feed silo Dispersion potential - Poor dispersion of emissions from the exhaust outlet on each silo due to the adjacent poultry sheds Duration - Releases are anticipated to be short in-duration and limited to filling periods Frequency - Relatively low frequency of winds between source and receptors (23.03%) 	Moderate	Minor

Poultry Rearing Operations

- 6.257 The proposed poultry rearing operations are predicted to produce the following vehicle movements:
- ~~404~~ AADT LDV movements; and,
 - ~~87~~ AADT HDV movements.
- 6.258 It should be noted that the existing residential properties located off the farm access track are situated approximately 400m to the west of the poultry development. Bioaerosols associated with the proposed poultry rearing operations are not anticipated to significantly affect ambient levels at these locations due to the separation distance involved. As such, they were not considered as receptors in the following assessment.
- 6.259 Based on the above, vehicle movements associated with the proposed poultry rearing operations are not predicted to exceed the IAQM or NE Stage 1 assessment criteria. As such, potential air quality effects as result of operational phase road vehicle exhaust emission impacts on human and ecological receptors are predicted to be negligible.

Pig and Poultry Rearing Operations

- 6.260 The proposed pig and poultry rearing operations are predicted to produce the following vehicle movements:
- ~~4610~~ AADT LDV movements; and,
 - ~~4410~~ AADT HDV movements.
- 6.261 Based on the above, vehicle movements associated with the proposed pig and poultry rearing operations are not predicted to exceed the IAQM or NE Stage 1 assessment criteria. As such, potential air quality effects as result of operational phase road vehicle exhaust emission impacts on human and ecological receptors are predicted to be **negligible**.

Summary

- 6.262 Effects associated with operational phase road traffic exhaust emission impacts were predicted to be **negligible**, long-term, permanent, irreversible, direct and unavoidable at human and ecological sensitive receptors.

Evaluation of Predicted Impacts

Construction Phase

- 6.263 Effects associated with construction phase dust emissions were predicted to range between **minor adverse** and **major adverse**. Overall effects are considered to be **significant**. Mitigation has therefore been identified in **Table 6.64A**.

Operational Phase

Odour Emissions

- 6.264 Effects associated with operational phase odour emission impacts were predicted to range between negligible and minor adverse. The IAQM guidance (IAQM, 2018) indicates that only if the effect is moderate or major, the effect is considered significant. As such, overall effects are considered **not significant**.

Dust Emissions

6.265 Effects associated with operational phase dust emission impacts were predicted to be **negligible**. The IAQM guidance (IAQM, 2017) indicates that only if the effect is moderate or major, the effect is considered significant. As such, overall effects are considered **not significant**.

Ammonia Emissions

6.266 Effects associated with operational phase NH₃ emission impacts were predicted to be **negligible** due to the predicted decreases in annual mean NH₃ concentrations and nitrogen/ deposition rates attributable to the proposed change in rearing operations at the Site. As such, overall effects are considered to be **not significant**.

Bioaerosol Emissions

6.267 Effects associated with operational phase bioaerosol emission impacts were predicted to be **minor adverse**. As such, overall effects are considered **not significant**.

Road Traffic Emissions

6.268 Effects associated with operational phase road traffic exhaust emission impacts were predicted to be **negligible**. As such, in accordance with the IAQM (IAQM, 2017) and NE (NE, 2018) guidance, overall effects are considered to be **not significant**.

Mitigation

Construction Phase

6.269 The IAQM guidance (IAQM, 2016) provides potential mitigation measures to reduce impacts as a result of dust emissions during the construction phase. These have been adapted for the Proposed Development as summarised in **Table 6.64A**. These will be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan (CEMP), which can be secured through planning condition if required by KLWNBC.

Table 6.64A: Construction Phase Dust Emission Mitigation Measures

ISSUE	CONTROL MEASURE
Communications	<ul style="list-style-type: none"> • Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary. This may be the environment manager/ engineer or the Site manager • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site management	<ul style="list-style-type: none"> • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book

ISSUE	CONTROL MEASURE
Monitoring	<ul style="list-style-type: none"> • Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request • Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
Site preparation	<ul style="list-style-type: none"> • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used • Cover, seed or fence stockpiles to prevent wind whipping
Operating vehicle/ machinery and sustainable travel	<ul style="list-style-type: none"> • Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable
Operations	<ul style="list-style-type: none"> • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • Ensure an adequate water supply on the Site for effective dust suppression, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips • Minimise drop heights and use fine water sprays wherever appropriate • Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	<ul style="list-style-type: none"> • Avoid bonfires or burning of waste materials
Earthworks	<ul style="list-style-type: none"> • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable • Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable
Construction	<ul style="list-style-type: none"> • Avoid scabbling (roughening of concrete surfaces) if possible • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos
Trackout	<ul style="list-style-type: none"> • Use water-assisted dust sweeper on access and local roads, if required • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required

Operational Phase

- 6.270 Effects as a result of operational phase odour, dust, NH₃, bioaerosol and road traffic exhaust emissions were predicted to be **not significant**. As such, mitigation to further control potential impacts beyond the requirements of the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments is not considered to be necessary.

Residual Effects

Construction Phase

- 6.271 Assuming the relevant mitigation measures outlined in **Table 6.64A** are implemented, residual air effects as a result of construction phase dust emission impacts are predicted to be **negligible**, which is considered to be **not significant**.

Operational Phase

Odour Emissions

- 6.272 Residual effects as a result of operational phase odour emission impacts are predicted to be **minor adverse**, which is considered to be **not significant**.

Dust Emissions

- 6.273 Residual effects as a result of operational phase dust emission impacts are predicted to be **negligible**, which is considered to be **not significant**.

Ammonia Emissions

- 6.274 Residual effects as a result of operational phase NH₃ emission impacts are predicted to be **negligible**, which is considered to be **not significant**.

Bioaerosol Emissions

- 6.275 Residual effects as a result of operational phase bioaerosol emission impacts are predicted to be **minor adverse**, which is considered to be **not significant**.

Road Traffic Emissions

- 6.276 Residual effects as a result of operational phase road traffic exhaust emission impacts are predicted to be **negligible**, which is considered to be **not significant**.

Cumulative Effects

Construction Phase

- 6.277 Should the construction phase programmes of any other proposed developments within 700m of the Site overlap then there is the potential for increases in dust impacts at sensitive locations. However, the implementation of suitable mitigation at both the Proposed Development and any other schemes would reduce cumulative impacts to an acceptable level. As such, residual cumulative effects are predicted to be **not significant**.

Operational Phase

Process Odour, Dust and Bioaerosol Emissions

- 6.278 The potential for cumulative operational phase odour, dust, NH₃ and bioaerosol emission impacts as result of the Proposed Development in operation with any other schemes is summarised in **Table 6.65A**.

Table 6.65A Cumulative Operational Phase Process Emission Impacts

SITE	COMMENTS
Warren Energy Ltd - FUL/2021/0011	The proposals are for a reduction in the amount of feedstock and flexibility in the type of material processed by the Anaerobic Digestion (AD) plant.
Warren Energy Ltd - FUL2021/0013	Emissions will be controlled by an Environmental Permit issued by the EA. This will limit the potential for adverse impacts beyond the AD plant boundary and at sensitive receptors considered in this assessment. As such, cumulative operational phase emission impacts are not considered to be significant
Land at Former RAF, Methwold - 20/01279/FM	The proposals are for the development of free standing solar panels. The equipment does not produce any emissions to atmosphere. As such, cumulative operational phase emission impacts are not considered to be significant
Methwold Airfield, Brandon Road - 16/01963/FM	<p>The proposals are for the development of a poultry facility with capacity to house circa 300,000 broilers. An EIA was undertaken in support of the planning application for the scheme. A review of the assessment conclusions identified the following:</p> <ul style="list-style-type: none"> • Odour emission impacts a result of the proposed poultry rearing operations at sensitive receptors considered in this assessment were not predicted to be significant • An Ammonia Mitigation Plan will be implemented in order to reduce NH₃ emission impacts at ecological designations during operation • Dust emission impacts as result of the proposed poultry rearing operations at sensitive locations considered in this assessment were not predicted to be significant due to the distance between sources and receptors • Bioaerosol emission impacts were not considered in the EIA. However, due to the distance between sources and receptors considered in this assessment, cumulative impacts are not predicted to be significant <p>Based on the above, cumulative operational phase emission impacts are not considered to be significant</p>

6.279 Based on the information provided in **Table 6.65A**, residual cumulative operational phase odour, dust, NH₃ and bioaerosol emission effects are predicted to be **not significant**.

Ammonia Emissions

6.280 Emissions from other plans or projects may result in-combination impacts at the identified designations. However, as the project is predicted to result in a decrease in pollution levels alone, any adverse in-combination effect would be solely related to the other plan or project. These would be subject to a separate HRA process and any significant impacts mitigated accordingly.

6.281 Based on the above, a screening conclusion of no likely significant effect as a result of the development in-combination can be reached with regards to annual mean NH₃ concentrations and nitrogen/acid deposition rates on all designations. Residual cumulative operational phase NH₃ emission effects are, therefore, predicted to be not significant.

Road Traffic Emissions

6.282 There is potential for cumulative operational phase road traffic emission impacts should vehicles generated by the Proposed Development and any other schemes utilise the same road links. Traffic flows for each proposal were provided by Cannon Consulting. This data was subsequently utilised to calculate the in-combination AADT flow for comparison with the IAQM and NE Stage 2 assessment criteria. The results are summarised in **Table 6.66A**.

Table 6.66A: Cumulative Operational Phase Road Traffic Emissions: Total Annual Average Daily Traffic Flows

SITE	TOTAL AADT FLOW
Proposed Development	27 20
Warren Energy Ltd - FUL/2021/0011	67
Warren Energy Ltd - FUL2021/0013	
Land at Former RAF, Methwold - 20/01279/FM	3
Methwold Airfield, Brandon Road - 16/01963/FM	-(a)
In-combination AADT Flow	97 90

Note: (a) The Design and Access Statement (Plandescil, 2020) for the development confirms the scheme will not generate additional traffic as the solar panels will be monitored remotely using satellite technology.

6.283 As indicated in **Table 6.66A**, the in-combination AADT flow is not predicted to exceed the IAQM or NE Stage 2 assessment criteria. As such, effects as result of cumulative operational phase road traffic emission impacts on human and ecological receptors are predicted to be **negligible**. This is considered to be **not significant**.

6.284 It should be noted that the trips shown in **Table 6.66A** are prior to distribution across the local highway network. As such, increases on individual road links are likely to be lower than those stated in this assessment.

Monitoring

Construction Phase

6.285 Suitable measures to monitor compliance with the CEMP have been identified in **Table 6.64A**.

Operational Phase

6.286 Monitoring is not required for operational phase odour, dust, NH₃, bioaerosol and road traffic emission impacts beyond any measures outlined in the future Environmental Permit for the Site.

6.287 A summary of the impacts described within Chapter 6 is shown below in **Table 6.67A**.

Table 6.67A: Summary of Impacts: Air Quality and Odour

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Construction Dust Emission Impacts	Loc	High	Maj	Adv	Rev	ST	Mod	As shown in Table 6.64	Adv	Irrev	ST	Neg
Operational Phase Odour Emission Impacts	Loc	High	Min	Adv	Irrev	LT	Min Adv	None Required	Adv	Irrev	LT	Min Adv
Operational Phase Dust Emission Impacts	Loc	High	Min	Adv	Irrev	LT	Neg	None Required	Adv	Irrev	LT	Neg
Operational Phase NH ₃ Emission Impacts	Loc	High	Neg	-	Irrev	LT	Neg	None Required	Adv	Irrev	LT	Neg
Operational Phase Bioaerosol Emission Impacts	Loc	High	Min	Adv	Irrev	LT	Min Adv	None Required	Adv	Irrev	LT	Min Adv
Operational Phase Road Traffic Exhaust Emission Impacts	Loc	High	Neg	-	Irrev	LT	Neg	None Required	Adv	Irrev	LT	Neg

Key:

Loc: Local Maj: Major Irrev: Irreversible ST: Short-Term LT: Long-Term
 Min: Minor Neg: Negligible Rev: Reversible Adv: Adverse

Ecology



7.0 Ecology

Introduction

- 7.1 This chapter addresses the likely significant environmental effects of the Proposed Development on the ecology and nature conservation receptors of the Site and the surrounding areas. This chapter has been prepared by Hopkins Ecology Ltd. The approach to the impact assessment is outlined and the baseline ecological environment is described. The chapter then goes on to identify the aspects of the Proposed Development that may cause impacts on ecology and nature conservation, assesses the significance of any potential impacts, and identifies appropriate mitigation and enhancement measures and associated monitoring surveys. A detailed ecology survey report is presented in **Appendix 7.1A**.

Potential Impacts

- 7.2 Potential impacts as a result of the construction phase of the Proposed Development include direct habitat loss and disturbance to species from works, including factors such as noise and also dust. Potential impacts during the operational phase include disturbance of species, and air quality impacts on semi-natural vegetation, species, and designated sites.

Methodology

Ecological Assessment Guidance Documents

- 7.3 The Ecological Impact Assessment (EclA) of the Proposed Development broadly follows guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM 2019). To maintain consistency across the chapters of this ES the assessment follows the Chapter 2: Methodology, and where the methods differ then additional clarification is provided.

Baseline Data Collection

- 7.4 The study area used for the EclA incorporates the Site and surrounding area as appropriate. Areas within the Site and immediately adjacent have been considered, with extended survey areas for some taxa. These distances are considered a reasonable limit to consider whether impacts associated with the Proposed Development are likely to have an effect on features of nature conservation importance.

Desk-Based Study

- 7.5 Relevant ecological information has been obtained through a desktop study, with a data search commissioned from the Norfolk Biodiversity Information Service in 2020, for a search radius of 2km around the approximate site centre, equivalent to approximately 1.5km from the Site boundary, although a 10km radius was used for statutory sites. Information on the occurrence of stone curlews was obtained from the Royal Society for the Protection of Birds in November 2020, for a 2km radius from the centre of the Site and covering the period 2010-2020. Additional sources of information include the Multi-Agency Geographic Information for the Countryside (MAGIC) website and published literature.

Field Surveys

Phase 1 Habitats, Hedgerows and Botany

- 7.6 The extended Phase 1 habitat survey was undertaken on 16 May 2021 (following JNCC 2016) [with a verification survey and survey of the access routes on 20 January 2023.](#)

Great Crested Newts

- 7.7 A scoping exercise for possible breeding ponds of great crested newts within 500m resulted in one reservoir being scoped out. Environmental-DNA sampling of three other reservoirs was undertaken on 18 April 2021.

Bats

- 7.8 Bat surveys considered roosting within trees and structures and inspections followed standard Bat Conservation Trust guidelines (Collins 2016). The buildings inspection was detailed and sufficiently robust to conclude roosts were absent, while the tree assessment was from ground level. Inspections were on 18 April 2021.

Breeding Birds

- 7.9 Surveys were undertaken for breeding birds using a scaled-down version of the Common Bird Census (BTO undated) methodology which is appropriate for most lowland breeding bird species. Four visits were undertaken between 09 May and 16 June 2021. Specific stone curlew surveys by a licenced surveyor were undertaken on these dates and on 02 August 2021. Post breeding surveys were also undertaken in August and September 2020.

Reptiles

- 7.10 A scoping assessment was undertaken for the suitability of habitats for reptiles, using professional experience and generally informed by survey guidance (Froglife 1999).

Badgers and Brown Hares

- 7.11 Specific surveys for badgers were undertaken at the Site on 18 April 2021, looking for signs of presence, such as latrines and sett entrances (Harris 1989). Incidental observations for brown hares were made during breeding bird surveys (Harris et al. 2016).

Terrestrial Invertebrates

- 7.12 A walkover appraisal of habitats was undertaken by an experienced entomologist in April and May 2021. This considered the extent and quality of specialist microhabitats and resources of potential relevance to rare and scarce invertebrates.

Ecological Assessment Methodology

- 7.13 The approach to the ecological impact assessment is therefore as follows:
- Sites, habitats and species that might be affected by the Proposed Development are considered and baseline conditions are defined through the combination of desk-based study and field survey work.
 - The importance of those habitats is evaluated to place their relative biodiversity value, social / community and economic values in context.
 - Components of the Proposed Development that could potentially affect the Site, habitats and / or species are described.

- The effects of these impacts on species and / or habitats are predicted and where possible quantified. The levels at which these impacts are then considered to be significant are determined.
- Measures to avoid or reduce any significant effects, if possible, are then developed in conjunction with other elements of the design and mitigation for other environmental disciplines. Any residual effects of the development are then reported.
- Scope for enhancements are also considered.

- 7.14 With regards to stone curlews, the avoidance of buildings has been modelled by Clarke et al. (2013) who present an analysis of nesting density in relation to buildings and roads, with both having a negative correlation. The function shows a decline over distance, which is roughly linear in the range of 400-1000m.
- 7.15 The Biodiversity Net Gain calculation tool (Natural England 2021) allows for the quantification of change by comparing the overall value of habitats before and after the development, based on a function of area, quality and condition of habitats and location.

Evaluation of the Importance of Ecological Receptors

- 7.16 To determine the important biodiversity receptors, consideration is given to any statutory protection and overall characteristics, including overall species-richness of assemblages, rarity of individual species and assemblages and also the extent to which features are characteristic or 'good examples'. A number of schemes / criteria are proposed for assigning importance and value:
- 7.17 Breeding bird assemblages are assigned a value based on the criteria from Fuller (1980). Although these are not directly comparable to values within the spatial context used for other groups, the criteria are adapted such that <25 breeding species is equivalent to Local importance and 25-49 breeding species is equivalent to District importance.
- 7.18 Habitats and species of conservation concern are referred to according to a number of criteria either defined within the text or below:
- Habitats and species of principal importance are those contained within Section 41 of the Natural Environment and Rural Communities Act 2006 and identified within the National Planning Policy Framework as those species for which planning policies should promote their reservation and recovery.
 - Birds described as Red and Amber listed are those identified within Stanbury et al. (2021) as being at risk, based on small population size and / or decline criteria, with Red listed species at greater risk than Amber listed species. Species not of conservation concern are Green listed.
- 7.19 The geographical context at which a feature is important is separated from any legal protection, recognising that some receptors are potentially protected for reasons of animal welfare and that the same legislation can protect receptors of different importance, e.g. a bat roost of a singleton of a common species is not as important as a maternity roost of a rarer species. A level of professional judgement is therefore applied in assigning value, with the supporting evidence documented in individual sections.

7.20 The assigned value for each receptor reflects their geographic significance as indicated in **Table 7.1A** and is adapted from Chapter 2: Methodology of this statement. The magnitude of impacts and the significance of effects are derived according to those previously described in Chapter 2 of this Statement.

Table 7.1A: Geographic Context for Determining Nature Conservation Importance

GEOGRAPHIC CONTEXT	IMPORTANCE OF RECEPTOR	VALUE
Nature Directives (European)	International	Very high
UK	National	High
East Anglia	Regional	Moderate
Norfolk	County	Moderate
King's Lynn and West Norfolk Borough Council	District	Low
Parish (Methwold St George)	Local	Low / Very low
Site	Local	Very low

Existing Baseline Conditions

Sites

7.21 There are three Nature Directives sites within 10km, which are formed from eight component SSSI (**Table 7.2A**). The nearest Nature Directives site is the Breckland SPA, which is 135m east of the poultry rearing facility (east site), while the Breckland Area of Conservation (SAC) and Norfolk Valley Fens SAC are more than 2.9km from the Site. There are nine SSSIs within 10km which are not components of Nature Directives sites (the nearest of which is 3.03km north-east). One of the SSSIs sites is also a National Nature Reserve and one is also a Local Nature Reserve.

7.22 The nearest parcel of the Breckland SPA has the Breckland Forest SSSI as its component site, and this includes heathland vegetation and plants as designated features.

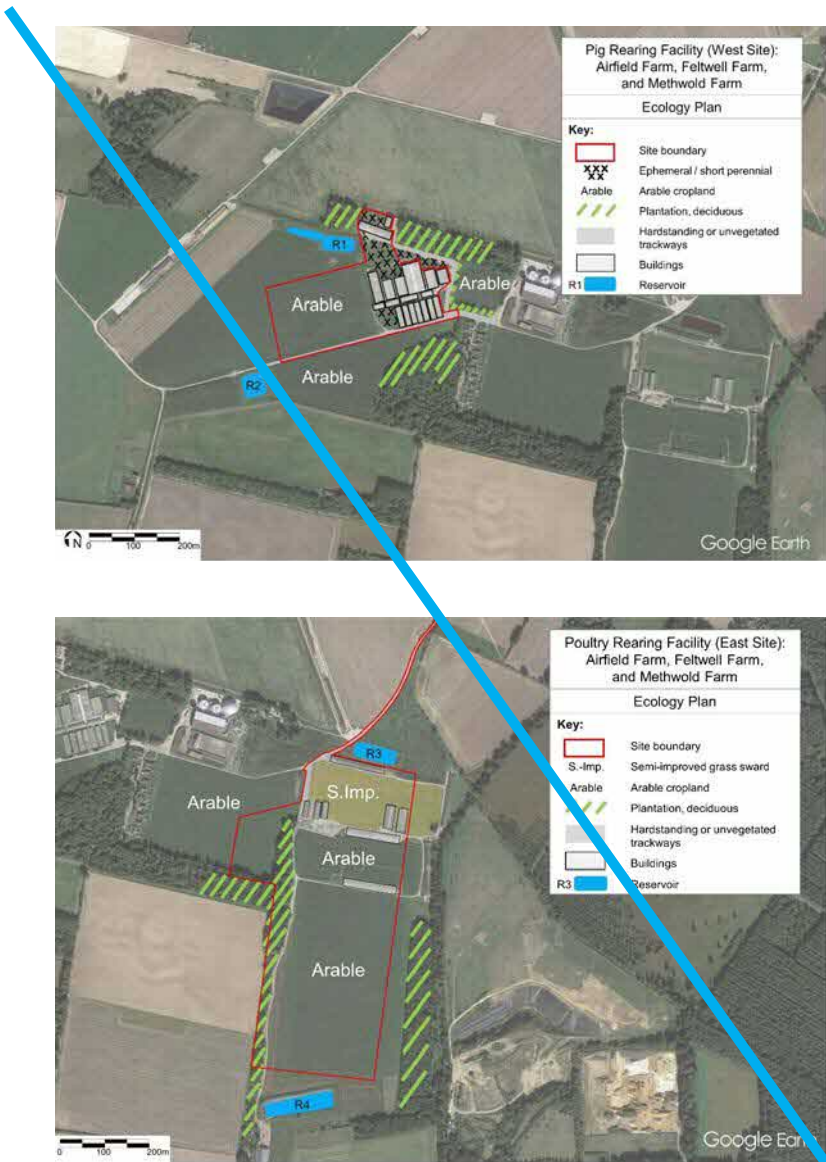
Table 7.2A: Descriptions of Nature Directives Sites within 10km of the Site Boundary (Defined as the Facilities Rather than Access Routes)

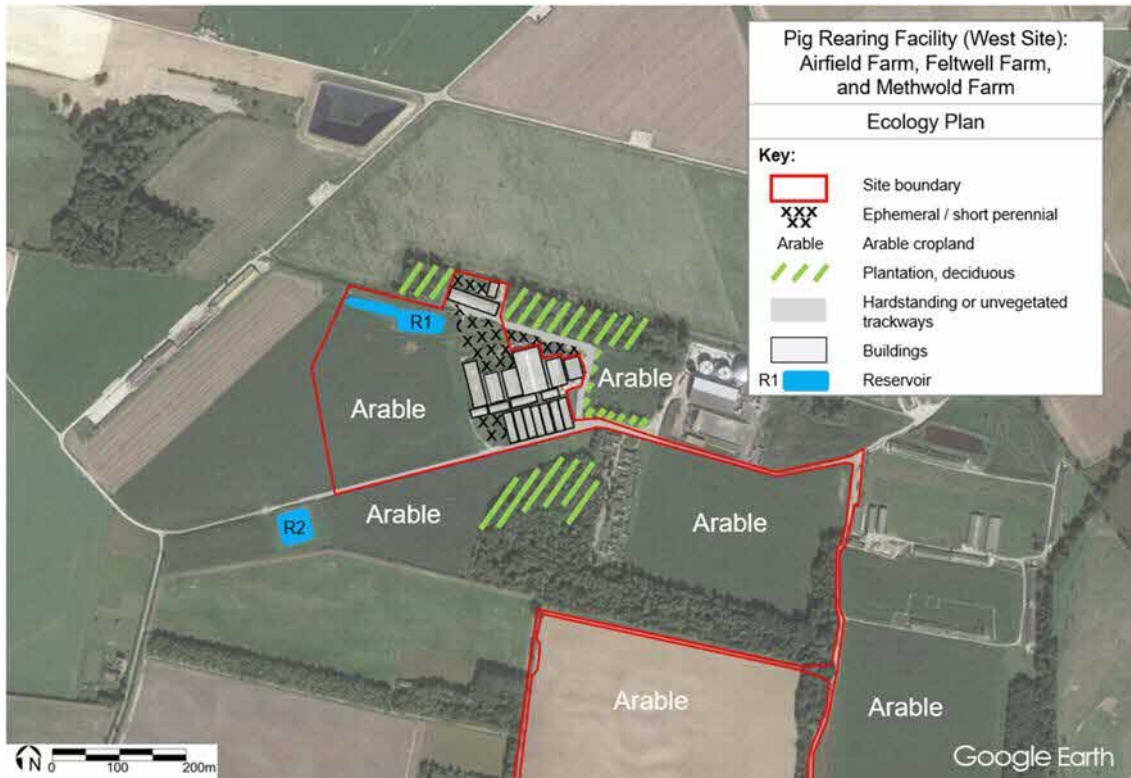
NATURE DIRECTIVES SITES	NEAREST LOCATION	COMPONENT SITES	OTHER COMPONENT SITES WITHIN 10KM	DESIGNATED FEATURES
Breckland SPA	145m east	Breckland Forest SSSI	6	Three species of breeding bird: stone curlew, woodlark, nightjar
Breckland SAC	2.96km south-east	Weeting Heath SSSI	5	Five habitats (Annex I) and great crested newts (Annex II)
Norfolk Valley Fens SAC	6.81km north-east	Foulden Common SSSI	None	Seven habitats (Annex I) and two wetland snail (Annex II)

7.23 There are no non-statutory County Wildlife Sites within 2km, and the nearest is 2.2km north-east (**of the rearing units**). There are three candidate County Geodiversity Sites within 2km, of which one is an active quarry 80m east of the Site.

Phase 1 Habitats

- 7.24 The pig rearing facility (west site, **Figure 7.1Aa**) comprises an existing complex of pig units plus a block of open farmland to the west, where the new facilities will be located. The non-arable vegetation comprises ephemeral short perennial areas around the buildings, where there is regular or occasional disturbance from farming operations, with the remainder to the west of the existing facilities being under cereals in 2021. There are a series of existing sheds.
- 7.25 The poultry rearing facility (east site, **Figure 7.1Ab**) comprises arable farmland, under cereals and sugar beet, a field of semi-improved (species-poor) sward managed by mowing and with some disturbance from farm operations, and a belt of mature deciduous plantation. There are a series of existing sheds.
- 7.26 The access routes run along a metalled road, across two arable fields and passes through two belts of deciduous plantation largely along existing track routes.





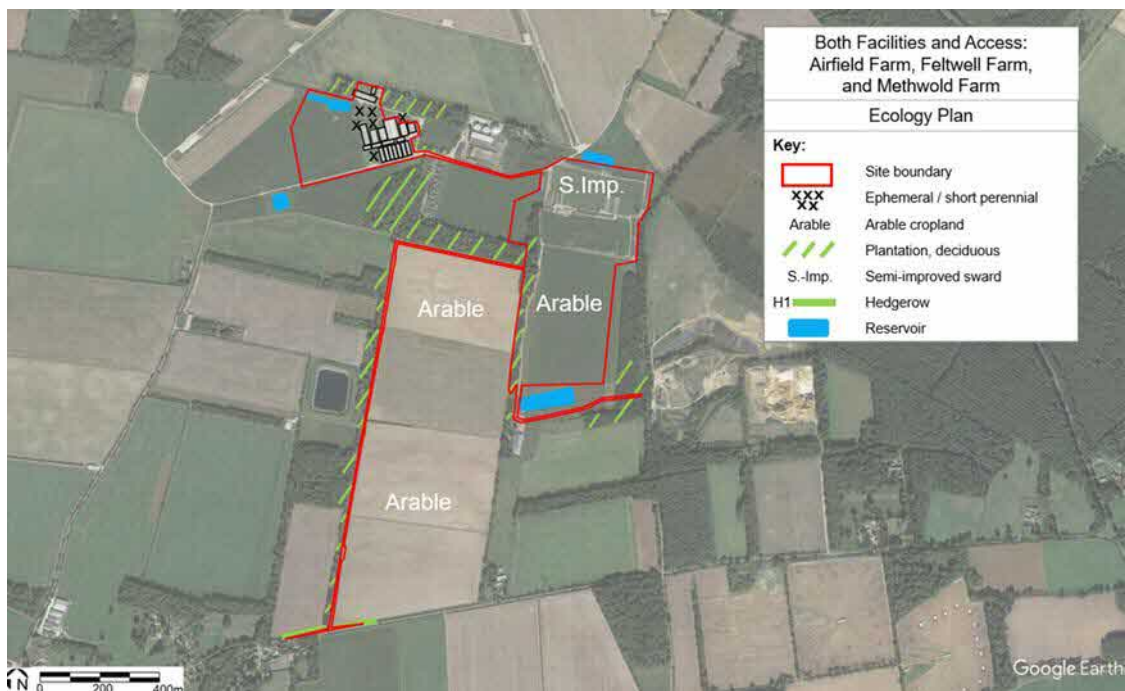


Figure 7.1A a-c and b: Ecology plans Plans for the tTwo fFacilities and the Access Routes

Species

Plants

7.27 No rare or scarce plants were recorded during the botany surveys. No species that are otherwise noteworthy were recorded (e.g. having a score within arable plant assessment schemes, following Byfield and Wilson (2005)).

Great Crested Newts

7.28 The environmental-DNA test results were negative, and great crested newts are concluded to be absent locally on this basis.

Bats

7.29 None of the trees within the Site or nearby are rated as having bat roost potential, and structures on-site are rated as having negligible bat roost potential, with most being single skin structures. Where structures had a more complex construction, then the inspection could adequately inspect relevant areas.

7.30 The wider Site is considered to be of low value for foraging bats, while the plantation belts are likely to be of greater value. The Site is considered to support a small assemblage of foraging bats.

Breeding Birds

7.31 In terms of the three Breckland SPA species:

- Stone curlews. The RSPB data provided information on 16 confirmed breeding records, the nearest from ~375m and the remainder at least 650m from the Site. There are additionally records of failed breeding attempts and attempts where the outcome is unknown, but all of these are also from >650m distant. No stone-curlews were seen during the 2020

August-September surveys or the 2021 breeding surveys May to August. The pig rearing facility (west site) had open arable fields, but these were considered to be of low quality, primarily due to human disturbance, proximity of tree belts and in three of the fields, the tall and dense wheat crop. The poultry rearing facility (east site) is of very low suitability due to its enclosed character with plantations and trees in close proximity. **The fields to the east of the new access from the B1112 are scoped out with respect to stone curlews by virtue of the proximity to the B1112 and the plantation belts creating an 'overly enclosed' series of fields rather than the preferred open fields.**

- Nightjar. No nightjars were observed, and the habitat within the survey area was wholly unsuitable for breeding. The nearest parcel of the Breckland SPA is suitable as breeding habitat.
- Woodlark. No woodlarks were observed and habitat within the survey area was of very low quality for nesting, a strip of fallow land at the extreme south-east corner of the poultry rearing facility (east site) offering perhaps the only potential habitat. The nearest parcel of the Breckland SPA is suitable as breeding habitat, and this is 135m east of the poultry rearing facility (east site).

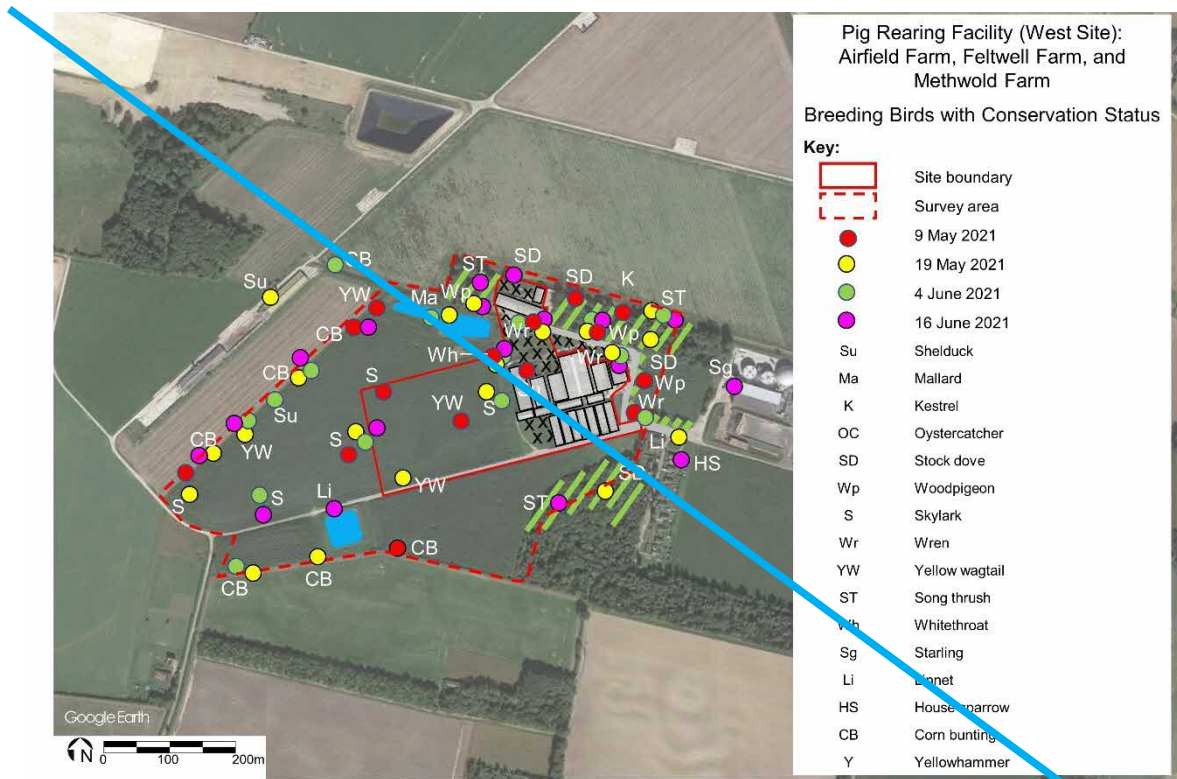
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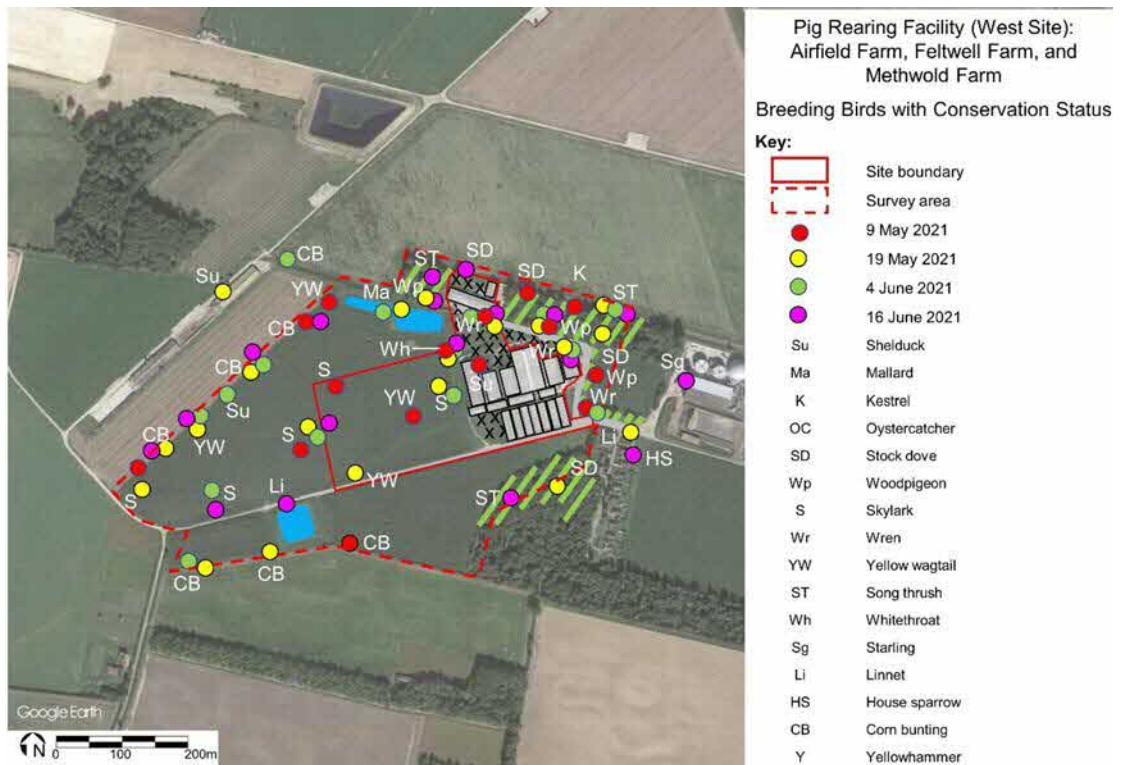
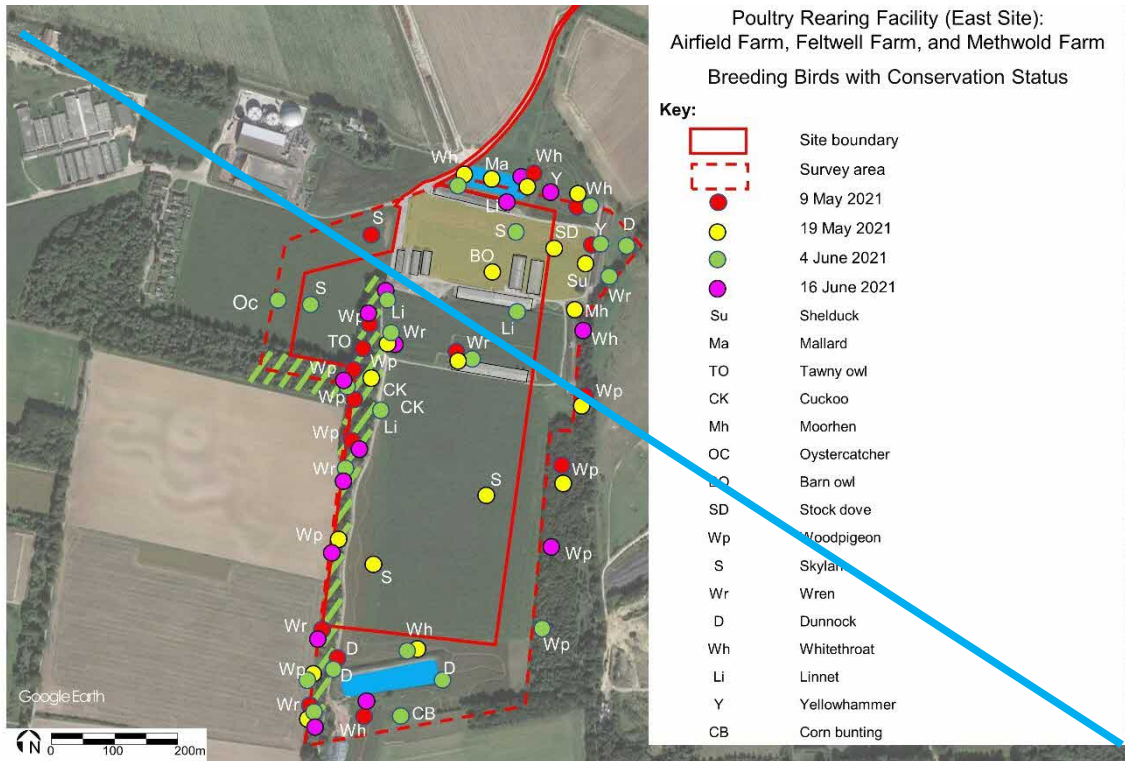
In terms of other breeding birds (and see **Figure 7.2A**) **the access routes are either scoped as being of low value for birds or otherwise included within the poultry facility survey area:**

- A total of fourteen species with conservation status were recorded as breeding species (confirmed/probable), and a further six were recorded as possibly breeding, none of which were likely to be nesting within the development area.
- The pig rearing facility (west site) had:
 - ~~Four~~**Five** breeding species (confirmed/probable/possible) with conservation status within its boundary: shelduck (probable), 1 pair; **mallard (probable), 1 pair**; stock dove (probable), 1 pair; skylark (probable), 1 pair; wren (probable), 3-4 pairs.
 - Within the wider survey area there were additionally another ~~twelve~~**eleven** (confirmed/probable/possible) breeders with conservation status: ~~mallard (probable), 1 pair~~; kestrel (possible), 1 pair; stock dove (probable), 1 pair; woodpigeon (probable), 2 pairs; yellow wagtail (confirmed), 2 pairs; song thrush (probable), 1 pair; starling (possible), 1 pair; common whitethroat (confirmed), 1-2 pairs; linnets (probable), 1 pair; house sparrow (possible), 1 pair; corn bunting (probable), 4-5 pairs; and yellowhammer (possible), 1 pair.
 - Also, within the wider survey area were the following confirmed/probable/possible breeders that were also present within the Site: shelduck (probable), 1 pair; stock dove (probable), 1-2 pairs; skylark (probable), 2 pairs.
 - Within the Site, some of these species are probably associated with the rearing sheds within the Site (nesting in their structures or within bales of straw or other material, for example shelduck and stock dove), the remainder are utilising open fields; boundary features such as old rabbit holes; or scrub / trees.
- The poultry rearing facility (east site) had:
 - ~~Seven~~**Eight** breeding (confirmed/probable/possible) species with conservation status within its boundary: woodpigeon (probable), 2-5 pairs; cuckoo (possible), 1 pair; tawny owl (possible), 1 pair; skylark (probable), 1 pair; wren (probable), 4-5 pairs; duncock (probable), 1 territory; **and** linnets (probable), 1-2 pairs; **and yellowhammer (possible),**

1 pair. Additionally, a barn owl pair is likely to be present (possibly breeding) (albeit not having conservation status but nevertheless having Schedule 1 protection).

- Within the wider survey area there were additionally another ~~five~~ four (confirmed/probable/possible) breeders with conservation status: oystercatcher (confirmed), 1 pair; moorhen (confirmed), 1 pair; common whitethroat (confirmed), 1-4 pairs; corn bunting (probable), 1 pair. ~~; and yellowhammer (possible), 1 pair.~~
- Also within the wider survey area were the following (confirmed/probable/possible) breeders that were also present in the Site: woodpigeon (probable), 2 pairs; skylark (probable), 1 pair; and dunnock (probable), 1 territory.
- Within the Site some of these species are associated with the rearing sheds, the plantation, open fields, boundary features or scrub.





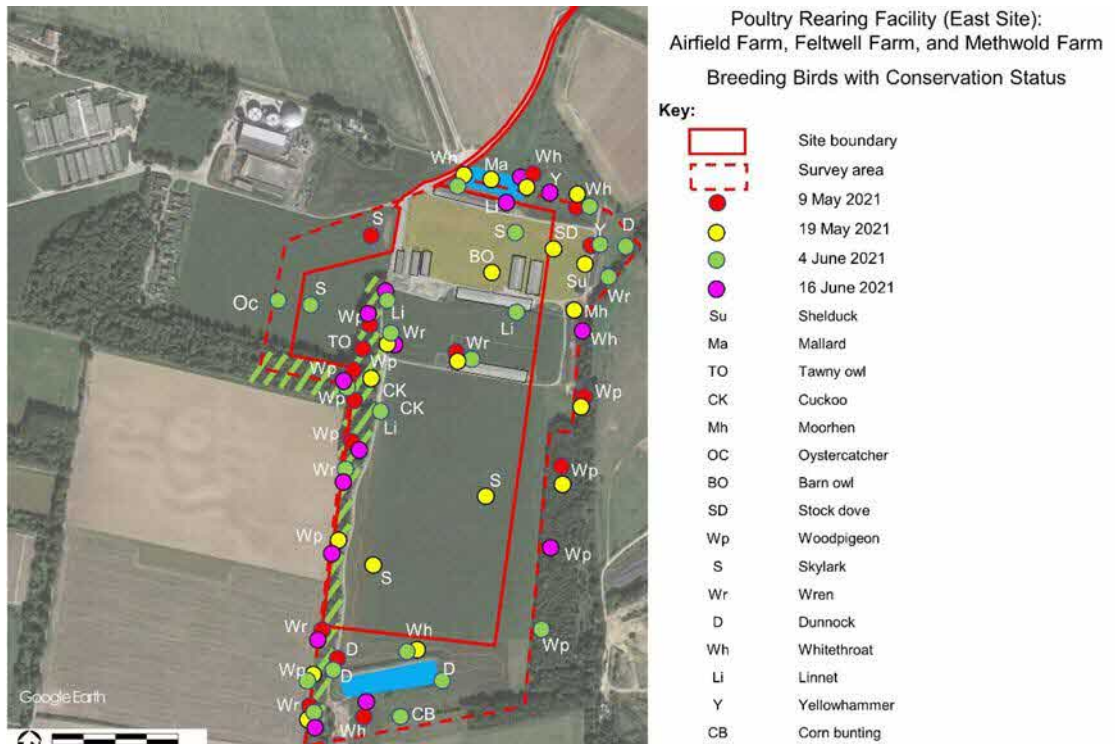


Figure 7.2A a and b. Breeding Bird Registrations for the Two Facilities

Reptiles

7.33 No reptile records were returned by the data search. The on-site habitat for reptiles is limited to the field verges, but throughout these are open and without cover or shelter. The larger block of potential habitat is the semi-improved sward within the poultry rearing facility (east site), but this has been managed via regular mowing and most recently no later than 2018, such that reptiles are scoped out of the assessment on this basis.

Small Mammals

7.34 No evidence of badgers was found, and brown hares were not seen during surveys. Hedgehogs are likely present locally and foraging on-site.

Invertebrates

7.35 The on-site habitats generally lack features associated with specialist species, such as dead wood within trees, mosaics of scrub and grassland and open grassland with structural variation including bare ground. The open areas of ephemeral / short perennial vegetation are generally over compacted substrate, and the arable margins are intensively cultivated. Given the low quality and extent of the open vegetation on-site and the generalist character of the other vegetation, it is concluded that the Site is only likely to support a small assemblage of generalist moths, with specialists unlikely to be present.

Summary of Baseline Condition

7.36 An overall summary of the survey results is presented below (**Table 7.3A**). A number of species / species-groups are scoped out on the basis that surveys did not record them, the habitat was unsuitable, or the numbers are almost certainly very low and can be scoped out. The species / species groups scoped out are:

- Botany and individual plant species;
- Great crested newts;
- Reptiles; and
- Badgers and brown hares.

Table 7.3A: Summary of Baseline Condition

LOCATION	RECEPTOR	DESCRIPTION
Off-Site	Designated sites: Nature Directives	Three sites within 10km, the Breckland SPA being the nearest at 135m and the other two >2.9km distant.
	Designated sites: national	Nine SSSIs that are not components of Nature Directive sites within 10km. Also, within 10km is a National Nature Reserve and one Local Nature Reserve. The nearest national site is >2.9km distant.
	County Wildlife Sites and candidate County Geodiversity Sites	The nearest County Wildlife Site is 2.2km north-east, and the nearest candidate County Geodiversity Site is 80m east.
On-Site	Habitats	Pig rearing facility (west site): arable and ephemeral / short perennial vegetation. Poultry rearing facility (east site): arable, of semi-improved (species-poor) sward, and mature deciduous plantation. Access routes: arable or existing tracks through plantation belts.
	Bats	Roosts: scoped out. Foraging: small assemblage.
	Breeding Birds	Pig rearing facility (west site): 16 species with conservation status within the Site or its survey area. Poultry rearing facility (east site): 12 species with conservation status within the Site or its survey area. Access routes: over arable or existing tracks through plantation belts, and scoped as being of low value or otherwise within survey areas for the poultry rearing facility.
	Hedgehogs	Hedgehogs probably present in low numbers as part of a wider population.
	Terrestrial invertebrates	A small assemblage of widespread moths.

Evolution of the Baseline Conditions without Development

7.37 Without the implementation of the Proposed Development the current operations will maintain current levels of disturbance and the vegetation largely within in its current condition, although some areas that are not subject to management or incidental disturbance from operations will undergo succession to ranker vegetation. As outlined later, Biodiversity Net Gain will be delivered by the scheme via areas of new landscaping, and these will not be planted in the absence of the Proposed Development.

Evaluation

7.38 The evaluation of the ecological features is summarised below (**Table 7.4A**), with the majority considered to be of Local importance and of very low or low value. The Nature Directives sites are of Very High value, the other statutory sites are of High value, and the non-statutory sites are of Moderate value. The breeding birds are the only species groups considered to be of District importance or Moderate value, based on the number of species or species that are specially considered scarce in Norfolk (corn bunting and cuckoo). This evaluation is considered appropriate for the two rearing facilities (east and west) when considered in isolation and together.

Table 7.4A: Evaluation of Ecological Receptors (for the two rearing facilities when considered in isolation and together)

LOCATION	RECEPTOR	IMPORTANCE	VALUE
Off-Site	Designated sites: Nature Directives	European	Very High
	Designated sites: National	National	High
	County Wildlife Sites and candidate County Geodiversity Sites	County	Moderate
Site	Habitats	Local	Very Low
	Bats	Local	Low
	Breeding Birds	District	Moderate
	Hedgehogs	Local	Very Low
	Terrestrial invertebrates	Local	Low

Predicted Impacts

7.39 The potential pathways of impacts are broadly classed as disturbance from construction and operation, including possibly recreational disturbance, air quality impacts and the direct loss of habitats:

- Construction-related noise and disturbance, principally in relation to the Breckland SPA birds.
- Dust from construction.
- Direct habitat loss from development footprints and changes in land use.
- Direct destruction and disturbance of nests during construction.
- Visual impacts on stone curlews.
- Noise and disturbance during operation.
- [Lighting during operation.](#)

- Vermin attracted to the rearing facility and either acting as direct predators of ground nesting birds or supporting elevated populations of other predators.
- Air pollution due to atmospheric ammonia, nitrogen deposition and acidification.

Construction Phase: Disturbance

Stone curlews and the pig rearing facility (west site)

- 7.40 Stone curlews were not recorded within the Site or the open farmland extending up to 500m west. Stone curlews on farmland to the west would be functionally linked to the Breckland SPA even if outside of the 1500m buffer. However, the likelihood of stone curlews in the vicinity was considered to be low due to disturbance from the existing facility and also walkers along the farm track running west. At most there would be a very low risk of disturbance to any birds that attempt to nest in the vicinity of works, and this would affect only low numbers of birds. Disturbance to woodlark and nightjar is not considered relevant given the distance to the nearest suitable habitat, which is within the Breckland SPA.

Woodlark and nightjar and the poultry rearing facility (east site)

- 7.41 The nearest suitable habitat for nesting is within the Breckland SPA at Methwold Warren 135m east. The intervening landfill blocks the line of sight from the Breckland SPA to the poultry rearing facility except for an estimated 4ha at the north of the Warren. Given the extent of screening and also distance it is concluded that the likelihood of sufficient disturbance to have an impact on the Breckland SPA is negligible.

Stone curlews and the poultry rearing facility (east site)

- 7.42 Stone curlews were not recorded during field surveys, and the poultry facility and relevant areas were specifically considered to have very little likelihood of stone curlews due to the enclosed character of the fields with boundary plantations. Construction of structures is not proposed within the 1500m buffer, although an attenuation feature will be partly within the 1500m buffer. In practice, there is substantial screening of the Breckland SPA from the poultry facility, with an intervening plantation belt, hedgerows and two roads including the main 'B' road into Feltwell from the east. It is not considered that construction of the buildings would impact the site integrity of the Breckland SPA.

Construction Phase: Dust

- 7.43 The Air Quality Assessment (Chapter 6) concludes that dust during construction has the potential to have a major adverse impact on habitats within the nearby parcel of the Breckland SPA and Breckland Forest SSSI. Although Breckland habitats are typically characterised as having disturbed soils (Dolman et al, 2017) and possibly tolerant of dusts, there is nevertheless the potential for changes in soil chemistry.

Construction Phase: Habitat Loss

- 7.44 In terms of species impacts, the Proposed Development will utilise areas used by a number of birds with conservation status, variously utilising buildings, open fields and field margins and scrub edge. The densities of species recorded on-site are relatively low and it is likely that there are vacant habitat areas nearby. As such, the loss of habitat is considered to be of low significance within the local landscape, and that territories would be displaced rather than lost.
- 7.45 Impacts on hedgehogs and widespread moths will result from the loss of habitat, mainly grassland and ephemeral / short perennial vegetation. Impacts will not be at a local population level.

Construction Phase: Direct Destruction and Disturbance of Nests

- 7.46 There is a risk of destruction of birds' nests if work commences during the active nesting season (which runs from March to August). Furthermore, stone curlews and barn owls are Schedule 1 species such that they are protected from disturbance while nesting. Although the risk of offences are low, particularly for stone curlews given that they are not believed to be nesting nearby, these cannot be wholly discounted.

Construction Phase: Visual Impacts on Stone Curlews.

- 7.47 Stone curlews are characterised as avoiding buildings, the mechanism of avoidance being visual intrusion.
- The pig rearing facility (west site) will extend buildings ~200m west from the current location. With reference to the disturbance function of Clarke *et al.* this would increase the disturbance function by roughly 0.1. However, within the landscape to the west (to a distance of at least 500m) it is not thought that stone curlews are nesting and although stone curlews outside of the Breckland SPA and its buffers may be functionally linked to the SPA population, the extent of visual intrusion is not considered sufficient to result in the deterrence of nesting over anything more than a minor area.
 - The poultry rearing facility (east) is outside of the 1500m buffer and as described for general disturbance (above) it is very unlikely that stone curlew are nesting nearby, and the location is screened from the SPA.

Operational Phase: Noise and General Disturbance Including Lighting

- 7.48 Operational noise is not anticipated to have more than a very localised increase, with activities at the pig rearing facility (west) unlikely to be significantly different from at present and those at the poultry rearing facility (east site) will be largely screened by the landfill site and nevertheless unlikely to extend as far as the Breckland SPA.
- 7.49 The poultry units will have individual spotlights at the front of each house to illuminate the loading area for work after dark and these will be activated via a motion sensor. Operations will therefore generate only a limited amount of light in total and during the period when woodlark and nightjar might be nesting within the SPA, then the extent of lighting is likely to be very low, e.g., from late-March sunset times are after 19.00 in the evening and site operations are unlikely to be that late in the evening. Irrespective, any light spill from the nearest shed towards the SPA would be very limited given the distance and also the raised landfill that occupies much of the intervening land.

Operational Phase: Vermin

- 7.50 Rodent control will be an integral part of the Site operations, not least for reasons of biosecurity but also to prevent the loss of feed and damage to housing and equipment by gnawing. The buildings will be modern units and with fewer potential access gaps than traditional units, and a 1m cordon free of vegetation will be maintained around each unit to deter digging. The Site operations will also limit the availability of food, with bulk delivery of feed directly into sealed silos and any spillage cleared up promptly. A vermin control company will also visit a minimum of eight times annually, and they will be deployed to deal with any visible rodent activity in-between scheduled visits.

Operational Phase: Recreational Disturbance

- 7.51 In relation to stone curlews the farmland to the west of the Site is relatively disturbed and judged to not be suitable for stone curlews on this basis. It is unlikely that the pattern and magnitude of recreational activity will change substantially following the construction of the facilities, either by works or the residents of the new workers' dwellings.
- 7.52 In relation to woodlarks and nightjars, a 400m buffer is typically applied in relation to recreational disturbance from new housing. The only new dwellings are for the poultry rearing facility (east site) and these are more than 400m from habitat on the Breckland SPA, while the pig rearing facility (west site) is more than 750m away.
- 7.53 Possible cumulative recreational disturbance from the four workers houses will be mitigated via a tariff payment as outlined within The Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy. As a requirement of local policies this item is considered to constitute inherent or embedded mitigation, and it is not considered to require assessment as a specific mitigation measure.

Operational Phase: Air Pollution

- 7.54 The technical assessment of ammonia-related air pollution (Chapter 6) concludes that ammonia concentrations, nitrogen and acid deposition will decrease at all sites. At all of the receptor stations included within the modelling the relevant levels decrease for the proposed pig facility and poultry facility when considered in isolation and in combination.
- 7.55 The technical assessment also concludes that any increases in emissions from changes to road traffic will be **negligible**.

Evaluation of Predicted Impacts

Construction Phase: Disturbance

- 7.56 Effects associated with construction phase disturbance are not considered likely to affect the Breckland SPA birds, through a combination of distance between their likely locations and the rearing facilities, with screening of the Breckland SPA at Methwold Warren by the landfill site also relevant. Disturbance to stone curlew, woodlark, and nightjar, and consequently the Breckland SPA and Breckland Forest SSSI are therefore **negligible**.

Construction Phase: Dust

- 7.57 The air quality assessment concludes that dust during construction has the potential to have a major adverse impact on habitats within the nearby parcel of the Breckland SPA and Breckland Forest SSSI. As a precautionary measure this effect is attributed to both facilities separately and cumulatively, and by impacting a feature of very high value, the effect would be **major adverse**.

Construction Phase: Habitat Loss

- 7.58 In terms of species impacts, the Proposed Development is likely to result in the loss of only a small area of poor-quality habitat locally and result in the displacement rather than loss of bird territories. This is considered to be a neutral impact and the overall effect is considered to be **negligible**.

Construction Phase: Direct Destruction and Disturbance of Nests

- 7.59 There is a risk of destruction and disturbance of birds' nests if work commences during the active nesting season (which runs from March to August). There is a possibility, albeit very low

likelihood, of disturbance to stone curlews from the pig rearing facility (west site) and these birds would be a small component of the Breckland SPA population and possibly functionally linked (such birds are assigned a value of 'high'). This is considered to be an impact on individual birds rather than being relevant in the context of the integrity of the Breckland SPA. Any destruction or disturbance from the poultry rearing scheme (east site) would be species that are not SPA species (although the barn owl is a Schedule 1 species). The magnitude of impact (notwithstanding legal protection) would be minor adverse on receptors of high and low value respectively, such that the effect would be **moderate / minor adverse** and **minor adverse** for the pig rearing facility (west site) and poultry rearing facility (east site) respectively.

Construction Phase: Visual Impacts on Stone Curlews.

- 7.60 Stone curlews are characterised as avoiding buildings, the mechanism of avoidance being visual intrusion. Evidence of this avoidance can be found up to distances of 1500m but given the local distribution of stone curlews and the location of the pig rearing scheme the extent of this intrusion is considered to be neutral. Likewise, the poultry rearing scheme is outside of the 1500m buffer and screened from the SPA, such that the intrusion is also assessed as neutral. The effect of visual intrusion is therefore **negligible**.

Operational Phase: Noise and General Disturbance

- 7.61 Operational noise and disturbance **including lighting** is not anticipated to have no more than a very localised increase or change, and not significantly extend as far as the Breckland SPA or otherwise affect stone curlews. This effect is considered to be **negligible**.

Operational Phase: Vermin

- 7.62 **As an integral part of site operations there will be vermin control. As such, vermin acting as direct predators of ground nesting birds or any role in elevating the numbers of other predators are considered to be negligible.**

Operational Phase: Recreational Disturbance

- 7.63 Recreational pressure from residents and workers is not anticipated to change substantially from the level currently experienced within the Breckland SPA and areas of farmland. For both facilities the effect is considered to be **negligible**.

Operational Phase: Air Pollution

- 7.64 During operation, the levels of ammonia-related pollution will decrease, such that there will be a neutral change to designated sites. This decrease is for both of the facilities when assessed separately and cumulatively. It cannot be concluded that this change will be beneficial without additional research, therefore the overall effect is assessed as **negligible**.

Mitigation

- 7.65 Two impacts are assessed as being more than negligible, namely dust deposition on the Breckland SPA during construction and disturbance and destruction of nests during construction. Mitigation is proposed for both, both of which could be secured by condition. The mitigation proposed during the construction phase therefore comprises:
- Nesting birds: The active nests of all species are protected from destruction, therefore the clearance of vegetation should either be outside of the nesting bird season (which runs from March to August) or otherwise following an inspection to confirm none are present. Schedule 1 species namely barn owls and stone curlews additionally receive protection from disturbance while nesting. Barn owls may be nesting within the sheds on the poultry

facility (east site), and although the likelihood of stone curlews on open ground near the pig facility is very low, they cannot be wholly discounted. If these species are nesting, then they would have implications for works over a wider area that might result in disturbance. For both these species therefore, if works commence during the nesting season then inspection by a suitably licenced surveyor should be undertaken to confirm the absence of nesting birds and / or determine suitable zones from where disturbance may result.

- The mitigation for dust impacts during construction is outlined in greater detail in Chapter 6, but broadly it comprises the implementation of an appropriate strategy for dust suppression, using industry standard methods.

7.66 Enhancements can be delivered by the two facilities, via soft landscaping, to comprise areas of woodland planting, grassland and sparse scrub planting, new hedgerows and also planting within attenuation features. In qualitative terms the planting will provide an increase in overall habitat availability for species present within the Site, for example new grassland-scrub mosaics will be suitable for nesting by linnets and foraging by skylarks.

7.67 Calculations for Biodiversity Net Gain, considering the on-site habitat and post-development habitats demonstrate a net gain for the facilities in combination (+~~29.75~~19.4%), and the two facilities when considered in isolation (+~~82.13~~45.2% for the pig rearing facility; +~~18.9~~18.2% for the poultry rearing facility). **The reduction in netgain figures is largely driven by the changes in the red line increasing the gross of units within the baseline, and consequently the absolute greater number of units required to gain a relative increase of the same magnitude. Additional drivers are the different areas of habitats within the amended red line.**

Residual Effects

7.68 The residual effects of the scheme are considered to be beneficial. Ammonia-related pollutants will decrease on all designated sites (ammonia concentrations, nitrogen and acid deposition), although the benefits of this in terms of ecology cannot be quantified. The landscaping proposals are expected to provide qualitative benefits and increased habitat areas for a number of species, and will deliver in excess of 10% Biodiversity Net Gain.

7.69 Following the implementation of the mitigation measures outlined in the section above, residual effects as a result of construction dust and effects on nesting birds were considered to be negligible and not significant.

Summary of Impacts

7.70 The Proposed Development will result in a decrease in ammonia-related pollution, with a reduction in ammonia concentrations, nitrogen and acid deposition at designated sites. Although the impacts and effects are not quantified, this is likely to be beneficial. Dust generated during construction would have an adverse impact on the Breckland SPA, but this can be adequately mitigated.

7.71 Construction has the potential to disturb nesting birds and active nests, with stone curlews and barn owls both having specific protection from disturbance. Although the likelihood of disturbance to stone curlews is very low given their absence locally, mitigation should be implemented to ensure legal compliance. It is possible that barn owls could nest in sheds to be demolished. For all nesting birds, legal compliance can be achieved through timing the start of works to avoid the nesting bird season (March to August) or the use of a watching brief.

7.72 Other pathways of potential impacts are assessed as having negligible effect, including general

disturbance, [lighting, predation of ground-nesting birds by vermin](#) and visual intrusion with respect to stone curlews. The loss of existing habitat is thought likely to result in the local displacement of some birds rather than the loss of territories.

- 7.73 The landscaping for both facilities will generate Biodiversity Net Gain, with additional qualitative benefits for species present locally including birds.

Cumulative Effects

- 7.74 In terms of cumulative impacts and effects, it is not thought that other schemes (including Land at former RAF Methwold 20/01279/FM, construction of a poultry unit at Methwold Airfield 16/01963/FM and applications FUL/2021/0011 and FUL/2021/0013 at Warren Energy) will interact with the Proposed Development with respect to ecological receptors. In relation to air quality and pollution these have been considered separately in Chapter 6. In terms of visual and other disturbance, these schemes would represent discrete structures in the landscape, separated from the pig rearing and poultry rearing facilities and they are also largely screened within the landscape by existing trees belts and structures. For the two larger schemes, at RAF Methwold and Methwold Airfield, project-level Habitat Regulations Assessments concluded that these would not impact the site integrity of the Breckland SPA in isolation. In combination impacts with the Proposed Development are considered unlikely by virtue of the separation from the Site and the overall level of existing screening afforded by trees and buildings.

Monitoring

- 7.75 A visual appraisal of the landscaping is proposed to ensure that it develops to provide the ecological services required for the mitigation of impacts, i.e. sufficient floristic diversity and a developing mature structure. The monitoring should be undertaken as part of the wider establishment and initial management of the landscaping. This can be outlined in a management plan and secured by planning condition.

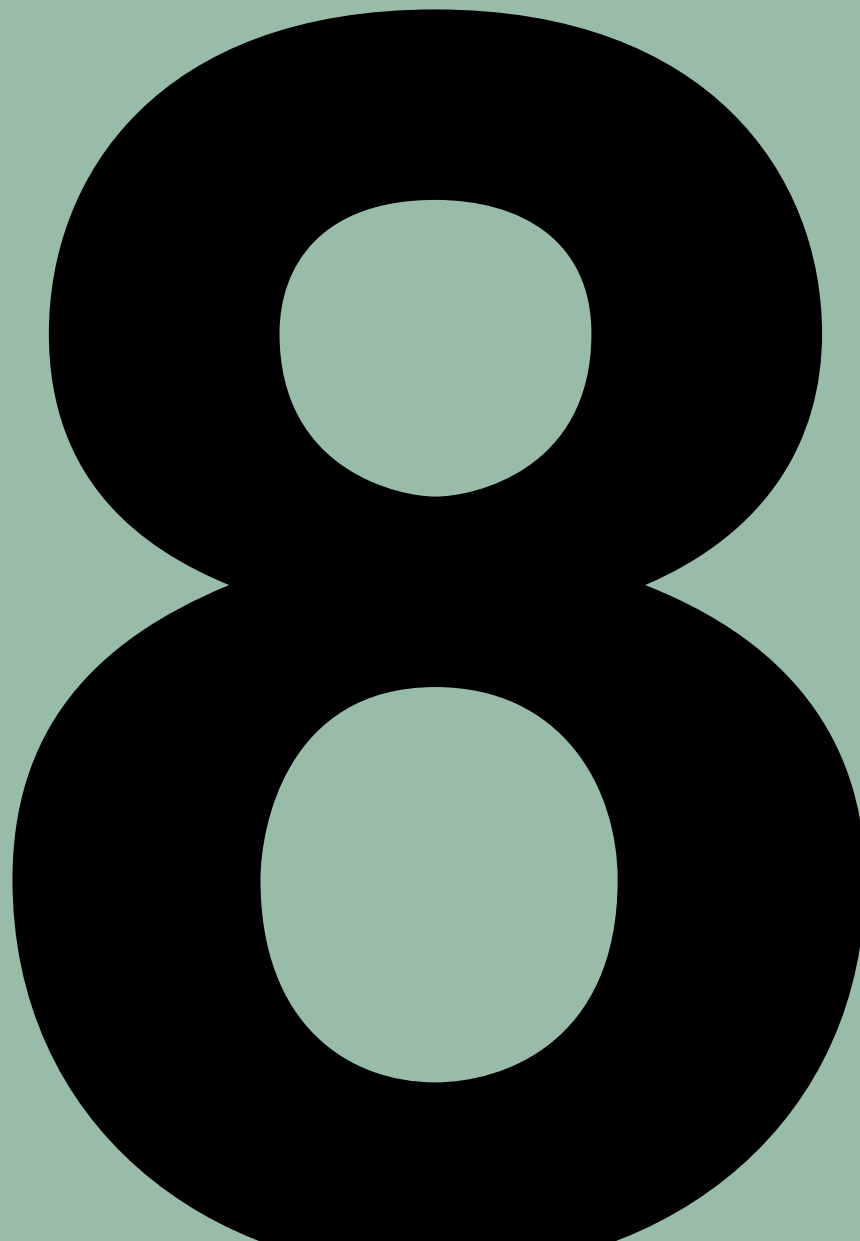
Table 7.5A: Summary of Impacts: *Ecology*

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE
Impact of construction dust	European	Very High	Maj	Adv	Irrev	ST	Min	Industry standard methods to limit dust production and release (see Chapter 6)	Adv	Irrev	ST	Neg
Destruction and disturbance of nests (including lighting and vermin)	European	High	Min	Adv	Irrev	ST	Mod	Timing of the start of works to avoid the nesting season (which runs from March to August) or the use of an ecological watching brief	Adv	Irrev	ST	Neg

Key:

Loc: Local Maj: Major Irrev: Irreversible ST: Short-Term Mod: Moderate
 Min: Minor Neg: Negligible Rev: Reversible Adv: Adverse

Flood Risk and Drainage



8.0 Flood Risk and Drainage

Introduction

- 8.1 This chapter addresses the flood risk and drainage impacts of the Proposed Development. It has been prepared by Canham Consulting Ltd to assess the impacts of the Proposed Development in relation to the effects it would have on the flood risk and drainage network in the local area.
- 8.2 This chapter draws primarily on information collated from a Flood Risk Assessment (FRA) and Drainage Strategy (DS).
- 8.3 The Technical Appendices that support this chapter include:
- Appendix 8.1A: Flood Risk Assessment Pig Facility;
 - Appendix 8.2A: Flood Risk Assessment Poultry Facility;
 - Appendix 8.3A: Drainage Strategy ~~and~~ Proposed Drainage Plans ~~and~~ Calculations
 - Appendix 8.4A: Infiltration Test Results ~~and~~ Percolation Test Results

Potential Impacts

- 8.4 Once the Proposed Development is operational, this will result in an increase in the impermeable area at the Site which has the potential to increase the risk of surface water flooding. This could lead to increased surface water runoff from the Site.
- 8.5 During construction, the SuDS and drainage features will not be installed and, therefore, there is a risk of exceedance events and contaminated surface water runoff.
- 8.6 The use of groundwater in the area makes the Site highly vulnerable to pollution. Therefore, particular regard needs to be had to the proposed surface water discharge with clarification on whether the abstraction point located within the wider site area is used for human water consumption, and if the Proposed Development will have any impact on the abstraction site.

Methodology

- 8.7 The methods used to undertake this assessment includes the works as outlined below.
- 8.8 Environment Agency records in relation to the abstraction point located in the wider site area were obtained. It has been confirmed that the abstraction is used for human water consumption. The groundwater is, therefore, considered sensitive.
- 8.9 The FRA and Drainage Strategy have involved the following steps:
- Review of the Proposed Development and relevant planning policies;
 - Review of sources of potential flooding (fluvial, tidal, surface water, sewer);
 - Examination of existing and proposed ground levels in relation to surface water flood risk and overland flows; and
 - Examination of existing and proposed impermeable areas and drainage arrangements.
 - Identification of appropriate mitigation measures for any potential adverse effects of flooding at the Site, taking into consideration climate change and surface water runoff associated with the development.

- [Update to Drainage Strategy to address Lead Local Flood Authority \(LLFA\) and Environment Agency \(EA\) comments.](#)

- 8.10 The SuDS Hierarchy has been used. The hierarchy seeks a prioritised order of discharge targeted at dealing with flows as close to the source as possible along the lines of the following list (in order of preference):
- Store rainwater for later use;
 - Use infiltration techniques, such as porous surfaces in non-clay areas;
 - Attenuate rainwater in ponds or open water features for gradual release;
 - Attenuate rainwater by storing in tanks or sealed water features for gradual release;
 - Discharge rainwater direct to a watercourse;
 - Discharge rainwater to a surface water sewer/drain; and
 - Discharge rainwater to the combined sewer.
- 8.11 Reviewing the above list from the top down, there is scope in exploring the potential for each of the potential discharge solutions, but the prime focus for the DS, would be to seek an infiltration method and reuse if suitable.
- 8.12 Infiltration testing to BRE365 has been undertaken which has informed the DS and demonstrates that infiltration is feasible. [Further infiltration tests have been undertaken during December 2022 at the location and depth of the proposed infiltration features. The drainage calculations have been updated accordingly.](#)
- 8.13 Given the DS is to use infiltration, and the local abstraction (receptor) which is considered a low sensitive value as it is only important locally, the Proposed Development is considered to be neutral, as no meaningful change to the receptor will occur with implementation of the DS, pollution control etc. Therefore, the significance of environmental effects is considered negligible.
- 8.14 The assessment of baseline conditions uses NPPF Guidance, Local Planning Policy and the Sequential Test to assess the level of flood risk at the Site.
- 8.15 The assessment of potential and residual effects has used the terminology described in **Table 8.1A** below.

Table 8.1A: Significance Criteria Determining Magnitude of Impacts

	MAGNITUDE	CHARACTERISTICS OF CHANGE
	Major Beneficial	The Proposed Development would remove features that adversely affect the existing environment, prevent further degradation, and enhance and protect the environment in the long-term.
	Moderate Beneficial	The Proposed Development would notably reduce rate of current degradation and/ or enhance existing character.
	Minor Beneficial	The Proposed Development would reduce rate of current degradation.
	Neutral	The Proposed Development would not result in any meaningful change to the receptor/ resource.
	Minor Adverse	The Proposed Development would increase the rate of current degradation or introduce some minor detractors into the environment.

	MAGNITUDE	CHARACTERISTICS OF CHANGE
	Moderate Adverse	The Proposed Development would result in the partial loss of a resource or notably degrade a receptor environment.
	Major Adverse	The Proposed Development would result in the complete loss of a resource or compromise the integrity of a receptor such that its long term survival is highly unlikely.

8.16 Effects are assessed as being either temporary or permanent.

Existing Baseline Conditions

Fluvial Flood Risk

8.17 The Site is in the EA Flood Risk Zone 1 and is considered at a low risk of flooding from fluvial (rivers & sea) sources.

8.18 The Proposed Development is considered appropriate for this location as shown in **Table 8.2A**.

Table 8.2A: Sequential Test

FLOOD RISK VULNERABILITY CLASSIFICATION		ESSENTIAL INFRASTRUCTURE	WATER COMPATIBLE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE
Flood Zone Classification	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception test required	✓	✓
	Zone 3a	Exception test required	✓	x	Exception test required	✓
	Zone 3b	Exception test required	✓	x	x	x

✓ Suitable for Development

x Not Suitable for Development

Pluvial (rainwater) Flood Risk

8.19 The existing Site has an impermeable area of 3.229ha consisting of roofs and hard standing. Currently this water is free to drain to the existing land surrounding the farm.

8.20 The Site is identified as being in a low to medium risk area from pluvial sources (surface water flooding).

8.21 Mapping (**Figure 8.1A**) shows an area of localised ponding around the existing farm buildings. There are no surface water flow paths shown to be going through the Site. The depth of flooding is shown to be below 300mm.

Groundwater Flood Risk

8.22 The environmental sensitivity of the ground conditions at the Site location has been examined using the online DEFRA Magic Map service. A summary of this information can be seen in **Table 8.3A** below.

Table 8.3A: Groundwater Sensitivity Classification

CLASSIFICATION	CLASSIFICATION AT THE SITE
Nitrate Vulnerable Zone (NVZ)	Yes
Source Protection Zone	No
Aquifer (Bedrock)	Principal Aquifer
Aquifer (Superficial)	None Recorded
Groundwater Vulnerability	High (not currently at risk)



Figure 8.1A: Surface Water Flood Map

8.23 The flood risk from groundwater is considered to be low. The Site is located on an aquifer and the ground water is, therefore, vulnerable to Nitrate pollution.

Nitrate Vulnerability Zone (NVZ)

8.24 The Site falls within two vulnerability zones. These are:

- Groundwater 71 - Anglian Chalk; and
- Surface Water 390 - Ely Ouse and Cut-off channel.

Climate Change

8.25 Climate change factors, as defined by NPPF Technical Guidance, should be applied to the peak rainfall intensity. A 50-year lifespan for the development has been considered as the Proposed Development use is considered as 'less vulnerable'.

8.26 National (EA) Guidance on Flood Risk Assessments and climate change allowances, Table 1 titled 'peak rainfall intensity allowance in small catchments (less than 5km²) or urban drainage catchments (based on a 1961 to 1990 baseline)', shows that in small and urban catchments a central level of 20% and upper end of 450% peak rainfall intensity allowance should be used to assess the range of impacts.

- 8.27 For the purposes of this assessment, it is proposed that a conservative approach is considered and that a climate change factor of +450% is utilised on all drainage calculations.

Evolution of the Baseline Conditions without Development

- 8.28 The Proposed Development will result in betterment to the current surface water runoff scheme by providing rainwater harvesting storage, attenuation and soakaways. The strategy is in line with Norfolk County Council (NCC) Lead Local Flood Authority (LLFA) guidance document [V6.1. dated October 2021](#).
- 8.29 Without the Proposed Development, the current drainage strategy would remain, whereby the surface water would run off and infiltrate, with no re-use.

Evaluation of Predicted Impacts

Surface Water Drainage

- 8.30 During construction, it is possible that surface water may run off without suitable treatment.
- 8.31 Once operational, the Proposed Development will result in an increase in impermeable area which will increase the volume of surface water runoff.
- 8.32 The proposed DS for the proposed pig facility is for clean water from roofs [to filter into underground soakaways to be collected, filtered, and stored in an underground rainwater harvesting tank. The tank will overflow into a soakaway](#) (infiltration rates have been confirmed by Ground Investigation in [Appendix 8.4A](#)).
- 8.33 Semi contaminated water from access roads will drain to a system of filters strips, prior to draining into a soakaway.
- 8.34 [Dirty water from shed washdown will be collected and stored in an below-ground tank, prior to being stored in a covered lagoon and then used for spreading on fields. Dirty Water from the yard area will be channelled to a foul sump prior to pumping to an above ground storage tank. The sump and tank will be sized accordingly and emptied monthly.](#)
- 8.35 The proposed DS for the proposed poultry facility is for surface water from the roofs to discharge via infiltration. There will be a separate infiltration basin for the roof area and road/ external areas. The surface water from the external areas will be treated via [an articulate interceptor for the road areas and](#) an infiltration trench, before reaching the infiltration basin. [There will be a penstock valve that is closed during periods of washdown, so dirty water is diverted to the foul system and does not enter the infiltration basin.](#)
- 8.36 The proposed dwellings will discharge surface water via a soakaway. The soakaway will receive roof water and water from the access road.
- 8.37 [The new access road will have a fall and drain to a French drain along the south side of the road.](#)
- 8.38 Accounting for the above, the potential effect of construction workers upon surface water would be **negligible** significance, which is not significant in EIA terms.
- 8.39 The proposed DS results in a **minor beneficial** impact with the surface water drainage being designed to cater for the 1 in 100 years plus 450% climate change. This will be for the

long-term. The surface water will be treated and discharge via infiltration, with storage provided for the 1 in 100 years plus climate change event, which will hold the additional volume of runoff, providing betterment to the current situation.

- 8.40 The potential effect of pollution to the ground water would be **minor adverse** significance without any mitigation.

Surface Water Contamination

- 8.41 Once the Proposed Development is operational, there will be an increase in risk of surface water pollution from pig manure in Nitrate Vulnerability Zone (NVZ).

- 8.42 During construction, the SuDS and drainage features will not be installed and, therefore, there is a risk of exceedance events and contaminated surface water runoff. These risks will be mitigated as outlined in the mitigation section of this chapter. The potential effect of contamination during construction would be **minor adverse** significance.

- 8.43 The potential effect of construction upon surface water and the groundwater NVZ would be **minor adverse** significance without any mitigation.

Ground Water- NVZ

- 8.44 The groundwater NVZ is at risk from surface water flows that haven't been treated during construction and during operation.

- 8.45 There is the risk from nitrate pollution, due to the manure generated from the Proposed Development during operation.

- 8.46 It is proposed that any manure will be stored undercover in the old farm buildings so the risk of runoff will be reduced. The location is not near a spring or borehole.

Foul Water Drainage

- 8.47 For both the pig and poultry sites, dirty water from wash down will be collected and stored in an above ground tank, prior to being disposed of locally (spread on fields). [There will be a penstock valve that is closed during periods of washdown, so dirty water is diverted and does not enter the infiltration basin.](#)

- 8.48 The effect of Nitrate pollution could be **moderate adverse**. However, with mitigation and appropriate storage, the effect is likely to be **negligible**.

- 8.49 [Foul Water from toilets \(offices and residential dwellings\) will go via a private sewage treatment plant \(one for residential units and one for each office\) and to infiltration via a drainage field. Percolation tests have been undertaken to size the drainage fields.](#)

- 8.50 [There will be no effluent from the heat exchangers as part of the proposed poultry facility.](#)

- 8.51 [Slurry will be collected and stored in a tank before being pumped out by tankers and exported offsite.](#)

- 8.52 [Any waste will be exported offsite.](#)

- 8.53 The proposals will be **negligible** on the flood risk and drainage network in the local area.

Mitigation

- 8.54 The proposed DS results in a positive impact, with the surface water drainage being designed to cater for the 1 in 100 years plus 450% climate change.
- 8.55 To ensure the DS is implemented, a planning condition is likely to be set to require the approval of the detailed DS by KLWNBC in consultation with Norfolk County Council as the Lead Local Flood Authority (LLFA).
- 8.56 The proposed DS for the pig's site is for clean water from roofs to be collected, filtered, and stored in an underground rainwater harvesting tank. The tank will overflow into a soakaway (infiltration rates have been confirmed by Ground Investigation). Semi contaminated water from access roads will drain to a system of filters strips, prior to draining into a soakaway. Dirty Water from the yard area will be channelled to a foul sump prior to pumping to an above ground storage tank. The sump and tank will be sized accordingly and emptied monthly.
- 8.57 The proposed DS for the poultry site is for surface water from the roofs to discharge via infiltration. There will be a separate infiltration basin for the roof area and road/external areas. The surface water from the external areas will be treated via an infiltration trench, before reaching the infiltration basin.
- 8.58 The proposed dwellings will discharge surface water via a soakaway. The soakaway will receive roof water and water from the access road. [Foul water will go via a private sewage treatment plant and to infiltration.](#)
- 8.59 [Foul water form office/washrooms will go via a private sewage treatment plant and infiltration via a field drain.](#)
- 8.60 Drainage Plans, [construction details and calculations](#) are included in **Appendix 8.2A**.
- 8.61 A Construction Surface Water Management Plan (CSWMP) will be prepared following planning to ensure that surface water quality and quantity is managed throughout the construction progress to mitigate impacts on-site and off-site. There will be a condition for the approval of the CSWMP.
- 8.62 A Surface Water Maintenance Plan will be prepared to ensure suitable ongoing management of drainage features, to ensure they operate as they should to control pollution and mitigate the impacts (A draft Maintenance Plan is included within the FRA). The Maintenance Plan will form part of the drainage approval required from the LLFA and LPA prior to construction.
- 8.63 Any impact of contamination will be fully mitigated by the proposed DS, with suitable treatment of the water prior to discharge via infiltration.
- 8.64 A system of positive drainage for the roof and hardstanding areas is proposed which will provide attenuation of the surface water runoff, which will mitigate the increase volume or surface water.
- 8.65 The development will be a betterment of the existing situation which will reduce the risk of surface water ponding.
- 8.66 Risk from Nitrate pollution will be mitigated by using covered manure storage buildings and draining dirty yard areas to storage for disposal.

- 8.67 Land within NVZ, must follow rules when you:
- Use nitrogen fertiliser; or
 - Store organic manure.
- 8.68 The Site will include storing organic manure so must take into account risk factors for runoff when deciding where to store manure. As stated in DEFRA document: Storing organic manures in nitrate vulnerable zones DEFRA; organic manure must not be stored:
- Within 10m of inland freshwaters or coastal waters; or
 - Within 50m of a spring, well or borehole.
- 8.69 The Proposed Development will adhere to the storage requirements as listed above and will store dirty water in accordance with the DEFRA Guidance.

Residual Effects

Construction

Construction Surface Water Runoff

- 8.70 During construction, the SuDS will not be installed and, therefore, the contractor should account for exceedance events and contaminated surface water runoff. This is necessary to suitably manage surface water on-site during construction and to prevent construction related pollution entering the ground. With the implementation of the CSWMP, the effect will be beneficial.
- 8.71 As the approach can differ and contractors have different preferred methods, it is proposed that the CSWMP is covered by a suitably worded planning condition to ensure that these risks are appropriately considered prior to commencement of construction.
- 8.72 The potential effect of pollution to the ground water during construction would be of **minor adverse** significance, however, once mitigation is provided, the impact is considered to be **minor beneficial**.
- 8.73 The potential effect of construction upon surface water is considered to be **negligible** once mitigation is undertaken. Come operation with all mitigation in place, there would be **minor beneficial** significance for the long-term.

Operational

- 8.74 The potential effect of pollution to the ground water once mitigation is provided is considered to be **minor beneficial**, as the Site will be treating surface water flows and formally draining the surface water, as well as collecting foul water via a formal drainage arrangement.
- 8.75 The site operation upon surface water contamination would be of **minor beneficial** significance, once mitigation is implemented.

Exceedance Event

- 8.76 Should a rainfall event greater than the 1-in-100-year, plus climate change event occur, then surface water flooding may occur. The levels will be designed to ensure that building thresholds are kept safe from flooding. Given the landscaped area around the Site, any exceedance event is considered to have **negligible** effect.

Lack of Maintenance

- 8.77 SuDS drainage systems are more likely to fail due to lack of maintenance than traditional piped networks. In order to minimise this risk, it is proposed that a maintenance strategy be prepared and approved as part of the DS. The maintenance strategy will mean the effect is **negligible**.
- 8.78 The proposed levels regime means that should the SuDS fail through lack of maintenance, then the areas which will flood will be non-critical areas. This will be a negligible significance.

Cumulative Effects

- 8.79 There are not considered to be any cumulative impacts on flood risk or drainage as a result of the projects (Warren Energy Applications FUL/2021/0011 and FUL/2021/0013) or the following projects:
- Land at Former RAF, Methwold (20/01279/FM); and
 - Methwold Airfield, Brandon Road (16/01963/FM).
- 8.80 There are not considered to be any cumulative impacts on flood risk or drainage as each development will implement a drainage strategy and deal with surface water on-site. None of the cumulative developments are shown to impact off-site.

Monitoring

- 8.81 The only monitoring required, is maintenance of the drainage network and SuDS features. The required maintenance will be set out in a Maintenance Strategy report provided as part of the DS and as outlined in the mitigation section of this chapter.

Summary of Impacts

- 8.82 A summary of impacts is shown in **Table 8.4A**.

Table 8.4A: Summary of Impacts: Flood Risk and Drainage

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE / BENEFICIAL	REVERSIBLE / IRREVERSIBLE	SHORT TERM / LONG TERM	SIGNIFICANCE		ADVERSE / BENEFICIAL	REVERSIBLE / IRREVERSIBLE	SHORT TERM / LONG TERM	SIGNIFICANCE
Impact of additional impermeable area	Low	Mod	Low	Adv	Irrev	LT	Min	Drainage Strategy, maintenance strategy and CSWMP	Ben	Irrev	LT	Neg
Treatment of surface water	Low	Mod	Low	Adv	Rev	LT	Mod	Drainage Strategy, maintenance strategy and CSWMP	Ben	Rev	LT	Min Ben
Impact on groundwater and abstraction	Low	High	Low	Adv	Rev	ST	Min	Drainage Strategy, maintenance strategy and CSWMP	Ben	Rev	LT	Neg

Key:

Loc: Local Ben: Beneficial Adv: Adverse Irrev: Irreversible ST: Short-Term
 Mod: Moderate Min: Minor Neg: Negligible Rev: Reversible LT: Long-Term

Ground Conditions and Contamination



9.0 Ground Conditions and Contamination

Introduction

- 9.1 This chapter addresses the ground conditions at the Site. It has been prepared by Harrison Group Environmental to identify, describe, and assess the impacts of potential soil and water contamination that may occur at the Site or may be generated or mobilised during construction works or operation of the Proposed Development.
- 9.2 This chapter is accompanied by the following Technical Appendices that should be consulted for relevant details.
- Appendix 9.1: Regulatory Consultations and Comments; and
 - Appendix 9.2: Desk Study Report.

Potential Impacts

- 9.3 There are a number of potential sources of ground contamination on the Site. These include on-site former feed liquid and solid feed storage tanks, muck pads, and historical airfield operations. In addition, dirty water lagoons from the previous farming operations are located [on and](#) immediately off site.
- 9.4 The potential impacts of the Proposed Development relating to ground conditions can be differentiated into those effects that could occur during construction works and operation of the Proposed Development respectively.
- 9.5 These sources may result in contamination migrating to sensitive receptors notably via direct contact with soil, surface water runoff, and seepage into groundwater, which is classified as a principal aquifer. Potential contaminants associated with these sources include nutrient nitrogen, phosphorous, ammoniacal nitrogen, biological and chemical oxygen demand, metals, PAH, petroleum hydrocarbons.
- 9.6 Construction works have the potential to mobilise existing sources of contamination via disturbance of contaminated ground causing sediment runoff to surface water and possibly facilitate contamination discharge to groundwater
- 9.7 Construction workers are also at risk from exposure to asbestos, contaminated dusts, or vapours via dermal contact, ingestion, inhalation of soil dust and inhalation of volatile organic vapours/ground-gas.
- 9.8 The construction works may also introduce potential new sources of contamination such as fuels, oils and other construction materials. Incorrect storage and handling leading to leakages or spillages of fuels, oils and other construction materials could present a potential risk to demolition and construction workers, site neighbours and controlled waters.
- 9.9 The proposed operations may introduce sources of contamination such as from the storage of farm wastes, dirty water, fuels, oils and chemicals, or spillages from vehicles. Soil and controlled waters may be at risk of contamination should uncontrolled spillages or leaks from these sources occur.

Methodology

- 9.10 This assessment has been devised to generally comply with the relevant principles and requirements of assessment methods and impact categorization ratings for land contamination risk assessment and management in the UK, as well as the set ES impact assessment sensitivity and magnitude significance criteria and matrices detailed in Chapter 2.
- BS10175:2011+A2:2017 'Investigation of potentially contaminated sites - Code of practice', the 'Land contamination: technical guidance' collection (Environment Agency, 2016) and 'Land contamination: risk management' (Environment Agency, 2019).
 - Risk-based methods referred to in Part IIA of the Environment Protection Act 1990, introduced by section 57 of the Environment Act 1995 and brought into force in April 2000.
 - Environment Agency, 8 October 2020 - Guidance on Land contamination risk management (LCRM): How to assess and manage the risks from land contamination.
- 9.11 Specifically, the following Steps were completed:
- 9.12 Step 1 - Baseline environmental data review. A desk-based search and review is completed of environmental databases and records as provided by commercial vendors and public information repositories. The aim is to review and summarise the following:
- Historical land uses – on-site and surrounding areas;
 - Baseline environmental information - soil, geology, groundwater, surface water; and
 - Sensitive land uses and receptors (humans, groundwater, ecology).
- 9.13 Step 2 - Site Walkover – A site walkover was completed to observe and record current site conditions as they relate to possible land and water contamination, including sources of contamination, sensitive receptors, and the possibility of contaminant migration from the source to the receptor location.
- 9.14 Step 3 - Conceptual Site Model / Pollutant Linkage Analysis and Hazard Assessment - Based on steps 1 and 2, a conceptual site model (CSM) is prepared. The CSM is a representation of the Site and its surrounding area with regards to potential sources of contamination, receptors, and pathways that could link the receptor and the source. A “viable” pollutant linkage requires a potential source and physical pathway by which a receptor may be exposed to a contaminant (e.g. contact with soil, leaching to an aquifer, surface water runoff).
- 9.15 If one or more of these elements is missing from a potential pollutant linkage, then that pollutant linkage is not considered viable and, by definition, does not represent a risk to health or the environment.
- 9.16 Step 4 – Hazard Assessment. For viable pollutant linkages, the potential hazards are then qualitatively assessed based on the likelihood of site related contamination being released to the environment, and the possible impact of such release, should it occur.
- 9.17 The likelihood and potential severity of an event is then classified as per a significance matrix for contaminated land risk assessment and EIA impact assessment criteria discussed in Chapter 2. These are as summarised on **Tables 9.1A to 9.6A**.

Table 9.1A: Likelihood Criteria for Risk of Viable Pollutant Linkage

High Likelihood	Contaminant linkage is viable, there is evidence of harm to the receptor, or continued contamination release is occurring.
Likely	Contaminant linkage may be present or is expected to occur over the short or long term.
Low Likelihood	Contaminant linkage may be present and there is a possibility of the risk occurring, although there is a low likelihood that it will do so.
Unlikely	Contaminants under which harm would occur are improbable.

Table 9.2A: Severity Criteria for Risk of Adverse effects to Sensitive Receptors

Severe	short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem. Major pollution of controlled waters (watercourses or groundwater)
Medium	Chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
Mild	Evidence of pollution of non-sensitive water resources, or minor exceedance of health risk screening values
Minor	No detectable impact or significant risk to human health or ecosystems or species

Table 9.3A: Sensitivity Classifications for Sensitive Receptors

GEOGRAPHICAL IMPORTANCE	VALUE	CRITERIA
International / National	VERY HIGH	Extremely rare (endangered), potentially extremely vulnerable to change, of international importance or recognition, very limited potential for substitution. For example, World Heritage Site, Ramsar Wetland etc. Principal Aquifer - Source Protection Zone 1
National	HIGH	Rare, of national importance or recognition, limited potential for substitution, highly vulnerable to change. For example, national park, national heritage, protected in national legislation. Principal Aquifer - Source Protection Zone 2
Regional / District	MODERATE	Somewhat rare or vulnerable, County/district/local importance, difficult to substitute: For example: County Wildlife Sites etc. Secondary aquifer Source Protection Zone 2
District / Local	LOW	Locally important, difficult to substitute at a local level, rare or unusual at the local level but well represented elsewhere. For example, Local Nature Reserves, local planning designations etc. Secondary aquifer Source Protection Zone 3
Local	VERY LOW	Of limited importance or value, not vulnerable to change, can be readily substituted. Non aquifer. Not SPZ

9.18 Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned as per the table below.

Table 9.4A: Contaminated Land Assessment Risk Matrix

		SEVERITY			
		Severe	Medium	Mild	Minor
PROBABILITY	High Likelihood	Very high risk	High risk	Moderate risk	Moderate / low risk
	Likely	High risk	Moderate risk	Moderate/ low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/ low	Low risk	Very low risk
	Unlikely	Moderate / low risk	Low risk	Very low risk	Very low risk

Table 9.5A: Definitions of Risk Categories

CLASSIFICATION	DEFINITION
Very High Risk	Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken.
High Risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long- term.
Moderate / Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low but is not of sufficient concern to be classified as mild. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild. No further site investigation or remediation is required
Very Low Risk	There is a low possibility that harm could occur and if realised the harm is likely to be negligible. No further site investigation or remediation is required

Table 9.6A: Impact Assessment Categories as per EIA Impact Assessment

MAGNITUDE ¹	CHARACTERISTICS OF CHANGE
Major Beneficial	The proposed development would remove features that adversely affect the existing environment, prevent further degradation and enhance and protect the environment in the long-term.
Moderate Beneficial	The proposed development would notably reduce rate of current degradation and/ or enhance existing character.
Minor Beneficial	The proposed development would reduce rate of current degradation.
Neutral	The proposed development would not result in any meaningful change to the receptor/ resource.
Minor Adverse	The proposed development would increase the rate of current degradation or introduce some minor detractors into the environment.
Moderate Adverse	The proposed development would result in the partial loss of a resource or notably degrade a receptor environment.
Major Adverse	The proposed development would result in the complete loss of a resource or compromise the integrity of a receptor such that its long-term survival is highly unlikely.

¹ The EIA Impact assessment criteria are described in detail in Section 2 of this report

Existing Baseline Conditions

- 9.19 This section summarises the existing/ baseline environmental conditions affecting the Site and surroundings (**Table 9.7A** and **Figure 9.1A**).

Table 9.7A: Summary of Baseline Environmental Information with Respect to Potential Ground Condition Impacts

ASPECT	BASELINE ENVIRONMENTAL INFORMATION	DATA SOURCE										
CURRENT USE	The proposed boundary of the Feltwell pig farm and nearby former poultry farm, most of the buildings of which are unused or in a state of disrepair, and adjacent arable land on which the planned extensions will be located.	Site Walkover										
PROPOSED	The proposal is to demolish most of the old existing buildings and construct 14 new state of the art sheds accomodating 14,000 pig finishing places on the arable land. In addition, up to 240 additional sheds are to be constructed housing up to 87400,000 birds.	Trundley September 2020 Proposed Pig Finishing Units At Wayland Farms, Feltwell Proposed Site Plan Drawing No. 20-L45-P004G Crown Chicken, 2021, September 2021, Client: Crown Chicken Ltd Drawing No: Breck-Cons Breckland Farm, Brandon Road, Methwold, Poultry Farm Redevelopment Revision 5-22-09-2021 Consolidated Site Layout Canham Consulting, July 2021, Granswick Country Foods Fresh Poultry, Faxley Proposed New Poultry Farm, Wayland Farms, Feltwell, Norfolk, Proposed Drainage Strategy: Option C, Drawing 216244-GCL-XX-XX-DR-C-3002 As per updated plans and drawings in Appendix 4.1A .										
TOPOGRAPHY	The site is shown as having an elevation of approximately 10maOD with the surrounding site area relatively level. It is surrounded by agricultural fields with residential properties to the south of the Site.											
SITE HISTORY	<table border="1"> <tbody> <tr> <td>1884 - 1906</td> <td>Arable field. No on-site buildings</td> </tr> <tr> <td>1950</td> <td>The site is shown as an open field to the south of land indicated as being an "Airfield".</td> </tr> <tr> <td>1957, 1964</td> <td>The site is shown as being part of Methwold Airfield, the runways and structures of which are identified on the map. The site is shown to be the location of aircraft parking bays.</td> </tr> <tr> <td>1983</td> <td>The airfield is indicated as being disused, and the runways and structures appear to be demolished. The pig farm site appears to be an open field, whereas the poultry sheds are shown to have been constructed.</td> </tr> <tr> <td>2001, 2020, 2020</td> <td>The site is indicated as being the location of Feltwell Farm. The pig sheds are shown in the eastern portion of the Site. There are two or three lagoons indicated to the north, and a lagoon to the south. Breckland Farm is indicated as occurring to the south of the Site.</td> </tr> </tbody> </table>	1884 - 1906	Arable field. No on-site buildings	1950	The site is shown as an open field to the south of land indicated as being an "Airfield".	1957, 1964	The site is shown as being part of Methwold Airfield, the runways and structures of which are identified on the map. The site is shown to be the location of aircraft parking bays.	1983	The airfield is indicated as being disused, and the runways and structures appear to be demolished. The pig farm site appears to be an open field, whereas the poultry sheds are shown to have been constructed.	2001, 2020, 2020	The site is indicated as being the location of Feltwell Farm. The pig sheds are shown in the eastern portion of the Site. There are two or three lagoons indicated to the north, and a lagoon to the south. Breckland Farm is indicated as occurring to the south of the Site.	Groundsure Report Ref: GS-7020577, Date: 03/09/2020 (Attachment A) Google Earth aerial imagery, accessed September 2021
1884 - 1906	Arable field. No on-site buildings											
1950	The site is shown as an open field to the south of land indicated as being an "Airfield".											
1957, 1964	The site is shown as being part of Methwold Airfield, the runways and structures of which are identified on the map. The site is shown to be the location of aircraft parking bays.											
1983	The airfield is indicated as being disused, and the runways and structures appear to be demolished. The pig farm site appears to be an open field, whereas the poultry sheds are shown to have been constructed.											
2001, 2020, 2020	The site is indicated as being the location of Feltwell Farm. The pig sheds are shown in the eastern portion of the Site. There are two or three lagoons indicated to the north, and a lagoon to the south. Breckland Farm is indicated as occurring to the south of the Site.											

ASPECT	BASELINE ENVIRONMENTAL INFORMATION	DATA SOURCE												
GEOLOGY	<p>There are no superficial deposits present within 500m of the Site; however, a limited amount of topsoil and granular subsoil can be expected. The solid geology in the area is reported as Holywell Nodular Chalk, with the nearest BGS borehole recording the following:</p> <table border="1"> <tr> <td>Topsoil</td> <td>Topsoil</td> <td>0-0.5 m</td> </tr> <tr> <td>Middle chalk</td> <td>Hard chalk</td> <td>0.5 – 25 m</td> </tr> <tr> <td>Lower Chalk</td> <td>Chalk mixed with clay and black flints</td> <td>25 – 38m</td> </tr> <tr> <td>Gault</td> <td>Grey and blue clay mixed with black flints</td> <td>38 – >45m</td> </tr> </table>	Topsoil	Topsoil	0-0.5 m	Middle chalk	Hard chalk	0.5 – 25 m	Lower Chalk	Chalk mixed with clay and black flints	25 – 38m	Gault	Grey and blue clay mixed with black flints	38 – >45m	<p>1:50,000 BGS Digital Mapping. Groundsure Report Ref: GS-7020577, Date: 03/09/2020 BGS Borehole Reference: TL79SW49, TL79SW12, TL79SW3/B</p>
Topsoil	Topsoil	0-0.5 m												
Middle chalk	Hard chalk	0.5 – 25 m												
Lower Chalk	Chalk mixed with clay and black flints	25 – 38m												
Gault	Grey and blue clay mixed with black flints	38 – >45m												
HYDROGEOLOGY / GROUNDWATER	<p>The middle chalk has high intergranular or fracture permeability providing a high level of water storage and may support water supply or river base flow on a strategic scale. Boreholes in the area have recorded groundwater level at 5-9mbgl).</p> <p>The bedrock geology is classified as a principal aquifer. The site is not within, or near, a designated groundwater source protection zone (SPZ).</p> <p>There is one active licenced groundwater abstraction on the Site: Wayland Farms Limited Annual Volume (m3): 60,480 Start Date: 01/01/2011 Expiry Date: 31/03/2027 Licence No: AN/033/0051/002 Details: General Farming & Domestic</p> <p>In addition, there are three additional licensed boreholes for spray irrigation within 500 metres of the Site.</p>	<p>Groundsure Report Ref: GS-7020577, Date: 03/09/2020 BGS Borehole Reference: TL79SW49, TL79SW12, TL79SW3/B</p>												
HYDROLOGY	<p>The drainage is controlled by farm drains that drain to the cut-off channel approximately 2.5 km to the west of the Site.</p> <p>The site is not within an area designated as being at risk from flooding. The closest zone 2 and zone 3 floodplains are found approximately 1.5 km north of the Site.</p>	<p>Site walkover Groundsure Report Ref: GS-7020577, Date: 03/09/2020</p> <p>OS Vector Map data</p>												
LICENSED INDUSTRIAL ACTIVITIES (PART A(1))	<p>Warren Energy Limited, Process: Disposal Of > 50 T/D Non-Hazardous Waste (> 100 T/D If Only Ad) Involving Biological Treatment Issue Date: 07/03/2016</p>	<p>Groundsure Report Ref: GS-7020577, Date: 03/09/2020</p>												

ASPECT	BASELINE ENVIRONMENTAL INFORMATION	DATA SOURCE
POLLUTION AND LANDFILL	The pollution inventory did not reveal any significant pollution incidents on or in close proximity to the Site. No landfill or waste sites were located within the search area.	Groundsure Report Ref: GS-7020577, Date: 03/09/2020
SENSITIVE ENVIRONMENTAL RECEPTORS	Groundwater: Principal Aquifer. The bedrock geology below the Site and surrounding area is shown as a principal aquifer signifying rock layers which may provide a high level of water storage and support water supply or river base flow on a strategic scale.	Site visit Groundsure Report Ref: GS-7020577, Date: 03/09/2020 Google Earth aerial imagery, accessed September 2021
	Future farm workers	
	Demolition and construction workers	
	Off-site residents Methwold 1.5 km north; Feltwell 1.5 km south	
	Sensitive Ecological Sites Breckland Forest SSSI and Breckland SPA are located approximately 50 metres east of the poultry site.	
RADON POTENTIAL	The site is not in an area where full or basic protection measures are required, nor where a geological assessment is required. No radon protection measures required at this location.	Groundsure Report Ref: GS-7020577, Date: 03/09/2020
GROUND WORKINGS	There is no recorded surface or underground workings within 125 m of the Site. The nearest historical surface working to the Site is 140m west south-west of the Site and is indicated as a pond originating from 1950.	Groundsure Report Ref: GS-7020577, Date: 03/09/2020

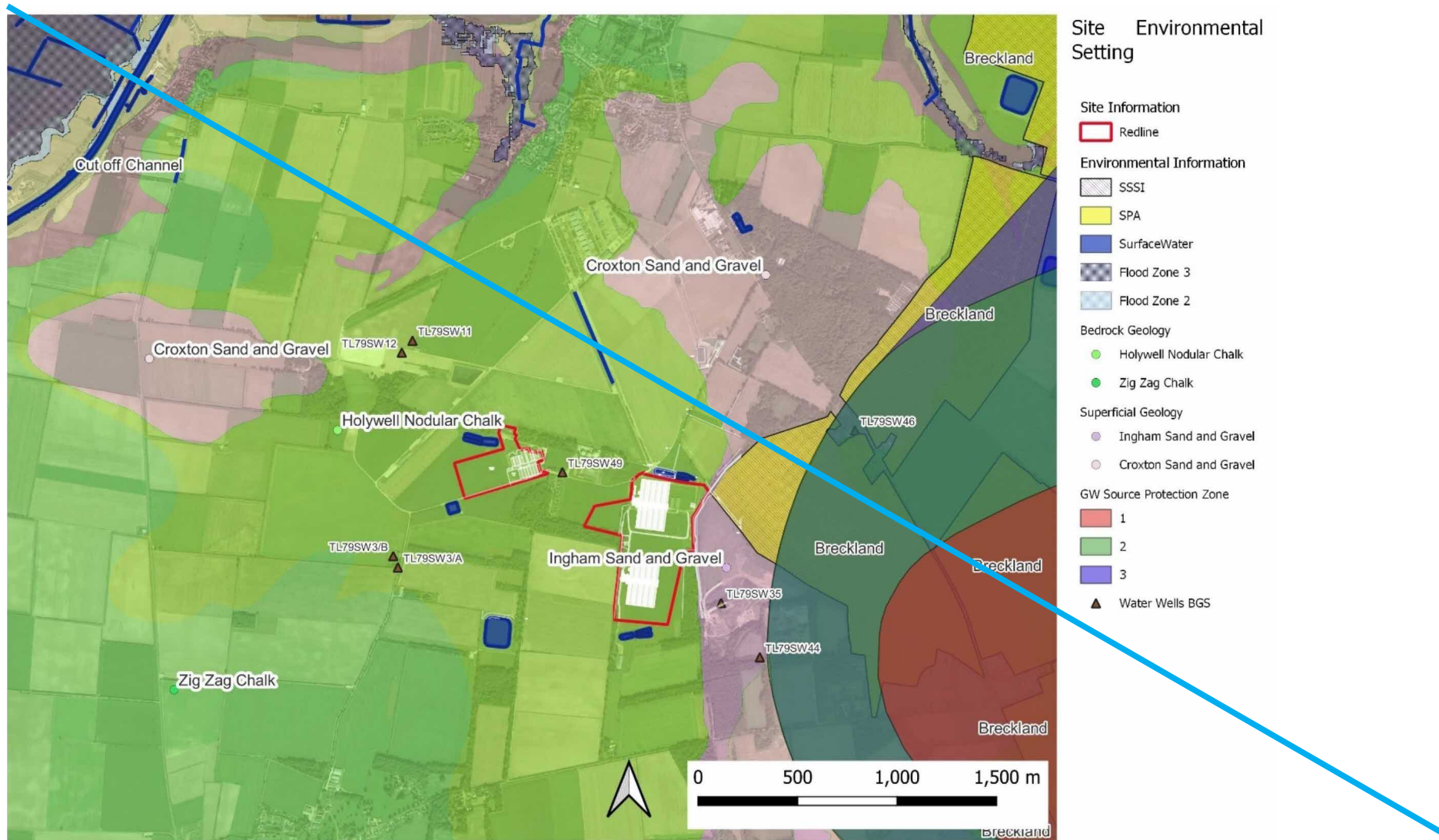


Figure 9.1: Site Location and Key Environmental Information and Features with Respect to Potential Ground Condition Impacts

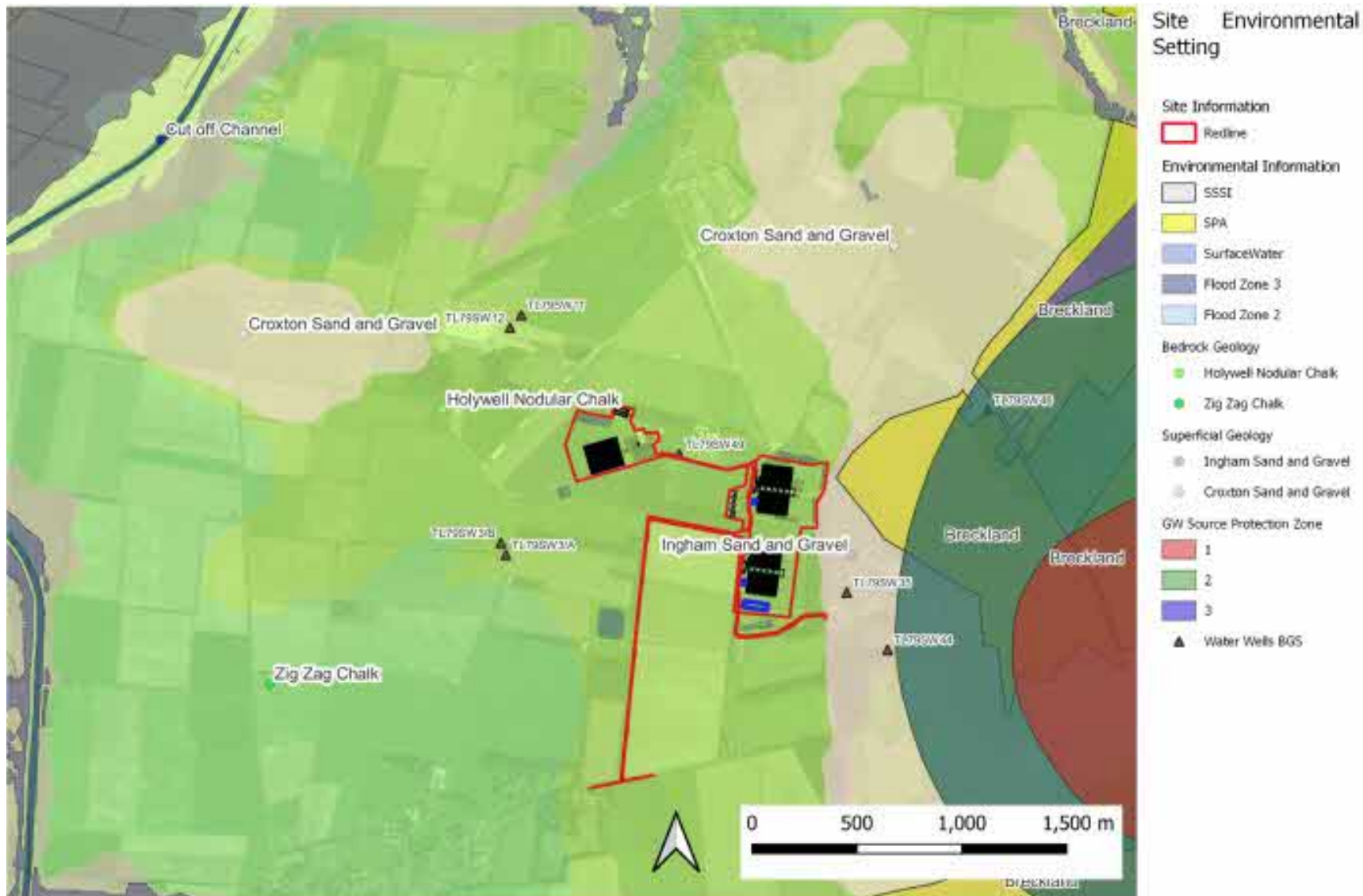


Figure 9.1A: Site Location and Key Environmental Information and Features with Respect to Potential Ground Condition Impacts

Evolution of the Baseline Conditions without Development

- 9.20 As required by Schedule 4 of the 2017 EIA Regulations an outline of the likely evolution of the baseline conditions without implementation of the development is presented².
- 9.21 Without development, the existing farms would have continued to be operated as per the existing protocols and operating procedures. To that end, dirty water drainage would discharge to the proximate dirty water storage lagoons, with the potential for further leaching to groundwater depending on the lagoon base and sides condition.
- 9.22 Furthermore, any existing contamination sources on the Site would remain, and may result in emissions to soil and controlled waters.
- 9.23 In addition, the asbestos containing materials on existing sheds would remain in place.
- 9.24 The development will significantly improve the baseline environmental condition in the following ways:
- The existing farm infrastructure will be either decommissioned and demolished or upgraded and repaired. In addition, new infrastructure will be designed and constructed as per current standards and guidelines, and the farms will be operated according to current Best Available Techniques (BREF document) as per the Environmental Permit.
 - New drainage systems will be designed and constructed, and existing pollution prevention drainage structure will be refurbished. ~~The dirty water will be collected and contained in a dirty water tank for appropriate land application. will be no longer discharged to the lagoons at the pig site will be retained and may be used for dirty water storage as needed. The lagoons will be subject to a suitable site investigation and integrity testing, and will be appropriately improved as required by the Environmental Permit. will be contained in a dirty water tank for appropriate land application.~~
 - The asbestos roofing will be removed and disposed of in accordance with applicable regulations.
- 9.25 In this context, the residual impact of farm operation relative to the existing farms is assessed as “major beneficial”.

Conceptual Site Model / Pollutant Linkage Analysis

- 9.26 Conceptual Site Model / Pollutant Linkage Analysis and Hazard Assessment - The CSM is a representation of the Site and its surrounding area with regards to potential sources of contamination, receptors, and pathways that could link the receptor and the source. A “viable” pollutant linkage requires:
- A source of contamination;
 - Release / occurrence of contamination to / in environmental media;
 - A potentially exposed receptor (i.e. humans, an ecological system or sensitive receiving water body); and
 - The potential to cause harm or to cause pollution of controlled waters.

² This needs to be “as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge”.

- 9.27 A physical pathway by which a receptor may be exposed to a contaminant (e.g. contact with soil, leaching to an aquifer, surface water runoff).
- 9.28 If one or more of these elements is missing from a potential pollutant linkage, then that pollutant linkage is not considered viable and, by definition, does not represent a risk to health or the environment. For viable pollutant linkages, the potential hazards are then qualitatively assessed based on the likelihood of site related contamination being released to the environment, and the possible impact of such release, should it occur.
- 9.29 **Figures 9.2A and 9.4A3** show the Site layout, **drainage systems** and possible on-site and off-site pollution sources. A CSM schematic showing the baseline environmental information, pollution sources, migration pathways, sensitive receptors, and pollution linkages is shown on **Figure 9.5A4**.
- 9.30 There are a number of potential sources of ground contamination on the Site. These include on-site former feed liquid and solid feed storage tanks, muck pads, and historical airfield operations. In addition, dirty water lagoons from the previous farming operations are located **on and** immediately off site.
- 9.31 The potential impacts of the Proposed Development relating to ground conditions can be differentiated into those effects that could occur during construction works and operation of the farm respectively.
- 9.32 These sources may result in contamination migrating to sensitive receptors notably via direct contact with soil, surface water runoff, and seepage into groundwater, which is classified as a principal aquifer. Potential contaminants associated with these sources include nutrient nitrogen, phosphorous, ammoniacal nitrogen, biological and chemical oxygen demand, metals, PAH, petroleum hydrocarbons.
- 9.33 Construction works have the potential to mobilise existing sources of contamination via disturbance of contaminated ground causing sediment runoff to surface water and possibly facilitate contamination discharge to groundwater.
- 9.34 Construction workers are also at risk from exposure to asbestos, contaminated, dusts, or vapours via dermal contact, ingestion, inhalation of soil dust and inhalation of volatile organic vapours/ground-gas.
- 9.35 The construction works may also introduce potential new sources of contamination such as fuels, oils and other construction materials. Incorrect storage and handling leading to leakages or spillages of fuels, oils and other construction materials could present a potential risk to demolition and construction workers, site neighbours and controlled waters.
- 9.36 The proposed farm operations may introduce sources of contamination such as from the storage of farm wastes, dirty water, fuels, oils and chemicals, or spillages from vehicles. Soil and controlled waters may be at risk of contamination should uncontrolled spillages or leaks from these sources occur.

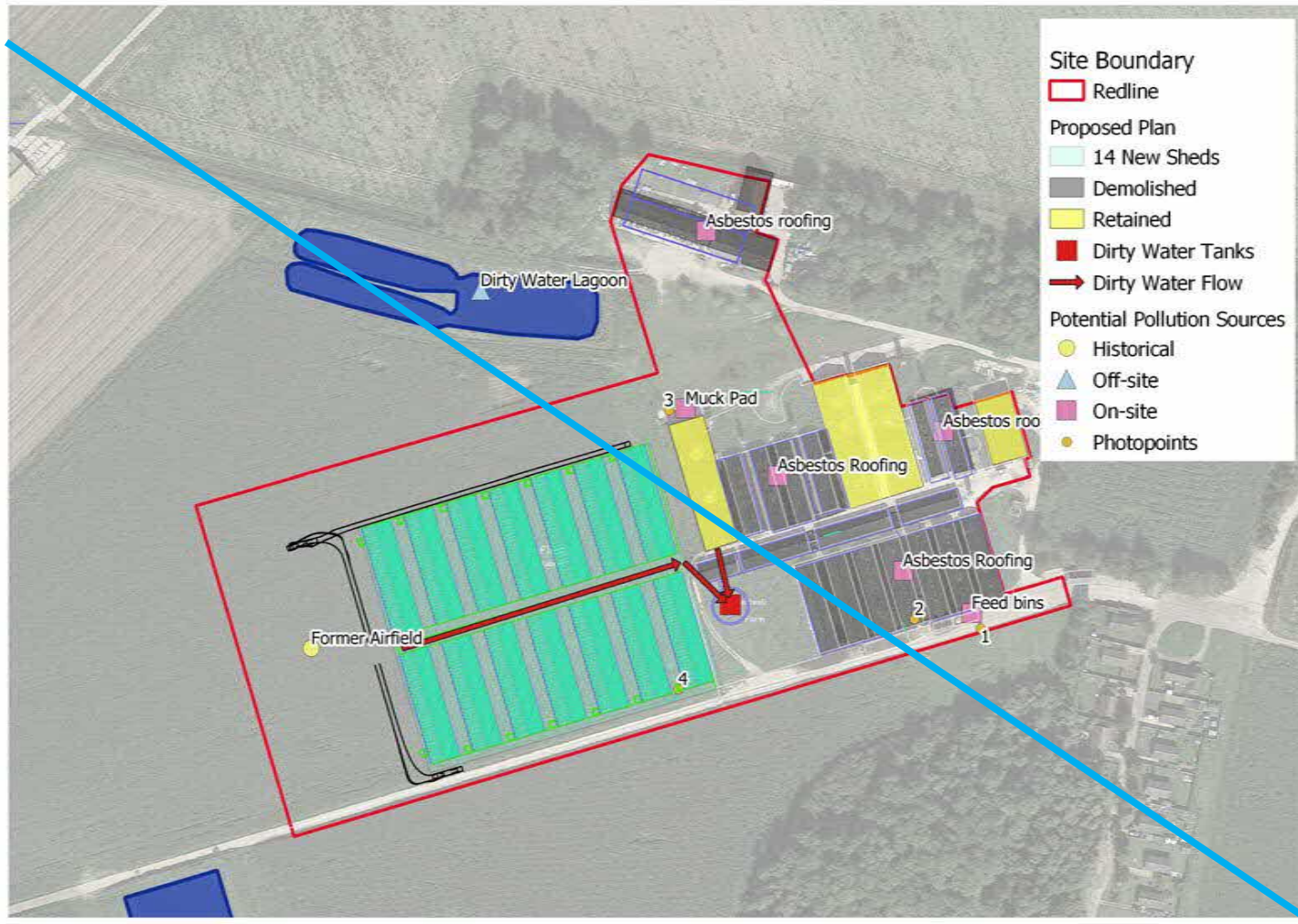


Figure 9.2: Existing Site Features and Proposed Site Layout for the Proposed Pig Facility and Potential Pollution Sources

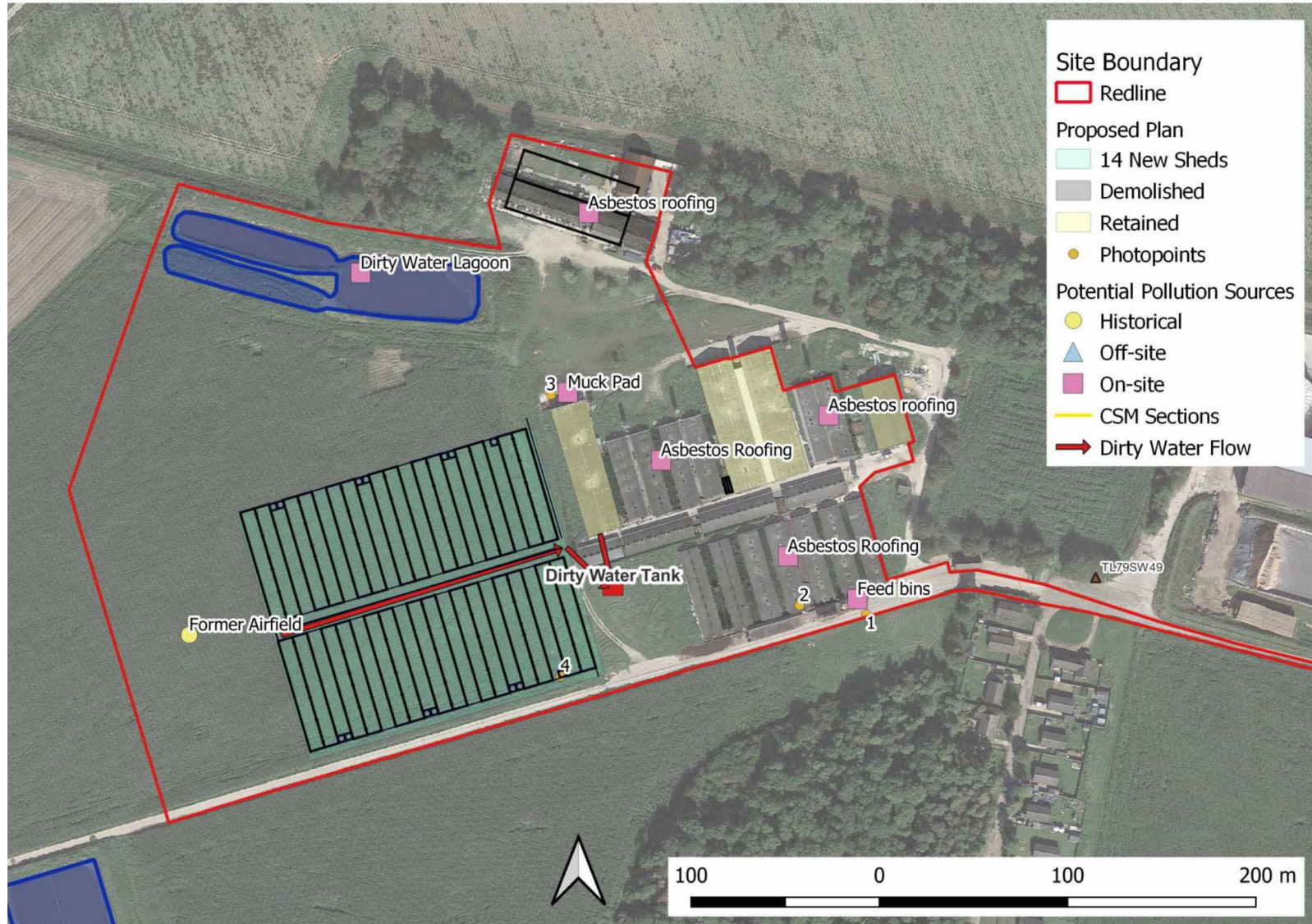


Figure 9.2A: Existing Site Features and Proposed Site Layout for the Proposed Pig Facility and Potential Pollution Sources - Pig Site

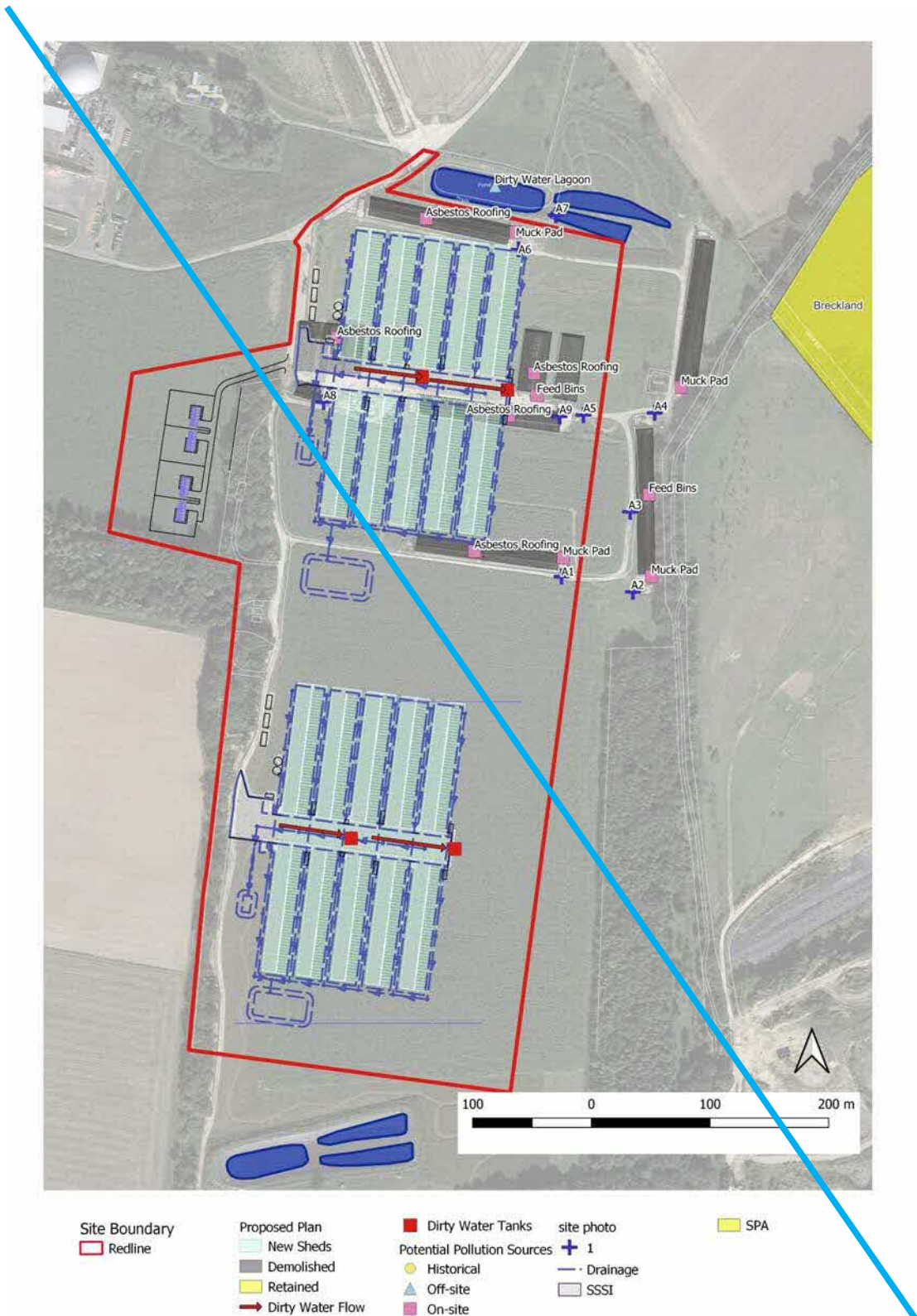


Figure 9.3: Existing Site Features

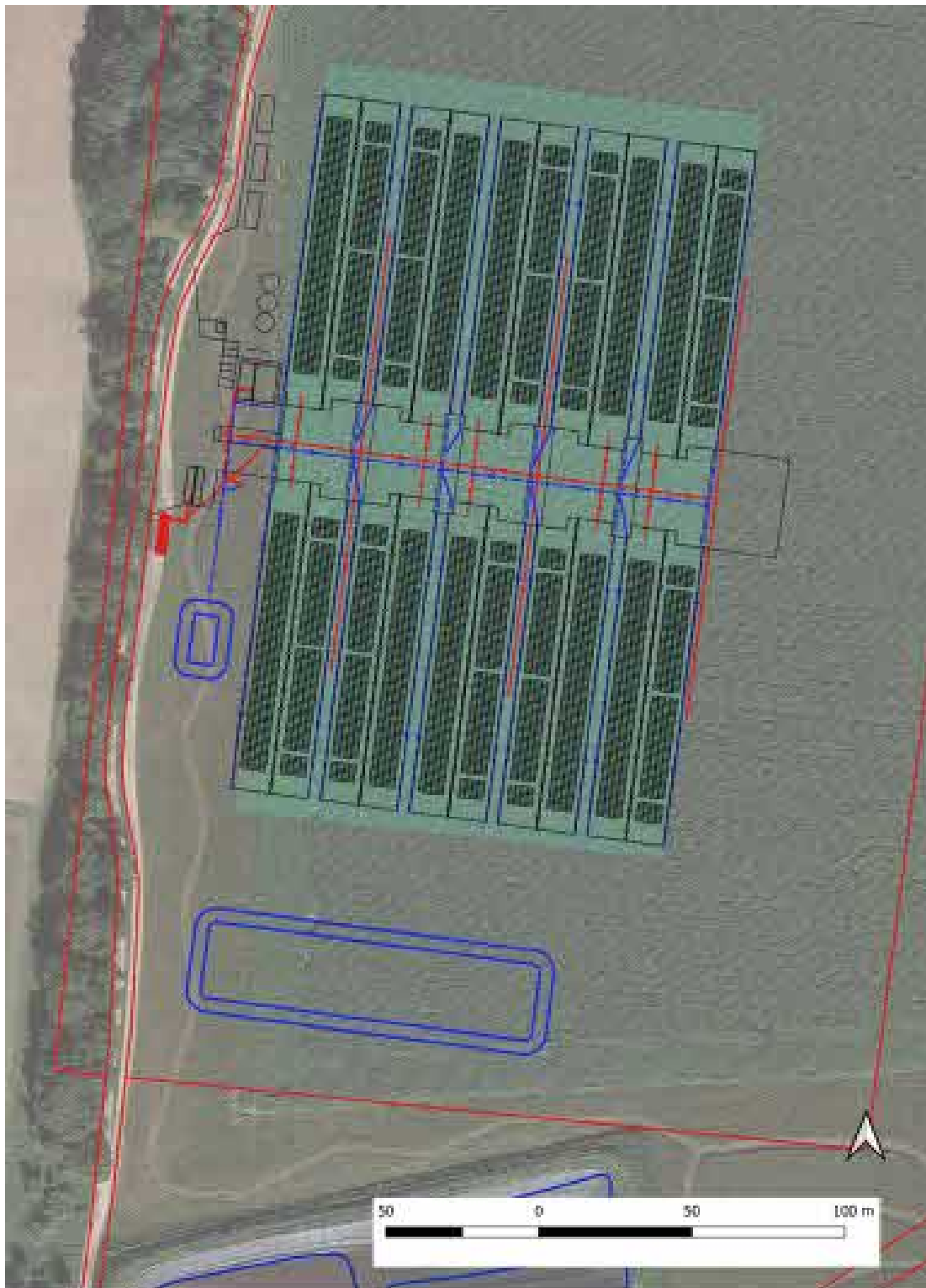


Figure 9.3A: Existing Site Features and Proposed Drainage at Poultry Sheds



- | | | | |
|----------------------|--|----------------------|--------------------------|
| Site Boundary | Potential Pollution Sources: site photo | Proposed Plan | Dirty Water Tanks |
| Redline | Historical | Demolished | ■ |
| | Off-site | Retained | |
| | On-site | | |
| | + 1 | | |
| | gna | | |

Figure 9.4A Existing Site Features and Proposed Site Layout and Potential Pollution Sources – Poultry Site

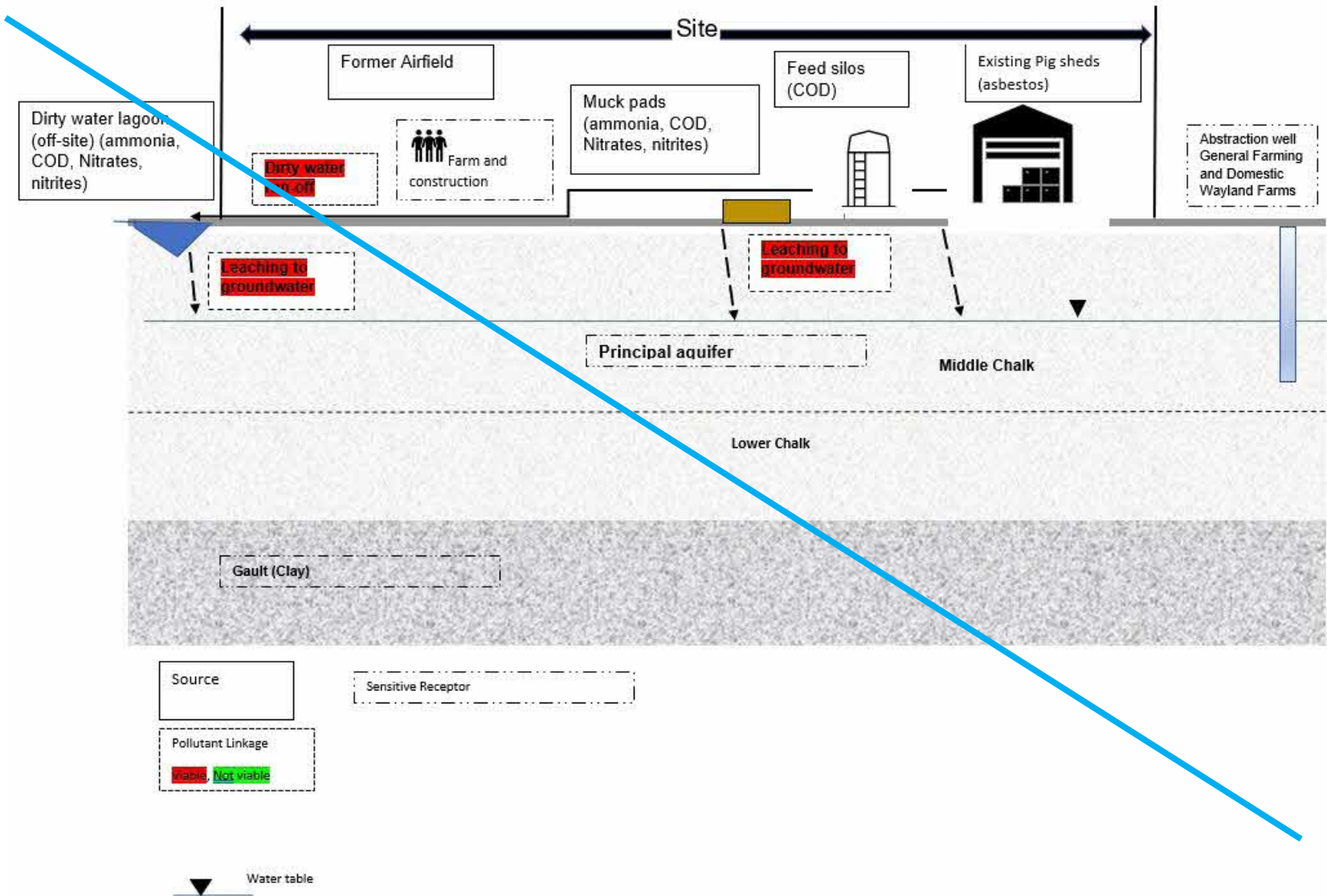


Figure 9.4: Conceptual Site Model Section Showing Pollutant Linkage Analysis

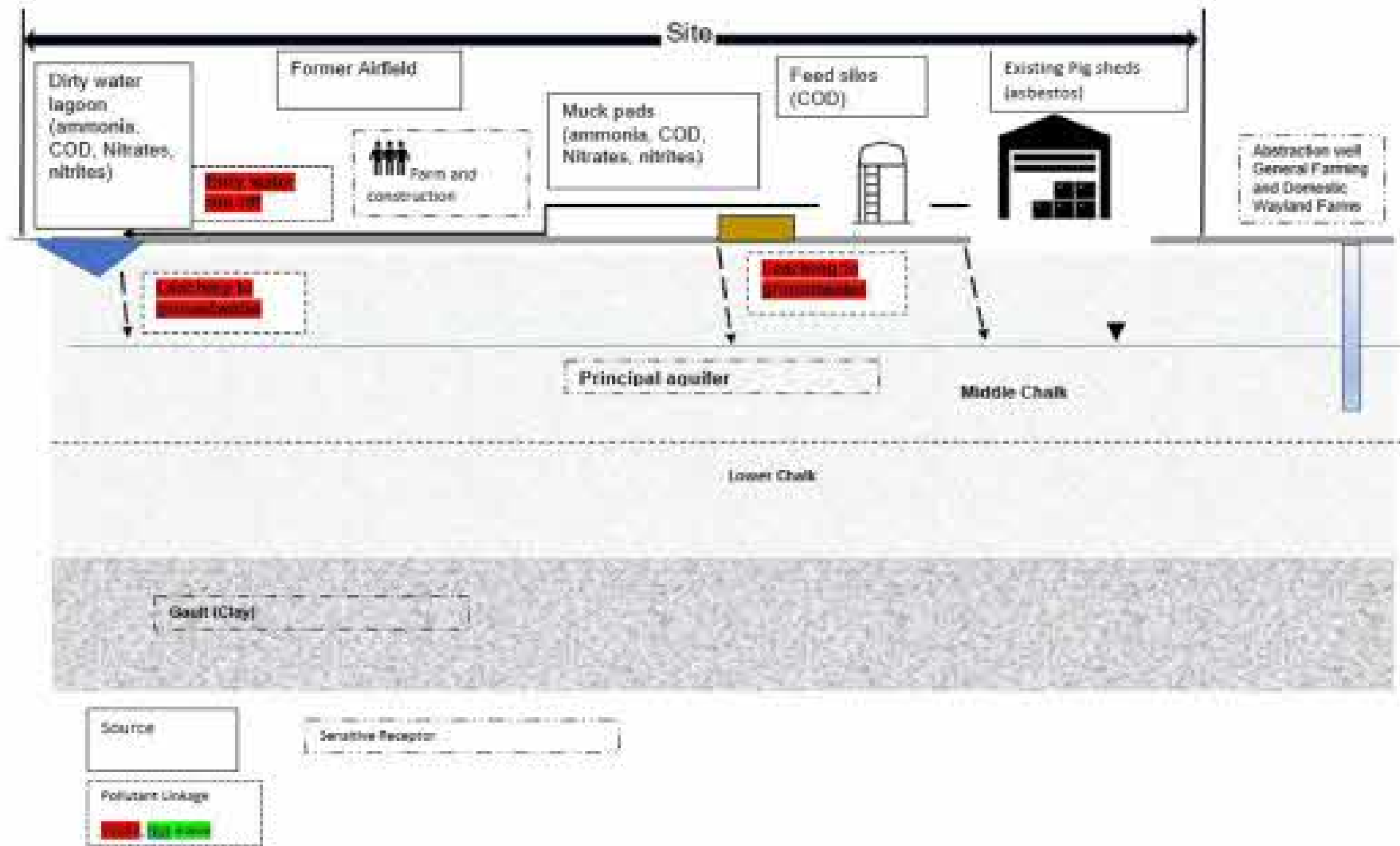


Figure 9.5A4: Conceptual Site Model Section Showing Pollutant Linkage Analysis

Evaluation of Predicted Impacts

- 9.37 The likelihood and potential severity of an event is then classified as per a significance matrix in line with the EIA Regulations and matrices for contaminated land risk assessment, as summarised on **Tables 9.1A to 9.6A**. The likelihood and potential severity of an event is then classified as per a significance matrix for contaminated land risk assessment.
- 9.38 The evaluation is presented according to two conceptual frameworks.
- 9.39 A Hazard Assessment is completed as per contaminated land assessment guidance. For viable pollutant linkages, the potential hazards are qualitatively assessed based on the likelihood of site related contamination being released to the environment, and the possible impact of such release, should it occur. The likelihood and potential severity of an event is then classified as per a significance matrix for contaminated land risk assessment.
- 9.40 The likely significant impacts of the development on the environment are also assessed as per the EIA assessment methodology summarised in Chapter 2. Potential impacts are classified according to whether they are beneficial or adverse, and the degree of impact - major, moderate, minor and neutral and/or negligible. This provides a consistent approach to expressing the results of the assessments undertaken as part of the EIA.
- 9.41 In summary, impact is assessed taking into account:
- the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
 - the location and sensitivity of environmental receptors;
 - the nature and intensity of the impact;
 - the probability of the impact;
 - the expected onset, duration, frequency and reversibility of the impact;
 - the cumulation of the impact with the impact of other existing and/or approved development; and
 - the possibility of effectively reducing the impact.

Construction Phase

Hazardous vapours / soil gas from made ground or migrating to site from backfill material off site and Ingress into excavations, structures and confined spaces, and subsequent inhalation.

- 9.42 The impacts are assessed as **minor adverse**. The probability of a ground gas source is assessed as unlikely since made ground is not expected and there are no infilled pits or landfill sites at or within 1 km of the Site.

Asbestos roofs on pig sheds

- 9.43 There is asbestos roofing on the existing sheds at both the pig and poultry sites. Unless suitably de-commissioned, exposure of construction and demolition workers to asbestos was assessed as **major adverse**, based on a high probability of exposure for construction workers during the construction phase, and potential irreversible and long-term adverse impacts to human health.

Contaminated soil from historical airfield operations

- 9.44 Historical airfield operations could have resulted in soil contamination. However, it is noted that the land on which new sheds will be constructed have been arable fields for the past 30 years, and such, the probability of contamination is assessed as low and the impact on human or groundwater resources was assessed as **minor adverse**, reversible, and short term.

Contaminated soil from muck pad storage

- 9.45 Unless suitably decommissioned, exposure to contaminants at and around muck pads was assessed as a **moderate adverse** impact to human health since exposure of construction workers would be likely, with possible reversible and short-term impacts on human health. The impact of possible leaching of contaminants to groundwater was assessed as moderate adverse, since contamination could be mobilised during construction works and leach to the principal aquifer.

Operational Phase

- 9.46 The proposed operations may introduce sources of contamination such as from the storage of farm wastes, dirty water, fuels, oils and chemicals, or spillages from vehicles. Soil and controlled waters may be at risk of contamination should uncontrolled spillages or leaks from these sources occur.
- 9.47 Historical airfield operations could have resulted in soil contamination. However, it is noted that the land on which new sheds will be constructed have been arable fields for the past 30 years, and such, the probability of contamination is assessed as low and the impact on human or groundwater resources was assessed as **minor adverse**, reversible, and short term.
- 9.48 Impacts from contaminant release from operations, in particular and predominantly muck pad waste storage, are assessed as **minor adverse** since the Proposed Development will be designed and operated as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems to minimise impacts to both human health and controlled waters.
- 9.49 It is noted, however, that the new farm infrastructure will be upgraded, repaired, or replaced and designed and operated according to current Best Available Techniques (BREF document). Furthermore, dirty water will be diverted to a dirty water collection tank rather than **directly** to the existing lagoons, reducing the risk of contaminant release to soils, surface water, or groundwater relative to the baseline condition. **The lagoons at the pig site will be retained and may be used for dirty water storage as needed. The lagoons will be subject to a suitable site investigation and integrity testing and appropriately improved as required by the Environmental Permit.** In this context, the residual impact of farm operation relative to the existing farms is assessed as **major beneficial**.

Mitigation

- 9.50 Mitigation measures, which may be enforceable via planning conditions, are identified for all assessed risk categories other than those assessed as “very low”.
- 9.51 Key mitigation measures to be implemented can be controlled by planning condition and include:
- Site investigation and soil testing at identified source areas or locations to be used for soakaways to assess any remediation measures or development constraints that may

be warranted. The Site Investigation may be secured via standard Contaminated Land conditions to be implemented prior to commencement of construction works.

- Removal of asbestos roofing by suitably qualified contractor as per the Control of Asbestos Regulations. This may be secured by planning conditions requiring asbestos surveys, mitigation, and risk assessment and management as per the Control of Asbestos Regulations 2012. Approved Code of Practice and guidance.
- Decontamination and decommissioning of the existing farm buildings to be demolished or re-purposed. This may be secured by planning conditions requiring that construction works be completed in accordance with a code of construction practice that sets out the standards and procedures to which a developer or contractor must adhere to in order to manage the potential environmental impacts of construction works.
- Design and construction of suitable drainage systems for dirty water and clean roof water, and pollution prevention infrastructure in accordance. It is expected that the proposed poultry and pig facilities will be operated in accordance with Best Available Techniques and as per an Environmental Permit to be issued by the Environment Agency. These requirements will ensure that the suitable drainage systems and pollution prevention infrastructure is constructed and may be secured via planning conditions requiring compliance of detailed design drawings with BAT requirements prior to commencement of construction works.
- Operation of the Proposed Development according to Best Available Techniques. It is expected that the sites will be operated in accordance with Best Available Techniques and as per an Environmental Permit to be issued by the Environment Agency. These requirements may be secured via Planning Conditions to be implemented prior to commencement of operations.

Residual Effects

- 9.52 Residual effects are assessed following implementation of mitigation measures.
- 9.53 Relative to the construction phase, the residual impacts are assessed as “minor adverse”. Site investigation and soil testing will be completed at identified source areas and proposed locations for soakaways.
- 9.54 Residual risk, relative to the possibility of contaminant release from farm operations are assessed as “minor adverse” since the proposed project will be designed and operated as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems to minimise impacts to both human health and controlled waters. This will significantly reduce the risk of contaminant release to environmental media.
- 9.55 It is noted, however, that the new farm infrastructure will be upgraded, repaired, or replaced and designed and operated according to current Best Available Techniques. Furthermore, dirty water will be diverted to a dirty water collection tank rather than the existing lagoons, reducing the risk of contaminant release to soils, surface water, or groundwater relative to the baseline condition. [The lagoons at the pig site will be retained and may be used for dirty water storage as needed. The lagoons will be subject to a suitable site investigation and integrity testing, and will be appropriately improved as required by the Environmental Permit.](#) In this context, the residual impact of the development proposal relative to the existing farms is assessed as **major beneficial**.

Cumulative Effects

- 9.56 Cumulative effects occur when a single receptor is affected by more than one effect at any point in time.
- 9.57 Relative to ground contamination, most of these projects are not relevant since they are greater than 1 km from the development site. The Warren Energy facility 2.5MW gas and electric anaerobic digestion (AD) plant is located approximately 100 metres from the development site.
- 9.58 AD processes are associated with various potential sources of contamination to soil and groundwater, particularly from the digestate which has high levels of nitrogen compounds including nitrates, nitrites, and ammoniacal nitrogen. These contaminants overlap with those that may be emitted from the proposed farming operations, and to the extent that there are releases from either or both developments, these may be of adverse cumulative impact.
- 9.59 The degree of possible impact cannot be predicted precisely and depends on the likelihood that there may be a concurrent release from both developments. This likelihood is considered low, given that the design construction, and operation of both developments will be regulated by their respective Environmental Permits.

Monitoring

- 9.60 Environmental monitoring will be completed as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems.

Summary of Impacts

- 9.61 Potential impacts related to ground conditions or contaminated land are summarised in **Table 9.8A**. Mitigation measures, which may be enforceable via planning conditions, are identified for all assessed risk categories other than those assessed as “very low”. The key hazards, assessed impacts, mitigation measures, and residual impacts are summarised below.

Construction Phase

- 9.62 There may be asbestos roofing on the existing sheds at both the pig and poultry sites. Unless suitably decommissioned, exposure of construction and demolition workers to asbestos was assessed as **major adverse**, based on a high probability of exposure for construction workers during the construction phase, and potential irreversible and long-term adverse impacts to human health. Removal of asbestos roofing by suitably qualified contractor as per the Control of Asbestos Regulations. This may be secured by planning conditions requiring asbestos surveys, mitigation, and risk assessment and management as per the Control of Asbestos Regulations 2012. Approved Code of Practice and guidance. Assuming implementation of mitigation measures, the potential impact is assessed as **minor adverse**.
- 9.63 Historical airfield operations could have resulted in soil contamination. However, it is noted that the land on which new sheds will be constructed have been arable fields for the past 30 years, and such, the probability of contamination is assessed as low and the impact on human or groundwater resources was assessed as minor adverse, reversible, and short term. Unless suitably decommissioned, exposure to contaminants at and around muck pads was assessed as a **moderate adverse** impact to human health since exposure of construction workers would be likely, with possible reversible and short-term impacts on human health. The impact of possible leaching of contaminants to groundwater was assessed as **moderate adverse**, since contamination could be mobilised during construction works and leach to the

principal aquifer. These possible adverse impacts may be mitigated by implantation of a Site investigation and soil testing at identified source areas or locations to be used for soakaways to assess any remediation measures or development constraints that may be warranted. The Site Investigation may be secured via standard Contaminated Land conditions to be implemented prior to commencement of construction works. Decontamination and decommissioning of the existing farm buildings to be demolished or re-purposed may be secured by planning conditions requiring that construction works be completed in accordance with a code of construction practice that sets out the standards and procedures to which a developer or contractor must adhere in order to manage the potential environmental impacts of construction works. Following implementation of mitigation measures, the residual impact is assessed as **minor adverse**.

- 9.64 The proposed operations may introduce sources of contamination such as from the storage of farm wastes, dirty water, fuels, oils and chemicals, or spillages from vehicles. Soil and controlled waters may be at risk of contamination should uncontrolled spillages or leaks from these sources occur. The design and construction of suitable drainage systems for dirty water and clean roof water, and pollution prevention infrastructure in accordance with Best Available Techniques and as per an Environmental Permit to be issued by the Environment Agency. These may be secured via planning conditions requiring compliance of detailed design drawings with BAT requirements prior to commencement of construction works.
- 9.65 Residual impacts from contaminant release from proposed operations, in particular and predominantly muck pad waste storage, are assessed as **minor adverse** since the proposals will be designed and operated as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems to minimise impacts to both human health and controlled waters.
- 9.66 It is noted, however, that relative to the existing farm buildings and past operations the Proposed Development infrastructure will be upgraded, repaired, or replaced and designed and operated according to current Best Available Techniques. Furthermore, dirty water will be diverted to a dirty water collection tank rather than the existing lagoons, reducing the risk of contaminant release to soils, surface water, or groundwater. [The lagoons at the pig site will be retained and may be used for dirty water storage as needed. The lagoons will be subject to a suitable site investigation and integrity testing, and will be appropriately improved as required by the Environmental Permit.](#) Relative to the existing baseline condition, the impact is assessed as **major beneficial**.
- 9.67 Potential ground condition and contamination impacts as a result of the Proposed Development are summarised in **Table 9.8A**.

Table 9.8A: Summary of Impacts: *Ground Conditions*

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)				
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE	
Land Condition Impact Assessment Summary – Construction Phase													
Impact of hazardous vapours/ soil gas from made ground on Construction workers	Loc	High		Adv	Rev	ST	Min	None warranted	Adv	Rev	ST	Min	
Exposure of Construction workers to asbestos containing materials during demolition	Loc	High		Adv	Irrev	LT	Maj	Removal of asbestos roofing by suitably qualified contractor as per the Control of Asbestos Regulations	Adv	Rev	ST	Min	
Impact to Construction workers through ingestion of soil through direct contact from historical site operations	Loc	High		Adv	Rev	ST	Min	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Adv	Rev	ST	Min	
Impact to Principal Aquifer through contaminants leaking into groundwater from historical site operations	Nat	High		Adv	Rev	ST	Min		Adv	Rev	ST	Min	
Impact to construction workers from contaminated muck pad storage	Loc	High		Adv	Rev	ST	Mod	Decontamination and decommissioning of farmyard structures as required by the Decommissioning plan detailed in the Environmental Permit	Adv	Rev	ST	Min	

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE
Impact to Principal Aquifer from muck pad storage	Nat	High		Adv	Rev	ST	Mod	Decontamination and decommissioning of farmyard structures as required by the Decommissioning plan detailed in the Environmental Permit	Adv	Rev	ST	Min
Impact to construction site users from surface contamination around the feed bins	Loc	High		Adv	Rev	ST	Min		Adv	Rev	ST	Min
Land Condition Impact Assessment Summary – Operation Phase												
Impact on future farm workers through hazardous vapours/ soils from made ground	Loc	High		Adv	Rev	ST	Min	None-warranted	Adv	Rev	ST	Min
Impact of contaminants from historical site uses leaching into Secondary Aquifer	Loc	Low		Adv	Rev	ST	Min	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Adv	Rev	ST	Min
Contaminants from historical site uses impacting Off-site lagoon through surface water run off	Loc	Low		Adv	Rev	ST	Min	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Adv	Rev	ST	Min

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT TERM/LONG TERM	SIGNIFICANCE
Impact to future site users from muck pad storage through ingestion of soil	Loc	High		Adv	Rev	ST	Min	Residual risk, relative to the possibility of contaminant release from farm operations are assessed as “minor adverse” since the proposed project will be designed and operated as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems to minimise impacts to both human health and controlled waters. This will significantly reduce the risk of contaminant release to environmental media.	Adv	Rev	ST	Min
Contaminants from muck pad storage leaching to Secondary Aquifer	Nat	High		Adv	Rev	ST	Min		Adv	Rev	ST	Min
Contamination of Off-site lagoon from contaminated muck pad storage	Loc	Very Low		Adv	Rev	ST	Min		Adv	Rev	ST	Min
Surface contamination around feed bins impacting future site users	-	-		Adv	Rev	ST	Min		Adv	Rev	ST	Min

Key:

Loc: Local Min: Minor Neg: Negligible Irrev: Irreversible ST: Short-Term Mod: Moderate
 Nat: National Maj: Major Rev: Reversible LT: Long-Term Adv: Adverse

Landscape & Visual

10

10.0 Landscape and Visual

Introduction

- 10.1 This chapter assesses the likely significant environmental effects of the Proposed Development in respect of landscape and visual matters. It has been prepared by FPCR Environment and Design Ltd (FPCR) to assess the impacts of the Proposed Development in relation to the effects it would have on the landscape and visual amenity.
- 10.2 In particular, this chapter describes the relevant legislation and landscape and visual policy context; the methods used for assessment and details of the criteria used to determine significance; the baseline landscape and visual conditions at and surrounding the Site; the potential impacts and effects as a result of the Proposed Development; any mitigation or control measures required to reduce or eliminate adverse effects; and the subsequent residual effects and likely significant effects associated with the Proposed Development.
- 10.3 This chapter is accompanied by a number of Technical Appendices as follows:
- **Appendix 10.1:** Landscape and Visual Impact Assessment (LVIA) Criteria;
 - **Appendix 10.2:** Landscape Effects Table (LET);
 - **Appendix 10.3A:** Visual Effects Table (VET);
 - **Appendix 10.4A:** Landscape Figures 10.1- 10.5; and
 - **Appendix 10.5A:** Figures (Photosheets) 10.6 - 10.11.

Competency

- 10.4 In accordance with the EIA Regulations (2017) the LVIA and ES chapter have been carried out by competent experts, comprising Chartered Members of the Landscape Institute, and is in accordance with guidance of the professional institution, the *'Guidelines for Landscape and Visual Impact Assessment'*, third edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment, in 2013.
- 10.5 FPCR is a multi-disciplinary environmental and design consultancy established over 60 years, with expertise in architecture, landscape, ecology, arboriculture, urban design, masterplanning and environmental impact assessment. The practice is a member of the Landscape Institute and Institute of Environmental Management and Assessment and are frequently called upon to provide expert evidence on landscape and visual issues at Public and Local Plan Inquiries.

Methodology

- 10.6 This LVIA has been prepared based upon the Guidelines for Landscape and Visual Impact Assessment, third edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment, in 2013. The assessment of Landscape Value also takes account of guidance in Landscape Institute Technical Guidance Note 02-21 "Assessing landscape value outside national designations".
- 10.7 In summary, the GLVIA3 states:
- "Landscape and Visual impact assessment (LVIA), is a tool used to identify and assess the significance of and the effects of change resulting from development on both landscape as an environmental resource in its own right and on people's views and visual amenity." (GLVIA3 paragraph 1.1.)*

- 10.8 There are two components of LVIA:
- *“Assessment of landscape effects; assessing effects on the landscape as a resource in its own right;*
 - *Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people.”* (GLVIA3 paragraph 2.21)
- 10.9 The components of this chapter include baseline studies; description and details of the landscape proposals and mitigation measures to be adopted as part of the scheme; identification and description of likely effects arising from the Proposed Development; and an assessment of the significance of these effects.
- 10.10 In terms of baseline studies, the assessment provides an understanding of the landscape that may be affected, its constituent elements, character, condition and value. For the visual baseline this includes an understanding of the area in which the development may be visible, the people who may experience views, and the nature of views.
- Assessment of Landscape Effects**
- 10.11 GLVIA3 states that *“An assessment of landscape effects deals with the effects of change and development on landscape as a resource”* (GLVIA3 paragraph 5.1).
- 10.12 The baseline landscape is described by reference to existing published Landscape Character Assessments and by a description of the Site and its context.
- 10.13 A range of landscape effects can arise through development. These can include:
- Change or loss of elements, features, aesthetic or perceptual aspects that contribute to the character and distinctiveness of the landscape;
 - Addition of new elements that influence character and distinctiveness of the landscape; and
 - Combined effects of these changes.
- 10.14 The characteristics of the existing landscape resource are considered in respect of the susceptibility of the landscape resource to the change arising from this development. The value of the existing landscape is also considered.
- 10.15 Each effect on landscape receptors is assessed in terms of size or scale, the geographical extent of the area influenced and its duration and reversibility. In terms of size or scale of change, the judgement takes account of the extent of the existing landscape elements that will be lost or changed, and the degree to which the aesthetic or perceptual aspects or key characteristics of the landscape will be altered by removal or addition of new elements. Geographical extent is considered by reference to the extent of the area over which there will be a change. Duration is considered for the landscape effects, with short term effects being defined as those lasting less than 5 years, medium term effects lasting between 5 and 10 years and long-term effects being defined as anything over 10 years in duration.
- 10.16 The level of effect is determined by considering the sensitivity of the landscape receptors and the magnitude of effect on the landscape. Final conclusions on the overall landscape effects are drawn from the assessment components described. This assessment describes the nature of the landscape effects, and whether these are adverse or beneficial, at the following stages of development; construction, completion (year 1) and longer term (year 15).

10.17 The criteria used in the assessment are set out in **Appendix 10.1**.

Assessment of Visual Effects

10.18 An assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity. This assessment describes the nature of the visual effects and, whether these are adverse or beneficial, at the following stages of development; construction, completion (year 1 winter) and longer term (year 15 summer).

10.19 The first stage in the assessment is to identify approximate visibility/ visibility mapping. This is done by either a computerised Zone of Theoretical Visibility (ZTV), or by manual methods using map study and field evaluation. A series of viewpoints are included within the assessment that are representative of views towards the Site from surrounding visual receptors. Other views of the Site are included where it supports the description and understanding of the Site`s landscape and visual characteristics.

10.20 The views also typically represent what can be seen from a variety of distances from the development and different viewing experiences.

10.21 It is important to remember that visual receptors are all people. For each affected viewpoint, the assessment considers both the susceptibility to change in views and the value attached to views.

“The visual receptors most susceptible to change are generally likely to include:

- *Residents at home;*
- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape or particular views;*
- *Visitors to heritage assets or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area.*

Travellers on road, rail or other transport routes tend to fall into an intermediate category of moderate susceptibility to change. Where travel involves recognised scenic routes awareness of views is likely to be particularly high.” (GLVIA3 paragraph 6.33)

“Visual receptors likely to be less sensitive to change include:

- *People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape;*
- *People at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where the setting is not important to the quality of working life(although there may be on occasion be cases where views are an important contributor to the setting and to the quality of working life.” (GLVIA3 paragraph 6.34)*

10.22 Each of the visual effects is evaluated in terms of its size or scale, the geographical extent of the area influenced and its duration or reversibility.

10.23 In terms of size or scale, the magnitude of visual effects takes account of:

- The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including proportion of the view occupied by the Proposed Development;

- The degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line height, colour and texture; and
- The nature of the view of the Proposed Development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses. (GLVIA3 paragraph 6.39).

10.24 The geographical extent of the visual effect in each viewpoint is likely to reflect:

- The angle of view in relation to the main activity of the receptor;
- The distance of the viewpoint from the Proposed Development; and
- The extent of the area over which the changes would be visible.

10.25 As with landscape effects, the duration of the effect could be short to long term or permanent and the same definitions apply. The criteria used in this assessment are set out in **Appendix 10.1**.

Overall Landscape and Visual Effects

10.26 The final conclusions on effects, whether adverse or beneficial, are drawn from the separate judgements on the sensitivity of the receptors and the magnitude of the effects. This overall judgement is formed from a reasoned professional overview of the individual judgements against the assessment criteria.

10.27 GLVIA3 notes, at paragraphs 5.56 and 6.44, that there are no hard and fast rules with regard to the level of effects, therefore the following descriptive thresholds have been used for this appraisal:

- **Major;**
- **Moderate;**
- **Minor;**
- **Negligible.**

10.28 Where it is determined that the assessment falls between or encompasses two of the defined criteria terms, then the judgement may be described as, for example, Major/ Moderate or Moderate/ Minor. This indicates that the effect is assessed to lie between the respective definitions or to encompass aspects of both.

Judging Overall Significance

10.29 A judgement is reached, based on the assessment, as to whether an effect is significant or not. Those degrees of effects that are considered to be significant by the assessor for this LVIA are judged to be effects that are either Major or Moderate/ Major.

10.30 GLVIA3 *Statement of Clarification 1/13* (2013; Landscape Institute and the Institute of Environmental Management) notes that:

“Concerning ‘significance’, it is for the assessor to define what the assessor considers significant... Depending on the means of judgment and terminology (which should be explicitly set out), effects of varying degrees of change (or levels of change), may be derived. The assessor should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant.”

Significance of Landscape Effects

10.31 GLVIA3 states, at paragraph 5.56, that:

“There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and context and with the type of proposal. At opposite ends of the spectrum it is reasonable to say that:

- *Major loss or irreversible negative effects, over an extensive area, on elements and/ or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;*
- *Reversible negative effects of short duration, over a restricted area, on elements and/ or aesthetic and perceptual aspects that contribute to but are not key characteristics of the character of landscapes of community value are likely to be of the least significance and may, depending on the circumstances, be judged as not significant;*
- *Where assessments of significance place landscape effects between these extremes, judgements must be made about whether or not they are significant, with full explanations of why these conclusions have been reached.”* (GLVIA3 paragraph 5.56.)

Significance of Visual Effects

10.32 GLVIA3 states, at paragraph 6.44, that:

“There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and context and with the type of proposal. In making a judgement about the significance of visual effects the following points should be noted:

- *Effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant;*
- *Effects on people at recognised and important viewpoints or from recognised scenic routes are more likely to be significant;*
- *Large-scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present within the view.”* (GLVIA3 paragraph 6.44.)

Assumptions and Limitations

10.33 The following assumptions are relevant to this chapter:

- The Residual Landscape and Visual Effects of the Proposed Development take into account the growth of the proposed planting and in particular the proposed woodland and tree planting. Typical growth rates for this planting is drawn from published sources and assumes that the proposed woodland and trees will be circa 8 – 10 metres high after 15 years.

10.34 The following limitations are relevant to this chapter:

- Judgements on the likely visual effects for any ‘private’ receptors e.g. residential properties have been determined based upon publicly accessible positions. For example, in some situations it has not been possible to determine the detailed nature of some private views from residential properties, although the likely nature of the view has been appraised based upon a combination of views back towards the property from within the Site and from nearby publicly accessible locations.

Existing Baseline Conditions

- 10.35 This section summarises the characteristics of the existing landscape and visual conditions of the Site and the surrounding area. An Aerial Photograph is included at **Figures 10.1 (Appendix 10.4A)** and the location and extent of the different defined Landscape Character Areas are detailed on **Figure 10.2 (Appendix 10.4A)**.

Landscape Character

- 10.36 Landscape Character Assessments and related studies have been prepared at National and Borough wide scales covering the Site and its context.

National Character

- 10.37 National Character Area (NCA) profiles have been prepared by Natural England for the 159 NCAs defined across England. These NCA profiles include a description of the natural and cultural features that shape the landscape, how the landscape has changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics. **Figure 10.2 (Appendix 10.4A)** illustrates the approximate location and extent of the NCAs within the context of the Site.
- 10.38 The Site lies within the western part of NCA 85: 'The Brecks'. This is an extensive NCA that stretches from the edge of Bury St Edmonds in the south to Swaffham in the north and includes Thetford relatively centrally located within the area. Relevant key characteristics of this NCA include the following:
- *"A largely open, gently undulating landscape with a low-lying, dry plateau that rises to the north. Subtle long slopes lead to alluvial flats containing shallow, meandering wooded river valleys.*
 - *Vast commercial conifer plantations form a forest landscape, unique in lowland England. The regular geometric shape and form and the repeated occurrence of plantations and shelterbelts unify the land cover pattern, forming wooded horizons and framing views into adjacent landscapes.*
 - *Predominantly agricultural land use focused on arable production, with planned courtyard farmsteads and large, regular 18th- and 19th century enclosure fields often clearly defined by Scots pine and beech shelterbelts or neat hawthorn hedges, indicative of large estate enclosure. The regular field layouts combine with long, straight, undulating roads to create a geometric landscape character.*
 - *Outdoor pigs and intensive indoor and outdoor poultry-rearing units are also characteristic.*
 - *Free-draining geology and soils with naturally low fertility support internationally important lowland heathland and mosaics of lowland acid and calcareous grassland that bring colour and textural variation to the landscape and provide a biodiversity-rich resource."*
- 10.39 The NCA defines a number of "Statements of Environmental Opportunity" (SEO). SEO 4 states; "SEO 4: Encourage measures which lead to the enhancement of landscape character and the historic environment, the sense of place and tranquillity, and the conservation of historic features when considering the design and location of new development and infrastructure and land management options, securing multiple benefits through the provision and management of high-quality green infrastructure networks.

- 10.40 Under the heading “Landscape Change” and subheading “Agriculture”, the NCA states;
“The NCA has seen an increase in in-field farming associated structures such as animal housing pens and infrastructure buildings connected with specialist pig farms, intensive indoor and outdoor poultry rearing sheds, new water storage reservoirs and the wide-scale use of large irrigation.....”
- 10.41 The NCA also acknowledges the benefits of the light sandy soils for pig rearing and it confirms the significant contribution that livestock farming, particularly pigs and poultry make to local and national food resources.
- 10.42 The details and description of this NCA are relevant to the very broad context of the Site and need to be appropriately considered and appraised at this scale.

Borough Character

- 10.43 At a relatively more detailed Borough wide scale, the Site lies within the ‘*Settled Farmlands with Plantations*’ Landscape Character Type (LCT) (Ref H) and specifically within the ‘*Northwold*’ Landscape Character Area (LCA) (Ref H5), as defined within the ‘*Kings Lynn & West Norfolk Borough Landscape Character Assessment*’ (March 2007). **Figure 10.2 (Appendix 10.4A)** details the location of the Site in relation to the Borough wide LCTs and LCAs.
- 10.44 The aim of this 2007b study was to provide an integrated assessment of the landscape character of the Borough at 1:25,000 scale, to serve as a baseline inventory to enable a better understanding of King’s Lynn’s and West Norfolk’s landscapes and for monitoring change. The study was intended to be used as a technical evidence base to inform the Local Development Framework at that time and to guide development control decisions.
- 10.45 The study states;
‘Judgements about the acceptability, or otherwise, of development and/or land management proposals should take account of:
(i) the description and evaluation of the relevant Landscape Character Type(s) related to the proposal; and
(ii) the description and evaluation of the relevant Landscape Character Area(s) related to the proposal.’
- 10.46 For LCT H, ‘*Settled Farmlands with Plantations*’, the study states; *‘This landscape forms the transition between the low-lying flat landscape of The Fens – Open Inland Marshes and the more elevated, variable landform of: The Brecks – Heathland with Plantations.’*
- 10.47 The ‘Key Characteristics’ for LCT H include the following;
- *“Medium to large field units interspersed by area of woodland and belts that offer some degree of enclosure and impart a medium scale to the landscape.*
 - *Areas of mixed woodland bring textural qualities and offer semi-enclosure in the landscape. Away from the wooded areas however, the landscape is open with distant views.*
 - *The skyline is variable – appearing inconsistent in areas of mixed woodland and scrub, regular where views can be gained of the block plantations within the adjacent landscape and feeling uncomplicated and open across the Fens.*
 - *With the exception of views across and into the Fens, wooded horizons define much of the skyline.”*

- 10.48 Under the heading 'Summary of Visual Character', the study states;
- It is the combination of the varied field margins, scrubby land and areas of woodland that create a mix of textures and heights; affording the landscape with a more variable land cover pattern than neighbouring landscapes. Sizeable plantations as well as small coniferous, deciduous and mixed woodland blocks and belts frequently occur - making for predominantly wooded horizons that vary in terms of height, form and density....'*
- 10.49 Under the heading 'Evaluation' and the subheading 'Landscape Condition and Strength of Character', the study states for LCT H;
- 'Field boundaries within this Landscape Character Type are inconsistent and gappy in places, denoting a somewhat declining landscape structure. Strength of character varies, depending on proximity to plantations. The simple, mainly arable land cover is relieved by the variety of plantation woodlands. Landscape pattern is quite striking as a result of the patchwork of regular plantations interspersed with predominantly arable farmland. Overall condition is considered to be declining and strength of character, moderate.'*
- 10.50 Under the subheading 'Management Strategy and Objectives', the study includes the following specific management objectives:
- Seek to restore hedgerows, where gappy, to enhance existing landscape pattern and improve their function as wildlife corridors throughout the type.
 - Seek to establish arable field margins as potential nest sites for ground nesting birds and habitats for small mammals.
- 10.51 Within LCT H a series of different Landscape Character Areas (LCAs) are identified. The Site lies within H5 – Northwold. The study includes a specific appraisal for this more detailed area. It states for LCA H5;
- 'This flat to very gently undulating landscape, situated in the east of the district, overlooks the Fen landscape to the west. The landform with an underlying geology of chalk and limestone encompasses a number of villages, large farms and estates, set within a backdrop of farmland and plantation woodland. The fields are mainly regular in shape, medium sized and generally lined with hedges (species-rich, overall intact but gappy in places). Views across the area are strongly influenced by the plantations in adjacent character area (K1 Cranwich). The belts and copses of (coniferous, deciduous and mixed) plantation woodland between Feltwell and K1 further frame views across the area and contribute to a sense of enclosure. Several locations in the west of the area offer wide, open views with huge skies looking across adjoining fen character areas E9 (Methwold) and E10 (Feltwell).'*
- 10.52 Under the 'Evaluation for LCA H5, it includes the following 'Inherent Landscape Sensitivities' and 'Landscape Planning Guidelines';
- Inherent Landscape Sensitivities**
- Mature landscape structure including belts and copses of plantation woodland, mature trees and patches of intact hedgerows.
 - Views on plantation woodlands (both within the area and in adjacent character area K1) to the east and across the adjacent fen landscape to the west.
- Landscape Planning Guidelines**
- Seek to conserve and enhance the existing belts and copses of plantation woodland and other tall vegetation within the area.

- Seek to conserve the mostly rural character of the area.
- Ensure that any new appropriate development responds to historic settlement pattern and is well integrated into the surrounding landscape.
- Seek to conserve the landscape setting of existing villages.
- Seek to conserve the largely undisturbed and tranquil nature of the area.

10.53 This 2007 Borough wide scale Landscape Character Assessment study presents the most detailed published assessment of the character of the landscape context of the Site. It is relevant to note however that the study is now relatively dated and should be considered and appraised in this context.

Published Landscape Character Assessments – Summary

10.54 It is evident from the published Landscape Character Assessment studies that the Site and its context lies within a very gently undulating and mostly rural landscape, including a number of scattered villages and a framework of medium scale farmland and plantation woodland. Views vary and are strongly influenced by the woodlands that provide enclosure and frame views. More open views generally occur to the west and the adjoining Fen landscape type and character areas.

Landscape Designations

- 10.55 The Site and the landscape within its context is not covered by any landscape quality designations at either a national or local level e.g. National Parks, AONB`s, Special Landscape Areas etc.
- 10.56 In relation to other environmental designations with relevance to landscape and visual matters, there is nothing of particular note within the immediate context of the Site and there are no identified and relevant designated areas or features within the Site. A relatively small number of Listed Buildings are situated within the small settlements of Methwold (approximately 1.4km) to the north and Feltwell (approximately 1.4km) to the south west of the Site.
- 10.57 Ecological designations are considered in Chapter 7 of this ES and heritage is considered within separate Heritage Statements submitted as part of the planning applications.

Topography

10.58 The following section should be read in conjunction with **Figure 10.3 (Appendix 10.4A)**.

Context – Landform

- 10.59 The topography of the Site`s context is gently undulating, relatively lower lying and with a general fall from east to west towards the lower lying and flat fenland landscape to the west.
- 10.60 The Site occupies a very shallow depression with relatively higher ground to the east, north, north west and south east. The greatest increase in levels arises to the east of the Site where the ground rises relatively more steeply, though still gently into the nearby plantation woodland (Methwold Warren). Tennis Plantation to the north-west of the Site also occupies a slightly more elevated position and a gentle ridge of higher ground extends westwards from this position.
- 10.61 The local landform is relatively subtle and not dramatic yet in combination with the nearby and surrounding plantation woodlands it provides enclosure to varying degrees.

Site – Landform

- 10.62 The topography of both Site areas are relatively flat. The site of the proposed pig rearing facility lies at around 12.5 – 14.0m Above Ordnance Datum (AOD), with a very gentle cross fall generally from the north west back towards the south east and the existing pig rearing facility.
- 10.63 The site of the proposed poultry facility lies at around 15.0 – 18.0m AOD, with a gentle cross fall from east to west.

Site and Immediate Context

- 10.64 An assessment of landscape character of the Site and its immediate context has been carried out, providing a finer level of assessment than the published studies.

Landscape Character and Features

- 10.65 The Site comprises two parcels of land [and a corridor of land \(providing for access to and egress from the Site parcels\)](#) situated within a predominantly farmland and woodland plantation setting, with the small settlements of Methwold and Feltwell set within the Site's wider context to the north and south west respectively. The Site areas are [presently](#) accessed by vehicles [via by](#) a narrow road/ track that extends from the B1112 (Brandon Road) approximately 1.0km to the north east.
- 10.66 In addition to the two small settlements, the relatively wider context of the Site includes further predominantly farmland, with some woodlands and tree belts and scattered properties. The land immediately to the north of the Site comprises a disused airfield and this extends northwards in the general direction of Methwold. This is presently largely under agricultural use and remains largely open.
- 10.67 A commercial plant nursery does however occupy part of the northern part of the disused airfield and sits just to the south of Methwold. Further commercial uses (Quorn Foods) also lie to the north of the Site on the B1112. Immediately north of the Site (proposed poultry area) is an energy facility. This comprises a biogas renewable energy unit with various tanks, hoppers and units, together with a containment bund.
- 10.68 Between the two Site areas lies a small linear grouping of dwellings. These comprise circa 12-14 No. single storey dwellings arranged along a single north - south track/ road. This grouping of properties sits alongside existing woodland to the west and south. Vehicular access to these properties is understood to be via a private road/ track from the south that connects through to the B1112.
- 10.69 To the east of the Site areas lies a large, wooded area (Methwold Warren). This mature woodland occupies relatively more elevated land and forms a notable feature within this landscape context. A quarry also sits close by within this land to the east yet is not directly visible from the Site. The status of this quarry is also not known.
- 10.70 To the south and west of the Site, the immediate context comprises predominantly arable farmland yet with a number of mature small, wooded areas and tree belts. The woodland includes Tennis Plantation to the north west and a series of connected woodland areas and tree belts extending to the south of the Site areas.
- 10.71 A very small number of individual properties lie within the context of the Site, including Muriel's Farm to the south west, Dyke House and Holmleigh to the north east and Woodside Lodge on the B1112 to the south.

10.72 Public access is generally limited within the Site`s context. A public footpath extends along the access track/ road that extends between the Site (of the proposed poultry facility) and the B1112 (Brandon Rd) yet this does not appear to connect beyond these points to any other public rights of way. A further public access route extends broadly around the edge of Methwold Warren to the east of the Site and this continues beyond the B1112, both to the north and south.

10.73 The landscape character of the Site and its immediate context is largely shaped by the very gently undulating landform and the combination of farmland and mature plantation woodlands and tree belts. The latter create a good degree of visual enclosure to much of this landscape, although further to the west of the Site the landscape is relatively more open. The Site and its immediate context also includes a number of other features and developments, most notably the existing pig rearing facility and former poultry sheds; the existing grouping of single storey properties and the biogas renewable energy unit. These do form a relatively more developed area within the wider farmland and woodland surrounds.

Landscape Value

10.74 In terms of “landscape value” it is appropriate to examine the role of the Site and its immediate context in terms of the range of local factors set out in LI TGN 02-21) and summarised in the methodology (**Appendix 10.1**). It considers the landscape in terms of a range of factors as set out below. As a starting point, landscape designations have been considered.

10.75 Landscape Designations: The Site and its wider landscape context (including its Zone of Theoretical Visibility (ZTV) (**Figure 10.5 in Appendix 10.4A**)) are not subject to any national, local or other landscape designations for reasons of quality, value or interest.

10.76 Natural Heritage: The Ecological Appraisal undertaken for the Site confirms that the ecological features are primarily of local importance and of low value. The designated ecological sites range from very high value with the Nature Directives sites to Moderate for the non-statutory sites. The breeding birds are the only species groups considered to be of District importance or Moderate value, based on the number of species or species that are specially considered scarce in Norfolk. This evaluation is considered appropriate for the two site areas (East and West).

10.77 Cultural Heritage: There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens or Battlefields) within the Site or its immediate context. The nearest heritage assets lie beyond the Site and its immediate context and comprise a number of listed buildings set within the settlements of Methwold and Feltwell.

10.78 The Heritage Assessment undertaken for the Site confirms that the closest designated heritage assets are located within the village of Methwold, 1.5- 2.0km north of the Site. This comprises a Conservation Area and fourteen Listed Buildings within the Conservation area. The Conservation Area and thirteen of the Listed Buildings have no inter-visibility with the development site due to their distance from the Site, the built environment of the village, and intervening vegetation.

10.79 Landscape Condition: The condition and degree of intactness of the landscape is variable. The respective Site areas comprise parts of existing arable fields, with minimal if any existing planting within the Site boundary. The Site area to the west (proposed pig rearing facility) includes no existing trees or other hedgerow planting. The Site area to the east (proposed poultry facility) similarly includes no existing planting other than that located bordering its boundary.

- 10.80 The proposed poultry facility (east site) includes a small number of redundant and former agricultural sheds, with a further small number of other redundant and former agricultural sheds in the immediate vicinity of this part of the Site. These are generally in a poor condition.
- 10.81 Within the immediate context of the Site, the surrounding existing woodlands and tree belts appear to generally be in reasonable or good condition, though there were no obvious signs (at the time of the appraisal) of any recent management or additional planting works. The surrounding field boundaries are variable with some including mature and largely continuous hedgerows but many others include just fencing or no planted or physical boundary at all. These field boundaries are therefore weaker and less intact.
- 10.82 The Landscape Condition of the existing Site and its immediate context is considered to be at best reasonable (or Medium) and it would benefit from some enhancement and management works, particularly in relation to some of the field boundaries.
- 10.83 Associations: No relevant associations between the landscape of the Site and its immediate context and any artists, writers or other people of interest, or with significant events in history have been identified.
- 10.84 Distinctiveness: The Site and its immediate context lies within a wider landscape characterised largely by a combination of farmland and mature plantation woodlands and tree belts and an underlying gently undulating landform. The Site and its immediate context largely aligns with this wider landscape yet does include a number of more developed uses and features; including existing farming facilities and buildings, a small grouping of residential properties and a biogas renewable energy unit.
- 10.85 Thus, the landscape is broadly representative of the wider landscape character area, yet it does not include any particularly distinctive or rare features. The most positive features are the mature woodland and tree belts that lie within close proximity to the Site areas, particularly the mature woodland habitats (Methwold Warren) that lies to the east of the Site.
- 10.86 Recreational Value: The Site and its immediate context is of very limited recreational value. With the exception of an unconnected stretch of a Public Right of Way (PROW) (footpath) extending north of the Site along the access track/ road to the B1112 (Brandon Rd) and a single public access route around the edge of Methwold Warren woodland to the east, there are no other recreational uses or activities within the context of the Site.
- 10.87 Perceptual (Scenic): The Site and its immediate context is predominantly rural in character yet does include existing developments and buildings within and around the respective Site areas. The presence of the mature woodlands and tree belts are positive in general scenic terms and also have the effects of varying and changing views and enclosure for those moving through this landscape.
- 10.88 The Site areas include no features of any particular scenic quality and should the existing redundant agricultural sheds within and around the eastern Site area decline in condition they may detract from the appearance of this part of the local landscape.
- 10.89 Overall, the scenic quality of the Site and its immediate context is considered to be reasonable (or Medium).
- 10.90 Perceptual (Wildness and tranquillity): There are no notable or obvious perceptual qualities to the Site or its immediate context and it is not a tranquil or a wild landscape. Wilder and more

tranquil areas are likely to lie beyond the Site and its immediate context within both the more wooded and fenland landscapes, to the east and west respectively.

- 10.91 Functional aspects: The existing surrounding woodlands and tree belts contribute to wider green infrastructure and ecological connectivity and provide some functional value to the wider landscape. Beyond these elements however, the Site and its immediate context does not have any physical or functional links with any surrounding landscapes.
- 10.92 The Site and its immediate context also does not have a physical or functional link with an adjacent landscape designation or towards the appreciation of a designated landscape and its special qualities. It also does not perform any other particular functional role e.g settlement separation.
- 10.93 Conclusion on Landscape Value: In conclusion and having appraised all of the above factors, it is judged that the Site and its immediate context is of Medium landscape value.

Visual Baseline

- 10.94 A visual appraisal has been undertaken for the Site and the Proposed Development. This has explored the nature of the existing visual amenity of the area and sought to establish the approximate visibility of the Site from surrounding locations and receptors. A series of photo viewpoints have been selected which support this analysis.
- 10.95 Photographs have been taken to illustrate a view from a specific vantage point, or to demonstrate a representative view for those receptors that are moving through the landscape, e.g. Public Rights of Way or Road users. The photographs may demonstrate varying degrees of visibility and include both short and long range views. The photographs were taken during 2020. Seasonal differences have been considered when determining the visual effects on surrounding receptors.
- 10.96 Further details of the existing views and the likely effects of the Proposed Development on these views and the visual receptors are included in the subsequent Assessment of Likely Significant Effects section.

Visual Receptors

- 10.97 The following visual receptors that may be affected by the Proposed Development have been identified:
- Limited numbers of residents – including:
 - Principally those within the small grouping of properties sited between the respective Site areas;
 - At Muriel's Farm;
 - On the southern edge of Methwold; and
 - At the two properties to the north east of the Site along the access track leading to the Site and on the B1112 (Brandon Rd).
 - Users of limited stretches of Public Rights of Way; including the Public Access Route (at Methwold Warren);
 - Users of very limited parts of Hythe Rd; Old Methwold Rd; the B1112 (Brandon Rd) and an access track.

- 10.98 The number of potential visual receptors is considered to be limited. The identified visual receptors are identified on **Figure 10.5** and included at **Appendix 10.4A** and are referenced below as part of the baseline photo viewpoints descriptions.

Photo Viewpoints

- 10.99 An assessment of the likely visual effects of the Proposed Development upon surrounding receptors is detailed in the subsequent section. **Figure 10.5 (Appendix 10.4A)** details the location of the Photo Viewpoints and **Figures 10.6 – 10.11 (Appendix 10.5A)** illustrates the photo viewpoints. The photo viewpoints provide a representative range of views in the general direction of the Site areas from different directions and distances around the Site. They are also generally representative of the nature of views from the visual receptors located in these directions and at these distances.

Evolution of the Baseline Conditions without development

- 10.100 The future landscape and visual baseline conditions of the Site itself are unlikely to change to any notable degree in the absence of the Proposed Development.
- 10.101 The proposed native woodland/ tree and hedgerow planting is unlikely to come forward without the Proposed Development and the existing redundant/ derelict poultry sheds are also unlikely to be removed without the Proposed Development. These existing buildings are likely to decline further over time.

Assessment of Likely Significant Effects

- 10.102 The following section outlines the likely landscape and visual effects that would arise from the Proposed Development on the Site. Tables detailing these likely landscape and visual effects for the receptors are included in **Appendices 10.2 and 10.3A** respectively. Please refer to these in conjunction with the following descriptions.
- 10.103 In the context of the assessment of effects, the landscape and planting proposals have been incorporated as an integral part of the design and layout of the Proposed Development. The residual operational effects assessment considers the Proposed Development 15 years after completion and takes into account the growth and management of the proposed and conserved planting and habitats over this time. These effects are also detailed in the Landscape and Visual Effects Tables and described below.

Evaluation of Predicted Effects

Construction Effects

- 10.104 Construction stage details of the project are included in Chapter 4 and include the indicative phasing or sequencing of the works.
- 10.105 Throughout the course of the construction process, the approaches and methodologies adopted will seek to avoid or minimise any unnecessary effects upon the landscape and surrounding visual receptors. Managed and controlled site activities and the application of good practices throughout the construction process will seek to minimise the potential adverse effects arising from construction. This will include the protection of any trees and vegetation to be conserved in accordance with BS5837:2012 (Trees in Relation to Design, Demolition and Construction- Recommendations).

Construction Landscape Effects

- 10.106 The predicted construction effects are considered with reference to the published landscape character assessments, local landscape character and site-specific landscape features. The landscape effects of the Proposed Development are detailed at **Appendix 10.2**.

Landscape Character Assessment Studies

- 10.107 In the context of the national and borough scale landscape character assessment studies, the construction of the Proposed Development will have negligible or no discernible effects. This reflects the generally extensive nature of these landscape character areas, yet also that the Site occupies a relatively visually contained position that also includes existing developments, including some of a similar nature.

Local and Site Landscape

- 10.108 Construction of the Proposed Development will entail the removal of some existing buildings and structures from both Site areas, including a series of derelict and redundant poultry sheds within the western site area. **It will also include the formation of the vehicular access routes into and out of the main Site areas, from and to the south (Lodge Road (B1112)).**
- 10.109 The works will result in some progressive localised changes to the landscape character of the Site and its immediate context, yet these will not be extensive and will be contained. The construction works will entail the active presence of plant and machinery, site compound and the increasing visual presence of the proposed buildings as they are constructed.
- 10.110 The construction landscape effect upon the Site areas will be direct. The existing farmland and the site of some of the existing buildings and structures to be removed will be replaced by construction of the new buildings and associated elements. **The construction of the vehicular access and egress will entail relatively limited construction works with parts of the routes occupying existing access roads/ tracks. Construction of these vehicular access and egress routes will necessitate the removal of a limited area of existing planting and a small number of trees (close to the proposed poultry facility (east Site area)). This limited and contained area of existing planting to be removed is not however considered to be important in landscape terms, even at a localised scale.**
- 10.111 **The construction process will not necessitate the removal of any other existing mature trees or hedgerows. The protection and conservation of the existing trees bordering the construction works will be undertaken as necessary to protect this existing planting.**
- 10.112 As a consequence of the construction of the Proposed Development, the landscape character of the Site will progressively change to include more agricultural buildings from that existing. **The construction of the vehicular access and egress routes will have minimal effects on the local landscape.** Beyond the Site boundary, the construction effects upon local landscape character will be minimal and will dissipate quickly with distance and the natural containment of the Site areas.
- 10.113 Overall, the magnitude of landscape change arising from construction of the Proposed Development upon the landscape of the Site and its immediate context will be Low/ Medium, resulting in a **Minor/ Moderate Adverse** construction landscape effect. This overall level of construction landscape effect is localised, well contained and both temporary and short term.

Construction Visual Effects

- 10.114 A comprehensive visual impact assessment of the Proposed Development has been undertaken to determine the potential effects upon surrounding receptors. This has considered the specific effects arising during the construction stage. A series of Photo Viewpoints (**Figures 10.6 – 10.11 in Appendix 10.5A**), related figures and a Visual Effects Table (**Appendix 10.3**) are included and collectively detail and support the following description of the likely visual effects arising from construction of the Proposed Development. The location of the Visual Receptors are detailed on **Figure 10.5 (Appendix 10.4)**.

Zone of Theoretical Visibility (ZTV)

- 10.115 The ZTV of the Proposed Development is described under the following Operational section. During the construction stage, the visible extent of the Proposed Development will vary, largely subject to the stage and nature of the construction works. It will, however, be broadly comparable with that of the ZTV for the completed and operational development. The ZTV for the completed and operational development is detailed on **Figure 10.5 (Appendix 10.4A)**.

Construction Effects upon Visual Receptors

- 10.116 Visual effects arising from construction of the Proposed Development will vary yet will generally be limited. Construction activities within the Site will be visible at times from those receptors with views towards the completed and operational development. In general, the clearest views towards the construction activities and plant movements etc. will be experienced by receptors in closest proximity to the Site areas, including the grouping or residential properties between the Site areas. The level of the visual effects for the receptors will vary during the course of the short construction period.
- 10.117 The short-term construction visual effects will vary from **negligible** for those receptors with the most limited and restricted views towards the construction activity; up to **Minor/ Moderate Adverse** for those receptors with the clearest views. The latter will comprise views from some of the existing properties (Receptor Ref 1 (**Appendix 10.3A**)) situated between the two Site areas and for users of a very limited stretch of the Public Access Route (around the edge of Methwold Warren) (Receptor Ref 5) immediately to the east of the proposed poultry facility site area.
- 10.118 None of these temporary and short-term visual effects will be significant.

Operational Effects (following Completion)

- 10.119 The operational effects of the Proposed Development are based upon full completion of the Proposed Development and do not take into account the subsequent management and maturing of the existing and new planting proposals. The subsequent effects which also consider the growth and management of the trees and planting over 15 years are considered and outlined in the subsequent Residual Effects section.

Operational Landscape Effects

- 10.120 The predicted operational effects are considered with reference to the published landscape character assessments, local landscape character and site-specific landscape features. The landscape effects of the Proposed Development are detailed at **Appendix 10.2**.

Landscape Character Assessments

- 10.121 In the context of the national and borough scale landscape character assessment studies, the completed and operational development will have **negligible** or no discernible effects. This

reflects the generally extensive nature of these landscape character areas, yet also that the Site occupies a relatively visually contained position that also includes existing developments, including some of a similar nature.

Local and Site Landscape

- 10.122 The Proposed Development would site new pig and poultry buildings into site areas containing existing similar buildings and associated hard standing and elements. The proposals will extend the existing facilities and extent of built development across the Site areas and in respect of the proposed poultry sheds within the east Site area, the existing redundant sheds will also be removed as part of the proposals.
- 10.123 The Proposed Development will partially change the use and character of the Site from open farmland to two separate areas comprising new agricultural/ livestock barns/ sheds with associated hard standing surrounds and feed hoppers and related elements. The proposals also include new native woodland, tree and hedgerow planting and wildflower/ conservation grassland areas.
- 10.124 In addition to the landscape change and effects arising from the two site areas, the vehicular access and egress proposals will have a very limited effect on the local landscape. The proposed routes utilise some stretches of existing vehicular roads/tracks and the only new roadway will be relatively limited in its extent and visually distanced from surrounding receptors. Any resultant effects arising from these routes will be from the influence of the vehicles using the routes on the local landscape and will be no more than limited in landscape terms.
- 10.125 Overall, the nature of the direct change to the Site areas will be contained and the development will reflect the type of development already existing within parts of the Site and in the immediate vicinity. Other existing development in the form of the biogas renewable energy facility and a grouping of residential properties also lie within the immediate context of the Site.
- 10.126 Surrounding and nearby mature woodland and tree belts provide a good degree of containment and this will limit the indirect effect of the Proposed Development on the surrounding landscape.
- 10.127 The magnitude of the landscape change arising from the Proposed Development will be limited. The native planting and habitat proposals will replace parts of the existing arable fields and will represent a beneficial albeit localised effect in the medium to longer term. These proposals will provide a gain to the lengths of hedgerows and number of trees across the Site areas.
- 10.128 Overall, the magnitude of landscape change arising from the completed and operational development upon the landscape of the Site and its immediate context will be Low, resulting in a **Minor Adverse** landscape effect. This overall level of landscape effect is localised and well contained.

Operational Visual Effects

- 10.129 A comprehensive visual impact assessment of the Proposed Development has been undertaken to determine the potential effects upon surrounding receptors. This has considered the specific effects arising during the operational stage. Two assessments have been conducted for receptors during the operational stage of the Proposed Development. The first considers the effects upon full completion of the development and in the winter period (i.e. the visual screening effects of any deciduous foliage in the summer is not taken into account) and the second predicts the residual effects 15 years after completion and in the summer period (thus enabling the effectiveness of any planting to be evaluated).

10.130 A series of photo viewpoints, figures and a Visual Effects Table (**Appendix 10.2 -10.5A**) are included and collectively detail and support the description of the likely visual effects arising from the Proposed Development.

Zone of Theoretical Visibility (ZTV)

10.131 The ZTV of the Proposed Development is the theoretical area from within which the Proposed Development is likely to be visible. It is representative and is not an indicator of the significance of the visual effect arising from the Proposed Development. The ZTV of the Proposed Development has been prepared based upon field-based appraisal supported by further analysis (e.g. cross-sectional review of levels). The ZTV of the Proposed Development is detailed on **Figure 10.5**.

10.132 The ZTV of the Proposed Development is primarily defined by the surrounding mature woodland and tree belts and to a lesser extent the gently undulating topography.

Effects upon Visual Receptors

10.133 The effects of the Proposed Development upon visual receptors are detailed in the Visual Effects Table (**Appendix 10.3A**). The following section details the visual effects of the Proposed Development upon full completion. Receptor references are included in brackets and refer to the Visual Effects Table and the location of the Visual Receptors are shown on **Figure 10.5**.

10.134 Views towards the completed and operational development will be possible from a limited number of receptors surrounding the Site and will range from relatively close views to distant and restricted views.

10.135 A small grouping of circa 12- 14 single storey properties (Receptor Ref 1) lie between and close to the Site areas. Close board fencing up to circa 2m high restricts some views outwards from these properties yet for most there are some views predominantly in an easterly direction. These views presently include a number of agricultural sheds and the biogas energy unit. Mature woodland restricts views towards the west and south, although 3 or 4 properties back on to the boundary with the existing pig rearing facility and have some restricted views beyond intervening trees towards the west.

10.136 The Proposed Development will be visible to varying degrees from these properties. The northern part of the proposed poultry site (East site) and proposed sheds will be seen from those properties with views towards this part of the Site and the existing sheds.

10.137 Glimpsed and restricted views towards part of the proposed pig rearing facility (West site) will also be seen for the small number of properties that back on to this corner of the Site. The most notable effects will arise during construction of the facilities yet even at this time these temporary effects will not be notable or significant. The proposed native woodland/ tree and hedgerow planting will provide some additional screening and filtering of views towards the Proposed Development in the medium to longer term.

10.138 **There will be no discernible views from these properties towards the proposed vehicular access and egress routes to the south and south east.**

10.139 The visual effect upon these properties with views of the completed development are likely to be **Minor Adverse** upon completion.

- 10.140 Residents of Muriel's Farm (Receptor Ref 2) are likely to have restricted views beyond an intervening hedgerow and to the side of a Tree Belt towards the western extent of the Proposed Development on the proposed pig rearing facility (west site) will be visible in part from this property. It will however only be partially visible and in due course the proposed native tree belt and hedgerow planting included at the western extent of this Site Area will assist in screening the proposed buildings.
- 10.141 The proposed poultry facility (East site) [and the proposed vehicular access and egress routes](#), will not be visible from this property due to the existing intervening woodlands and tree belts.
- 10.142 The visual effect of the completed development upon this property is likely to be **Minor Adverse**.
- 10.143 From some properties on the southern edge of Methwold (Receptor ref 3), views southwards across the disused airfield are possible in the general direction of the Site. The gently undulating nature of the landform in combination with the plant nursey and woodland areas do however limit views generally towards the Site areas.
- 10.144 Glimpsed views towards the highest parts of the proposed buildings and associated hoppers/ chimney stacks are likely to be possible from a limited number of settlement edge properties. However, where visible, any parts of the Proposed Development will be distant, set beyond existing woodland/ trees and only glimpsed alongside potential glimpsed views of the biogas unit. Any visual effects arising will be limited and from the vast majority of properties within the settlement there will be no views towards any part of the Proposed Development.
- 10.145 The visual effect upon any properties with views of the completed development are likely to be **Negligible/ Minor Adverse** upon completion.
- 10.146 From a stretch of public bridleway to the north west of the proposed pig facility (west site) areas (that extends eastwards from Hythe Rd) (Receptor ref 4) glimpsed and limited views towards the Proposed Development will be possible. The bridleway does not connect through to or with any other PROW. The route also sits on the northern side of an established and mature hedgerow and this limits any opportunities for views towards the Site to any gaps/ breaks in the existing hedgerow.
- 10.147 Where views are possible the existing pig rearing facility and a number of other intervening agricultural buildings/ sheds are visible. The proposed poultry facility (East site) and existing buildings/ sheds in this area are not however discernible from this stretch of bridleway. The proposed poultry facility will not be visible from this bridleway due to the existing intervening buildings and woodland/ tree belts.
- 10.148 However, the proposed pig rearing facility will be visible in part. Where visible it will be seen in the context of the existing buildings and will be set beyond and against these existing buildings. This will limit the nature of the visual change and the likely visual effect of the completed development will be **Minor Adverse**.
- 10.149 To the east of the Site, a public access route (Receptor ref 5) follows an arc broadly around the perimeter of the Methwold Warren woodland. Views outwards from the route vary and opportunities for views in the general direction of the Site are relatively limited. From some parts of the route relatively close to the east of the proposed poultry facility area however, views towards and beyond the existing poultry sheds to be demolished are possible.

- 10.150 For the majority of this route however, between the B1112, there will be no views towards the proposed pig and poultry developments. Where views are possible these will be confined to relatively short stretches and will be generally filtered by the trees and planting fringing this woodland. The Proposed Development on the proposed poultry facility (East site) will be more evident in any views, although restricted and more distant views beyond to development on the proposed pig facility (West site) may also be possible. Any views will be seen in the context of other existing buildings and development, including the existing pig rearing facility and the bio gas energy unit.
- 10.151 The southern part of this route between the B1112 (Lodge Road) and an existing quarry (to the east of the route) also provides vehicular access to the quarry and is proposed to be used as part of the vehicular access route for the Proposed Development. The proposed vehicular access route extends westwards from this existing public access route. Vehicles using the proposed route will be visible to users of the route. This will result in some operational visual effects, yet given the presence of the existing quarry access and the likely extent of the vehicular movements, the visual effects for users are likely to be relatively limited.
- 10.152 ~~Any views will be seen in the context of other existing buildings and development, including the existing pig rearing facility and the biogas energy unit.~~ The overall visual effect of the completed and operational development upon users of this route will be **Minor/Moderate Adverse**.
- 10.153 From the access track (and public footpath) (Receptor ref 6) leading to the Site from the B1112 to the north some approaching yet restricted views towards the Site are possible. However, these views also encompass other buildings and developments, including the large granary building, the redundant poultry sheds and the biogas energy unit.
- 10.154 The Proposed Development will be partially seen in these approaching views from the north east, although for much of the route the development will be effectively screened by other intervening buildings and existing planting. Views towards the Proposed Development on the proposed pig facility (West site) will be limited to the highest parts of the proposed sheds and associated hoppers/ chimneys. The proposed poultry facility (East site) development will be relatively more visible from the southern stretch of the route yet in these views the proposed buildings will be located where the existing redundant poultry buildings are presently located. The nature of the visual change will thus be limited and the visual effect **Minor Adverse**.
- 10.155 Hythe Road extends in a general north- south direction, approximately 1.6km to the west of the proposed pig facility (West site) area. Opportunities for views towards the Site from this road are principally limited by the nature of the undulating landform. The Proposed Development on the proposed poultry facility (East site) area will not be visible at all from this road.
- 10.156 The Proposed Development on the proposed pig facility (West site) area will however be visible for a very short stretch for those using this road. In these views it will be the highest parts of the development in the west of the proposed pig facility (West site) that will be distantly seen beyond the intervening farmland. It will form a minor element in the view and will be seen where the existing pig rearing facility is visible. The nature of the visual change will thus be limited and the visual effect **Negligible/ Minor Adverse**.
- 10.157 Limited and restricted views towards the Proposed Development are also likely to be possible from very limited positions on Old Methwold Road (Receptor ref 8) (northern end only); from the track leading to the small grouping of properties between the Site areas (Receptor ref 9); for

users of the B1112 (Receptor ref 10) and residents of a property on the B1112 (Receptor ref 11) to the north of the Site; and for residents of a property (Receptor ref 12) sited along the access track leading to the Site (north side of the Granary building).

10.158 There will be some operational visual effects arising from the proposed vehicular access routes (to and from the south and the B1112) for users of the existing track leading to the small grouping of properties between the site areas (Receptor ref: 9) and from the B1112 Lodge Road (Receptor ref: 11). These visual effects will arise from the operational use of these proposed routes by vehicles.

10.159 Any views from these receptors is likely to be very limited and restricted and at most any visual effects will be **Negligible to Minor Adverse**.

10.160 Overall, there will be no significant visual effects arising from the completed and operational Proposed Development on any of the surrounding visual receptors.

Landscape Design and Mitigation

10.161 The development proposals are described in Chapter 4, as well as in the separate Design and Access Statements and other information accompanying the two planning applications. Existing landscape character and features and the visual amenity of the Site have been considered by the planning and design process and have been factors in informing the resultant scheme. This approach has entailed collaboration between landscape and ecological consultants and other professionals. The resultant planting proposals reflect the outcome of this iterative design and assessment process.

10.162 The landscape and habitat proposals will include new woodland and native tree and hedgerow planting. It will also include new wild flora/ conservation grassland. The native planting species reflect those present within the existing site context and these proposals will be beneficial to the existing local landscape and will reflect the general objectives of the published landscape character studies.

10.163 Landscaping for the proposed poultry facility includes native hedgerow planting on all three sides of each set of poultry sheds and woodland to the west of the sheds and to the north of the workers dwellings.

10.164 Landscaping proposed for the proposed pig facility include woodland planting to the west of the proposed pig units as well as native scrub mix and woodland to the east of the proposed pig units. Details can be found in the accompanying landscape plans in **Appendix 4.1A** The landscaping and planting and their management will be secured by planning condition.

10.165 All of the new planting and grassland areas will be managed and maintained in the long term.

Residual Effects

10.166 The residual effects consider the effects after the incorporation of the mitigation and landscape design measures. In the context of this landscape and visual assessment, the measures comprise the new planting and grassland habitats as detailed in the preceding section.

10.167 Consideration of the likely residual effects also considers and appraises the Proposed Development 15 years after completion and takes into account the growth and management

of the proposed planting. In this landscape setting, the woodland, tree and hedgerow planting proposals will in the medium to longer term filter some views from the surrounding properties and receptors and in general the level of landscape and visual effects will be further reduced.

- 10.168 There will be Negligible residual effects on both NCA No.85 'The Brecks' and the 'Northwold' LCA and Negligible/Minor beneficial residual effects on the Site and its immediate context.
- 10.169 In terms of visual residual effects, there will be Minor adverse effects for receptor ref 6 (users of PROW along the track leading to B1112), Negligible/Minor adverse effects for receptor references 1 and 2 (residents of single storey properties at Breckland Farm and residents at Muriel's Farm respectively. All other residual visual effects will be Negligible.
- 10.170 Overall, there will be no significant landscape or visual residual effects arising from the Proposed Development. In fact, any residual landscape and visual effects will be no more than limited and localised.

Cumulative Effects

- 10.171 Four projects were identified through the EIA scoping stage for inclusion in the assessment of cumulative effects:
- Warren Energy Ltd - FUL/2021/0011;
 - Warren Energy Ltd - FUL2021/0013;
 - Land at Former RAF, Methwold - 20/01279/FM; and
 - Methwold Airfield, Brandon Road - 16/01963/FM.
- 10.172 No potential cumulative landscape and visual effects have been identified alongside any other committed or Proposed Development.

Summary and Conclusions

- 10.173 The landscape character of the Site and its context is predominantly shaped by the presence and interaction of medium scale farmland, woodland and tree belts and a very gently undulating landform. The woodland, tree belts and other hedgerows and vegetation enclose parts of the landscape to varying degrees, with the wider landscape to the east generally more enclosed by woodland and to the west as it gently falls towards the Fenlands the landscape is relatively more open.
- 10.174 The settlements of Methwold and Feltwell lie within the wider context respectively to the north and south west of the Site. A series of generally minor roads yet including the B1112 also lie within this wider context and vehicular access to the Site is via a small access road/ track from the B1112 to the north. Within the Site and its more immediate context are a variety of existing developments and features including the existing pig rearing barns and facilities and a series of redundant poultry sheds. These existing buildings and features lie respectively within the Site areas to the west and east.
- 10.175 A biogas renewable energy unit lies alongside the Site areas as do a grouping of a small number of dwellings which lie between the two respective Site areas. Mature woodland and tree belts also lie within close proximity and are effective in containing this localised landscape and the influence of the existing developments and features.

- 10.176 The Site and its context includes no designated landscapes or features and no landscapes recognised of being of any particular higher value or sensitivity. Within the '*Kings Lynn & West Norfolk Borough Landscape Character Assessment*' (March 2007), the Site lies within the '*Settled Farmlands with Plantations*' Landscape Character Type (LCT) (Ref H) and specifically within the '*Northwold*' Landscape Character Area (LCA) (Ref H5).
- 10.177 This Borough wide published study advises for the 'Northwold' LCA; '*...The simple, mainly arable land cover is relieved by the variety of plantation woodlands. Landscape pattern is quite striking as a result of the patchwork of regular plantations interspersed with predominantly arable farmland. Overall condition is considered to be declining and strength of character, moderate.*' The study also advises (under the headings '*Inherent Landscape Sensitivities*' and '*Landscape Planning Guidelines*') that this landscape should conserve and enhance the existing belts and copses of woodland and ensure that new appropriate development is well integrated into the surrounding landscape.
- 10.178 This Landscape and Visual Impact Assessment (LVIA) has assessed the landscape value and sensitivity of the Site and its immediate context in accordance with recognised guidelines (Guidelines for Landscape and Visual Impact Assessment; 3rd Edition) and concludes that it is Medium. This is supported by the judgements and detail included within the published landscape character assessment study for the Borough.
- 10.179 The Proposed Development has appropriately considered landscape and visual matters as part of the assessment and design process. The proposals will include new native woodland, tree and hedgerow planting that will represent a gain and enhancement to the existing situation, reflecting the guidelines of the Borough Landscape study.
- 10.180 The landscape effects of the Proposed Development will be limited and localised and effectively contained by the presence of the surrounding woodlands and tree belts. The proposed new native planting will support this and further aid integration in the medium and longer term.
- 10.181 The visual effects of the Proposed Development will also be limited and localised with relatively few receptors having views towards the proposals. The most notable visual effects are likely to arise for the small number of properties that lie between the two Site areas, although even for these residents any available views are likely to be restricted and where visible the proposals will be seen in the context of the existing pig rearing facility, redundant poultry sheds and the biogas renewable energy unit. The nature of the visual change will thus not be marked.
- 10.182 Other views towards the Proposed Development will generally be restricted to very limited stretches of Public Rights of Way and distant glimpsed views from very limited roadside positions and a handful of other distant properties. The visual effects of the Proposed Development upon these receptors is likely to be predominantly Negligible or **at-most** Minor Adverse.
- 10.183 Overall, the Proposed Development will result in only limited and localised landscape and visual effects and no significant effects in these terms. The Proposed Development includes a sympathetic and appropriate landscape scheme, and this will contribute towards local Green Infrastructure and to the Borough wide landscape planning guidelines.

Table 10.1A: Summary of Impacts: *Landscape and Visual*

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Impact of Construction Dust and PM ₁₀	Loc	Mod	Low	Adv	Irrev	ST	Min	Sheeting of loose aggregates; Use dust suppression tools; Regular inspection and cleaning of local highways; Ensure all construction plant and equipment is well maintained; No unauthorised burning of materials on site.	Ben	Rev	ST	Neg
Construction: Landscape Character – Published Landscape Character Areas	Loc	Mod	Neg	Adv	Irrev	ST	Neg	Good construction practices and protection of existing conserved trees/ planting where required	Adv	Irrev	ST	Neg
Construction: Landscape Character - Site and Immediate Context	Loc	Mod	Low	Adv	Irrev	ST	Min/Mod	Good construction practices and protection of existing conserved trees/ planting where required	Adv	Irrev	ST	Min/Mod
Construction: Visual – Overall	Loc	Mod/High	Neg/Low	Adv	Irrev	ST	Min	Good construction practices and protection of existing conserved trees/ planting where required	Adv	Irrev	ST	Min
Completed/ Operational Development: Landscape Character – Published Landscape Character Areas	Loc	Mod	Neg	Adv	Irrev	LT	Neg	New native woodland, tree and hedgerow planting to assimilate the development within its landscape setting	Adv	Irrev	LT	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Completed/ Operational Development: Landscape Character - Site and Immediate Context	Loc	Mod	Neg/ Low	Adv	Irrev	LT	Min	New native woodland, tree and hedgerow planting to assimilate the development within its landscape setting	Ben	Irrev	LT	Min/ Neg
Completed/ Operational Development: Visual - Overall	Loc	Mod/ High	Neg/ Low	Adv	Irrev	LT	Min	New native woodland, tree and hedgerow planting to visually filter/ screen the limited available views towards the proposals	Adv	Irrev	LT	Min/ Neg

Key:

Loc: Local Maj: Major Irrev: Irreversible ST: Short-Term LT: Long-Term Ben: Beneficial
 Min: Minor Neg: Negligible Rev: Reversible Adv: Adverse Mod: Moderate

Noise and Vibration



11.0 Noise and Vibration

Introduction

- 11.1 This chapter has been prepared by Hepworth Acoustics to assess the noise and vibration impacts of the Proposed Developments on the neighbouring residences.
- 11.2 Hepworth Acoustics Limited has been commissioned to carry out a noise and vibration assessment of the proposed Site Developments. The assessment is to accompany two full planning applications to increase the pig and poultry rearing capacity at Airfield Farm, Feltwell Farm, and Methwold Farm.
- 11.3 The assessment has been carried out by Thomas Bailless MEng MIOA, Principal Consultant at Hepworth Acoustics, who is a full corporate member of the Institute of Acoustics, and who has 17 years of experience conducting noise and vibration assessments.
- 11.4 The assessment has been commissioned to support both planning applications for the Proposed Development. The proposal includes the following elements:

Pig Rearing Facility

- The Proposed Development includes the demolition of the existing buildings on the Site (~~total area 9,701 m²~~). Four buildings will be retained on the Site for storage of farmyard manure and straw.
- To replace the demolished buildings mentioned above, 14 modern pig finishing units will be constructed, each with the capacity to house up to 1,000 pigs. These units will be approximately ~~6.4 7.2~~ metre high but will also include 6 metre high stacks for ventilation, giving a total height of ~~12.4 13.2~~ metres.

Poultry Facility

- 20 poultry sheds will be constructed. ~~each with the capacity to house up to 43,500 birds~~. Each flock will be reared from day old chicks up to 38-40-day old birds, with a seven day turn around where sheds are cleaned down and emptied.
- Each poultry unit will use mechanical ventilation.
- Four workers' dwellings are proposed to be located to the west of the poultry sheds. As the poultry facility will be a 24-hour operation, both the manager and assistant manager for each poultry site will be required to share the responsibility of ensuring site safety and the wellbeing of the chickens.

- 11.5 The nearest non-associated residential properties to the Proposed Development are Muriel's Farm on Old Methwold Road to the south west, Clopton Pig Cottages between the two development sites and Hangar Bungalow on the ~~non-associated~~ access road to the north east – these are marked on **Figure 11.1A**. The distances to the nearest residences from the Proposed Developments are shown in **Table 11.1A**. This shows the minimum distance, from the residence to each development site boundary, and the average distance, from the residence to the centre of each development site.

Table 11.1A: Distance to Nearest Residences

RESIDENCE	DISTANCE TO PROPOSED PIG UNITS	DISTANCE TO PROPOSED POULTRY SHEDS
1. Muriel's Farm	500 metres (minimum) 650 metres (average)	1,200 metres (minimum) 1,300 metres (average)
2. Clopton Pig Cottages	220 metres (minimum) 320 metres (average)	370 metres (minimum) 470 metres (average)
3. Hangar Bungalow	1,250 metres (minimum) 1,350 (average)	820 metres (minimum) 1100 metres (average)

11.6 ~~Hangar Bungalow is around 5 metres away from the Site access road to the north east.~~

11.7 Adjacent to the existing pig units is Warren Energy, a biofuel power plant. This has regular HGV deliveries throughout the day.

11.8 Access to the Site will be from the ~~north east~~ south of the Site, off the B1112 (Lodge Road). This access road is also used by residents of Clopton Pig Cottages and ~~Hangar Bungalow and~~ by Warren Energy.

11.9 Four new staff residences are proposed for the poultry site. These will be for staff only and will remain associated with the Site.

11.10 We understand that deliveries come to the Site seven days a week, with the bulk of deliveries arriving during the daytime. Fixed plant at the Site can potentially operate up to 24 hours a day, depending on the season.

11.11 This assessment is based on the drawings provided in **Appendix 4.1A**.

11.12 We have also taken into consideration the predicted traffic data prepared by Canham Consulting.

11.13 We previously informed Jo Reed, Environmental Health Officer at the BCKLWN, of our proposed noise measurement locations in our email dated 14th September 2020. She confirmed these were acceptable in her email response, dated 30th September 2020.

11.14 The following feedback to the ES Scoping Report relevant to noise and vibration was received from Suzi Pimlott, Senior Community Safety & Neighbourhood Nuisance Officer at the BCKLWN, in her email dated 15th January 2021:

Noise

Section 12.12, page 45, states transport will not be scoped in to the EIA. As outlined above, there are 13 dwellings, as close as 7m to the access road, and therefore the noise impact from construction phase vehicle movements will impact on occupiers of these and should be considered/scoped in.

Vibration

Table 4.1, page 8, 'Noise and Vibration' does not directly state that vibration will be scoped into the EIA; it does advise that noise will. Given the proximity to the access route of 13 dwellings (as referenced above), vibration from passing construction traffic should be scoped in.

- 11.15 The technical appendices that support the chapter include **Appendix 11.1** – Noise Survey Data and **Appendix 11.2** – Fixed Plant Noise Calculations.

Potential Impacts

- 11.16 The potential impacts during the construction phase include noise and vibration from construction equipment, power tools, and vehicle movements.
- 11.17 The potential impacts once the Site is operational will be noise from the proposed mechanical equipment at the Site, along with noise and vibration from additional vehicle movements.

Methodology

- 11.18 The noise assessment has included:
- Agreeing the content of the noise and vibration assessment with the Local Authority through the EIA Scoping Process.
 - A site inspection to identify the location of the nearest residences.
 - Noise surveys to determine the existing ambient and background noise levels outside the nearest residences.
 - A prediction of the noise and vibration associated with the Proposed Development, including noise and vibration from traffic associated with the development (on-site and off-site) and noise from new fixed plant at the Site.
 - Recommendations of suitable noise and vibration mitigation measures.
 - Recommendations on reducing noise and vibration impacts during the construction phase.
 - Details of difficulties and the main uncertainties.

- 11.19 The following standards and guideline documents have been referred to in preparation of the Noise Assessment:

National Planning Policy Framework (NPPF)

- 11.20 The National Planning Policy Framework (NPPF) 2021 states at paragraph 174 that “Planning policies and decisions should contribute to and enhance the natural and local environment by: ... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution ...”.
- 11.21 Further, paragraph 185 states that “Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life ...”
- 11.22 Paragraph 187 states that: *“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development*

permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

11.23 BCKLWN has planning policy document C.15 DM15 - Environment, Design and Amenity relevant to noise. This states the following:

"Development proposals should aim to create a high quality environment without detrimental impact on the amenity of new and existing residents. Factors that could have a significant negative impact on the amenity of residents include: noise, odour, poor air quality, light pollution, land contamination and visual impact."

11.24 No specific guidance is given in the NPPF on acoustic criteria and BCKLWN also have no specific noise limits, therefore, the guidance discussed below has been used to determine acceptable noise criteria.

BS 4142

11.25 British Standard 4142: 2014 + A1: 2019 'Methods for rating and assessing industrial and commercial sound' provides methods for rating and assessing sound of an industrial and/or commercial nature. This will be referred to as BS 4142 from hereon for brevity.

11.26 BS 4142 requires the 'rating' noise level for the operation to be compared with the LA90 background noise level in the absence of the operational noise.

11.27 With regard to the background noise level, BS 4142 states that *"it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."*

11.28 The 'rating' level is derived based on the 'specific' L_{Aeq} noise level attributable to the operation with an 'acoustic feature' penalty added for any noise sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.

11.29 BS 4142 stipulates that impacts should be assessed over a reference time interval of 1-hour during the daytime (07:00 – 23:00) and 15-minutes during the night-time (23:00 – 07:00).

11.30 An initial estimate of the impact of the operation is determined by subtracting the background level from the 'rating' level. BS 4142 states that:

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

11.31 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:

- The absolute level of sound, including “where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background”;
- The character and level of the residual sound; and
- The sensitivity of the receptor and whether dwellings ... will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as: i) façade insulation treatment, ii) ventilation and/or cooling, and iii) acoustic screening.

BS 8233

11.32 Guidance on acceptable noise levels within residential accommodation is set out in British Standard 8233: 2014, ‘Guidance on sound insulation and noise reduction for buildings’. This is summarised in **Table 11.2A**.

Table 11.2A: BS 8233 Recommended Acoustic Design Criteria

ROOM TYPE	INTERNAL NOISE LEVELS	
	DAYTIME (07:00 – 23:00)	NIGHT-TIME (23:00 – 07:00)
Living room	35 dB LAeq,16hr	-
Dining room/area	40 dB LAeq,16hr	-
Bedroom	35 dB LAeq,16hr	30 dB LAeq,8hr

11.33 For garden areas and patios, BS 8233 recommends that it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$

IEMA Guidelines for Environmental Noise Impact Assessment

11.34 The IEMA Guidelines for Environmental Noise Impact Assessment include examples of tables of impacts relating to changes in L_{Aeq} noise level. The criteria adopted for assessment of significance of impact relating to increased road traffic noise from existing roads, attributable to the Proposed Development, are set out in **Table 11.3A**.

Table 11.3A: Impact Significance Criteria for Increased Road Traffic Noise

NOISE LEVEL INCREASE (DB)	SUBJECTIVE RESPONSE	SIGNIFICANCE
0.0 – 0.9	No perceptible increase	Negligible
1.0 – 2.9	Very low but potentially perceptible increase	Minor
3.0 – 4.9	Noticeable increase	Moderate
5.0 – 9.9	Up to a doubling in loudness	Major

BS 5228

11.35 BS 5228: Part 1: 2009 + A1: 2014 ‘Code of Practice for Noise Control on Construction and Open Sites’ and BS 5228: Part 2: 2009 +A1: 2014 ‘Code of Practice for Vibration Control on Construction and Open Sites’ set out techniques to predict the likely noise and vibration effects from construction/demolition works. These are based on detailed information on the type and number of plant being used, their location, and the length of time they are in operation. Currently this detailed information is not available, so we have based this part of the assessment on general good practice recommendations applicable to the development.

Details of Difficulties and the Main Uncertainties

11.36 At this stage, the specific makes and models of the vehicles that will be accessing the Site in future is not known. Therefore, the assessment has been based on noise levels associated with the general types of vehicles that are currently used at the Site.

11.37 The specific construction equipment and hours of usage for the construction phase is not known at this stage. Therefore, the part of this assessment concerning the control of construction noise is based on general good practice recommendations applicable to the development.

Existing Baseline Conditions

Environmental Noise Survey Details and Results

11.38 Continuous monitoring of prevailing ambient/background noise levels has been carried out at Locations 1, 2, and 3. Location 1 is adjacent to Muriel’s Farm, the detached residence south-west of the Site on Old Methwold Road. Location 2 is adjacent to Clopton Pig Cottages, south-east of the existing pig farm. Location 3 is by Hangar Bungalow, on the access road to the north-east of the development site. The monitoring locations are identified in **Figure 11.1A**.

11.39 Noise levels were measured at all locations for 24 hours, starting at the following times:

- Location 1: 13:30 on Tuesday 8th September 2020;
- Location 2: 13:45 on Tuesday 8th September 2020; and
- Location 3: 14:15 on Wednesday 9th September 2020.

11.40 The noise measurements were taken in ‘free-field’ conditions with the microphone at approximately 1.5 metres above ground level at all locations. Measurements were made with 15-minute sample durations.

11.41 The results of the noise survey are detailed in **Appendix 11.1**. The measured levels are summarised in **Table 11.4A** below.

Table 11.4A: Noise Levels Summary (dBA)

POSITION	TIME	SOUND PRESSURE LEVELS		
		LAMAX,F	LAEQ,15MINS	LA90,15MINS
		RANGE	LOG AVERAGE	MEAN
Location 1	Daytime (07:00 to 23:00)	48 – 87	42	34
	Night (23:00 to 07:00)	39 – 68	36	29

POSITION	TIME	SOUND PRESSURE LEVELS		
		LAMAX,F	LAEQ,15MINS	LA90,15MINS
		RANGE	LOG AVERAGE	MEAN
Location 2	Daytime (07:00 to 23:00)	42 – 85	45	34
	Night (23:00 to 07:00)	33 – 74	33	29
Location 3	Daytime (07:00 to 23:00)	53 – 85	48	33
	Night (23:00 to 07:00)	43 – 79	39	30

Noise Sources

- 11.42 Noise was mainly due to road traffic on the surrounding highways, including HGVs accessing the existing pig farm and the Warren Energy site.
- 11.43 Noise from fans at the existing pig units was slightly audible as a minor source at Location 2 during the daytime. Noise from the Warren Energy site was slightly audible at Locations 2 and 3 between lulls in traffic as a minor source.
- 11.44 Noise from the animals themselves was not significantly audible outside the existing pig units.
- 11.45 Noise from the feeding silos was not significant.
- 11.46 There was no significant agricultural activity in process in the vicinity of the Site at the time of the surveys. Other times of the year are likely to have more agricultural activity and therefore higher background noise levels.
- 11.47 Noise from aircraft flying overhead was occasionally audible.
- 11.48 On this basis, the noise survey is considered to be suitably representative of the lowest likely background noise levels, therefore representing a reasonably worst case scenario.

Sound Level Meter Details

- 11.49 The noise monitoring at Locations 1 and 3 was carried out using a Rion NL-31 Type 1 sound level meter (serial no. 01120834). The noise monitoring at Location 2 was carried out using a Brüel & Kjær 2250 Type 1 sound level meter (serial no. 3011626).
- 11.50 The calibration level of the meters was checked before and after the surveys with a Brüel & Kjær Type 4231 sound calibrator (serial no. 2412667). No significant calibration deviation was observed.

Evolution of the Baseline Conditions without Development

- 11.51 Without development, the noise levels at Location 1 are not expected to change significantly. The daytime noise level at Location 2 is anticipated to rise to 50 dB L_{Aeq,1hr} due to vehicles accessing Warren Energy, as calculated by Sustainable Acoustics in their Noise Impact Assessment, Report No. 21-0179-1 R01, dated 3rd March 2021.

Predicted Impacts and Mitigation

On-Site Noise

11.52 Based on an analysis of the full data set that is summarised in **Table 11.4A**, and consideration of the guidance set out in BS 4142 as discussed above, it is recommended that noise emissions from all noise sources to be installed/operated on the Site should equate to a ‘rating’ level (as defined by BS 4142) at the boundary of the nearest existing residential properties no greater than those set out in **Table 11.5A** for the given periods.

Table 11.5A: Recommended Noise Limits at Nearest Existing Residences

PERIOD	LIMITING NOISE ‘RATING’ LEVEL, DB		
	LOCATION 1	LOCATION 2	LOCATION 3
Daytime (07:00 – 23:00)	34	34	33
Night-time (23:00 – 07:00)	29	29	30

11.53 The recommended noise limits in **Table 11.5A** have been applied in order to achieve a ‘rating’ level that does not exceed the background level. Based on BS 4142 this will hence achieve a “low impact, depending on the context”.

11.54 It must be noted that where noise emissions are such that they give rise to intermittent, tonal or impulsive characteristics, the L_{Aeq} noise limits specifically attributable to the noise source(s) must be reduced commensurately to account for the ‘acoustic feature’ penalty, in line with BS 4142.

11.55 The recommended limits in **Table 11.5A** are intended to be applicable to the cumulative noise level of all on-site sources, which for this development will include fixed plant and machinery noise and, also, mobile noise sources operating within the Site boundary (e.g. HGVs manoeuvring and forklift trucks loading/unloading).

11.56 To consider HGV manoeuvring and loading/unloading activity, we expect that up to 6 HGVs will manoeuvre within each Site (i.e. six at the pig site and six at the poultry site) during the worst-case daytime hour based on the expected operations provided by the Applicant. It is further assumed that there will be an average of two forklift trucks operating continuously over this period at each site (i.e. four forklift trucks in total, two for each site).

11.57 For the night-time period, it has been taken that up to two HGVs will manoeuvre within each Site during the worst-case night-time 15-minute period (i.e. four HGVs in total, two at each site) and that there will be a single forklift truck in each site operating continuously over this period (i.e. two forklift trucks in total, one for each site).

11.58 All on-site vehicle activity has been taken to occur at the minimum separation distances from the nearest residential property shown in **Table 11.1A**. Conservative acoustic screening corrections of -15 dB(A) has been taken due to the effects of ground absorption and the barrier effect provided by the intervening buildings and topography.

11.59 The assessment has been based on previously measured noise levels for vehicle manoeuvres and loading activities from Hepworth Acoustics’ data library. The following represents the typical noise levels for the activity types pertinent to this assessment:

- HGV manoeuvring including forward and reverse: 85 dB LAE at 10 metres; and
- Forklift loading/unloading HGV: 66 dB $L_{Aeq,T}$ at 10 metres.

- 11.60 Given the impulsive nature of the noise sources associated with HGV manoeuvring and loading/unloading activity, an ‘acoustic feature’ penalty is considered applicable in accordance with BS 4142, and a penalty of +6 dB has been applied. This correction is usually applicable when the sound is ‘clearly impulsive’ and is hence considered to be highly robust given the level of predicted sound relative to the prevailing ambient levels.
- 11.61 Based on the above, the predicted worst-case daytime hour and night-time 15-minute rating levels at the nearest residential properties are shown in **Table 11.6A**.

Table 11.6A: Total Predicted On-Site Vehicle Noise Levels at Nearest Residences

DESCRIPTION	DB(A)		
	MURIEL’S FARM	CLOPTON COTTAGES	HANGAR BUNGALOW
Resultant daytime vehicle noise rating level (dB LAeq,1hr)	10	17	7
Resultant night-time vehicle noise rating level (dB LAeq,15mins)	10	17	7

- 11.62 To provide an initial assessment of the worst-case impact of HGV manoeuvring and loading/unloading activity noise, in line with BS 4142, the derived ‘rating’ level is compared to the recommended noise limits for the Proposed Development as set out in **Table 11.5A**. From this it can be seen that the predicted ‘rating’ level is within the recommended limits for each of the daytime and night-time periods. Based on BS 4142 this will hence achieve a “low impact, depending on the context”.
- 11.63 To consider the ‘context’ of the assessment, as necessary in line with BS 4142, it is noted that the absolute level of sound predicted is relatively low. The worst-case predicted noise level outside the nearest residences from HGV manoeuvring and loading/unloading activity is 17 dB LAeq. Based on a typical noise reduction provided by an open-window of 15 dB(A) (as cited by BS 8233), internal noise levels within the nearest residential properties will be at least 28 dB(A) lower than the most onerous internal noise level recommendations for dwellings set out in BS 8233 even with windows open, and substantially lower when windows are closed.
- 11.64 It is also noted that this level is 33 dB(A) lower than the most onerous external daytime noise level recommendations for dwellings set out in BS 8233. This does not take account of any existing fencing to the gardens of the nearest properties, which will provide further protection.
- 11.65 Notwithstanding the above, it is also necessary to consider additional noise from fixed plant and machinery. It is necessary to ensure that the cumulative noise from all sources is controlled such that the recommended limits are achieved.
- 11.66 Fixed plant proposed at the Site with a potential noise impact includes ventilation fans for the pig and poultry units. Each of the 20 poultry sheds will have 16 ventilation fans. Each of the 14 pig units will have 6 ventilation fans. The proposed ventilation fans have the sound power output shown in **Table 11.7A**, based on the manufacturer’s data.

Table 11.7A: Fan Outlet Sound Power Data, dB L_w

EQUIPMENT	TYPE	OCTAVE BAND CENTRE FREQUENCY (HZ)							
		63	125	250	500	1K	2K	4K	8K
Ventilation Fan	Ziehl FC071-6D	70	67	64	63	62	59	54	52

11.67 Based on our experience of this type of equipment and the manufacturer’s noise data, we do not expect the new fans to feature tonal, intermittent, or impulsive characteristics readily distinctive against the residual acoustic environment. Therefore, no BS 4142 acoustic feature correction is required. [Based on the manufacturer’s data, noise from the proposed heat exchangers will be insignificant.](#)

11.68 [Based on our noise measurements of the existing facility, noise from animals and noise from feeding silos is not significant, therefore, the noise impact due to these sources is negligible.](#)

11.69 The predicted fixed-plant noise impact at the nearest residences is summarised in **Table 11.8A**. [This assumes all fixed mechanical plant, including gable fans, is running at full speed, to consider a worst-case scenario.](#) The calculations are shown in **Appendix 11.2**.

Table 11.8A: Total Predicted Fixed-Plant Noise Levels at Nearest Residences

DESCRIPTION	DB(A)		
	MURIEL’S FARM	CLOPTON COTTAGES	HANGAR BUNGALOW
Resultant fixed plant rating level (dB $L_{Aeq,15mins}$)	Negligible	21	Negligible

11.70 The cumulative total rating level from on-site vehicles and fixed plant is shown in **Table 11.9A**.

Table 11.9A: Total Predicted Cumulative Noise Levels at Nearest Residences

DESCRIPTION	DB(A)		
	MURIEL’S FARM	CLOPTON COTTAGES	HANGAR BUNGALOW
Resultant daytime cumulative rating level (dB $L_{Aeq,15mins}$)	10	23	7
Resultant night-time cumulative rating level (dB $L_{Aeq,15mins}$)	10	23	7

11.71 As can be seen in **Table 11.9A**, the cumulative total rating level of noise when assessed outside the nearest residences is lower than the measured background noise levels. As stated in BS 4142, “Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

11.72 For the proposed new staff accommodation buildings on site, these will be designed with suitable building envelope sound insulation to ensure the internal noise limits in **Table 11.2A** are achieved.

11.73 It is concluded based on the above that the potential impact of on-site fixed-plant noise sources is of negligible significance, and the potential impact of on-site HGVs and loading noise is of negligible significance.

Off-Site Noise and Vibration

- 11.74 Whilst noise from on-site vehicle movements falls within the stated scope of BS 4142, noise from off-site vehicles movements does not. However, it is nonetheless necessary to consider the potential impact of development related traffic as they access the Site from the wider road network.
- 11.75 The predicted traffic to the Proposed Developments once operational, prepared by Canham Consulting, is summarised in **Table 11.10A**.

Table 11.10A: Existing and Predicted Traffic Numbers

	PIGS (PROPOSED)		CHICKENS (PROPOSED)		TOTAL TRIPS (PROPOSED)		
	NON-HGV	HGV	NON-HGV	HGV	ALL	HGV ONLY	HGV %
DAILY	6.2	2.9	10.34.0	86.3	19.427.6	9.211.2	47.42%40.53%
MONTHLY	187.4	87.2	311121.9	253.2191.9	588.4839.7	279.1340.3	47.43%40.53%
ANNUALLY	2249.0	1046.0	37431463.0	30382303.0	706110076.0	33494084.0	47.43%40.53%
	Pigs (Existing)				Total Trips (Net) (Total Trips Proposed - Pigs (Existing))		
	Non-HGV	HGV			All	HGV Only	HGV %
DAILY	9.2	4.4	Daily		5.814.0	4.86.8	83%48.33%
MONTHLY	278.7	133.9	Monthly		175.8427.1	145.2206.4	83%48.33%
ANNUALLY	3344.0	1607.0	Annually		21105125.0	17422477.0	83%48.33%

- 11.76 We understand from applications reference FUL/2021/0011 & FUL/2021/0013 submitted by Warren Energy to Norfolk County Council that some of the traffic for Warren Energy will use the same access road as used by the development sites.
- 11.77 In these applications, the predicted vehicle numbers for Warren Energy on the access road ~~passing Hangar Bungalow~~ are ~~1651~~ two-way vehicle movements a day, rising to 67 two-way vehicle movements outside Clopton Cottages where traffic combines with Warren Energy vehicles using their second access road ~~passing Hangar Bungalow. from Lodge Road~~. The predicted increase in vehicle numbers of ~~145.8~~ per day for the proposed chicken and pig developments combined therefore give rise to an increase in noise levels of ~~2.6 dB(A) outside Hangar Bungalow~~; <1 dB(A) increase outside Clopton Cottages, and no change outside Muriel's Farm and Hangar Bungalow. The impact on overall noise levels due to this ~~change outside Hangar Bungalow is described as "Very low but potentially perceptible increase", with minor significance based on the impact significance criteria in the IEMA Guidelines shown in Table 11.3. For Clopton Cottages and Muriel's Farm, the~~ change is "No perceptible increase", with negligible significance.
- 11.78 This assessment is based on traffic being restricted to an upper limit of 20 mph on the access road.

- 11.79 To ensure the above assessment remains applicable, no Site vehicle should be permitted to wait and idle in front of ~~Hangar Bungalow or on~~ the hardstanding adjacent to Clopton Pig Cottages. This will ensure that the only source of HGV noise relating to the Site is moving vehicles on the access routes, with stationary vehicles sitting with engines off, when necessary.
- 11.80 We note during our site inspection in September 2020 that the access road is generally in good condition. There were however some potholes developing, which can lead to the creation of additional noise and vibration from passing vehicles. We recommend that the access road is kept reasonably smooth and free from potholes, ridges, bumps, or other surface irregularities in order to reduce noise and vibration created by passing vehicles. To this end, we would also suggest removing ~~the two any~~ existing speed bumps on the access road ~~in the vicinity of Hangar Bungalow~~, if this is acceptable in terms of road safety and if it is approved by the Highways department.
- 11.81 In addition to the above, vehicles operated by the Site should be generally well maintained and regularly serviced. This can help prevent unusual or uncharacteristic vehicle noise.
- 11.82 It is concluded based on the above that potential impact of increased road traffic noise presents negligible ~~to minor~~ adverse significance.

Construction Noise and Vibration

- 11.83 Construction activities are temporary and the level of noise generated will vary considerably throughout the duration of the works. Depending on the proximity of works to noise sensitive properties, construction noise has the potential to give rise to short-term noise effects of varying significance, particularly if suitable mitigation measures are not implemented.
- 11.84 Although there are techniques available to predict the likely noise effects from construction works, such as those contained within BS 5228-1, they are necessarily based on detailed information. This includes the type and number of plant being used, their location and the length of time they are in operation.
- 11.85 There is no detailed information available at this stage regarding the specific construction plant and techniques that will be in operation on the Site during construction such that this type of accurate prediction is not possible at this stage.
- 11.86 The adoption of Best Practicable Means, as defined in the Control of Pollution Act 1974 is usually the most effective means of controlling noise from construction sites. In addition, the following measures will be considered where appropriate:
- Any compressors brought onto site should be silenced or sound reduced models fitted with acoustic enclosures.
 - All pneumatic tools should be fitted with silencers or mufflers.
 - Care should be taken when erecting or striking scaffolds to avoid impact noise from banging steel. All operatives undertaking such activities should be instructed on the importance of handling the scaffolding to reduce noise to a minimum.
 - Deliveries should be programmed to arrive during daytime hours only. Care should be taken when unloading vehicles to minimise noise. Delivery vehicles should be routed so as to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting within the Site or on the public highway with their engines running.
 - All plant items should be properly maintained and operated according to manufacturers'

recommendations in such a manner as to avoid causing excessive noise. All plant items should be sited such that noise effects at nearby noise-sensitive properties are minimised.

- Local hoarding, screens or barriers should be erected as necessary to shield particularly noisy activities.
- Problems concerning noise from construction works can usually be minimised by taking a considerate and neighbourly approach to relations with the local residents. Where necessary, the operating times of particularly noisy activities may be reduced.

- 11.87 It is anticipated that construction noise may give rise to a short-term noise effect of moderate adverse significance during periods where particularly noisy activity is taking place at the closest points to the nearest existing residences. However, for the majority of the time it is anticipated that any effects will be of negligible or minor adverse significance.
- 11.88 Vibration caused by construction activities on site is not expected to be perceptible at any of the nearest residences.
- 11.89 Based on our experience measuring roadside vibration levels from construction vehicles, vibration caused by construction vehicles accessing the Site during the construction phase is expected to be within suitable limits. Additional measures to control vibration include maintaining a smooth road surface for the access road, as described earlier in this chapter.
- 11.90 Based on the above, it is concluded that long-term noise and vibration monitoring will not be necessary.

Evaluation of Predicted Impacts

- 11.91 The evaluation of predicted impacts is summarised in **Table 11.11A**. All of the above impacts are direct.
- 11.92 Noise and vibration mitigation measures are proposed for construction phase activities only, as all other impacts are either negligible or minor, and further mitigation is either unnecessary or impractical.
- 11.93 The recommended construction phase noise and vibration mitigation measures are as described in the preceding section.

Table 11.11A: Evaluation of Predicted Impacts

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE OF CHANGE	ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
On-site HGV loading/unloading	Local	High	Minor	Adv.	Rev.	LT	Negligible
On-site fixed plant	Local	High	Minor	Adv.	Rev.	LT	Negligible.

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE OF CHANGE	ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Off-site road traffic	District/ Local	High	Minor	Adv.	Rev.	LT	Negligible. Minor Adv.
Construction phase activities	Local	High	Moderate	Adv.	Rev.	ST	Moderate Adv.

Residual Effects

Construction phase

11.94 It is anticipated that residual noise and vibration impact at the nearest residences may give rise to a short-term noise and vibration effect of moderate adverse significance during periods where particularly noisy activity is taking place at the closest points to the nearest existing residences. However, for the majority of the time it is anticipated that any effects will be of negligible or **minor adverse** significance.

Operational phase

11.95 Internal and external noise levels at nearby residences are predicted to be in accordance with the guidance set out in BS 8233 and BS 4142. The significance is therefore anticipated to be of **negligible adverse** impact.

11.96 The significance of noise impact of additional traffic generated by the Proposed Development compared to the overall traffic levels is predicted to be **of minor adverse impact negligible**.

11.97 Vibration impact is predicted to be of **negligible** significance.

Cumulative Effects

11.98 We note applications references FUL/2021/0011 and FUL/2021/0013 submitted by Warren Energy to Norfolk County Council. This includes their predicted traffic flows to the Warren Energy site using the Site access road. We have used this information to predict the noise impact of off-site road traffic associated with the Proposed Developments.

11.99 The following projects have also been included in the cumulative assessment. These are predicted to have negligible significance for noise and vibration with regards to cumulative impacts from the Proposed Development Site:

- Application reference 16/01963/FM for a poultry unit, which was granted permission in May 2017 and is situated approximately 800 metres to the north-west of the Site.

- Application reference 20/01279/F, erection of free-standing solar panels, located approximately 500 metres north-west of the Site. Application was permitted in March 2021.

11.100 To summarise the assessment above, the cumulative effects of on-site and off-site noise will be of negligible or minor adverse significance.

Monitoring

11.101 Based on the above, it is concluded that noise and vibration monitoring will not be necessary.

Summary of Impacts

11.102 Hepworth Acoustics has undertaken a noise impact assessment relating to the proposed Site Developments at [Airfield Farm](#), Feltwell Farm and Methwold Farm.

11.103 A survey of prevailing background noise levels has been undertaken at locations representative of the nearest existing residences to the Sites.

11.104 Appropriate limits, applicable to cumulative noise level of all noise sources to be installed/operated on the Proposed Development Sites, have been determined based on the prevailing background noise climate.

11.105 A worst-case assessment of potential noise emissions attributable to HGV and loading/unloading activity on the Sites has been undertaken and it has been concluded that the effects will be of **negligible to minor adverse** significance.

11.106 The significance of fixed plant and machinery noise is predicted to present negligible adverse impact.

11.107 An assessment of the potential impact of increased road traffic noise and vibration has been undertaken. It has been concluded that the significance will be of minor adverse impact. Good practice guidance on the control of vehicle noise and vibration has been provided.

11.108 A qualitative assessment of the potential impact of construction noise and vibration has been provided and it has been concluded that this may give rise to a short-term noise impact of moderate significance during periods where particularly noisy activity is taking place at the closest points to the nearest existing residences. However, for the majority of the time it is anticipated that any impact will be of **minor or negligible** significance, subject to appropriate standard noise mitigation measures.

11.109 Impacts described Chapter 11 are summarised in **Table 11.12A** below.

Table 11.12A: Summary of Impacts: Noise and Vibration

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE OF CHANGE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)				MEANS OF SECURING MITIGATION
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	
On-site HGV loading/unloading	Loc	High	Min	Adv	Rev.	LT	Neg	None	Adv	Rev	LT	Neg	N/A
On-site fixed plant	Loc	High	Min	Adv	Rev.	LT	Neg	None	Adv	Rev	LT	Neg	N/A
Off-site road traffic	Dist/Loc	High	Min	Adv	Rev.	LT	Neg Minor-Adv.	None-General best practice recommendations for control of road traffic noise as recommended in this ES Chapter.	Adv	Rev	LT	Neg Minor-Adv.	N/A
Construction phase activities	Loc	High	Mod	Adv	Rev.	ST	Mod Adv.	Adoption of Best Practicable Means (as defined in the Control of Pollution Act 1974) and measures recommended in this ES Chapter 13.	Adv	Rev	ST	Mod to Min Adv.	Condition

Key:

Loc: Local Mod: Moderate Adv: Adverse Irrev: Irreversible ST: Short-Term
 Dist: District Min: Minor Neg: Negligible Rev: Reversible LT: Long-Term

Transport

12

12.0 Transport

Introduction

12.1 This chapter addresses the transport impacts of the Proposed Development. It has been prepared by Canham Consulting Ltd to assess the impacts of the Proposed Development in relation to the effects it would have on the local highway network.

12.2 The technical appendices that support this chapter include:

- Appendix 12.1A: Traffic Count Data;
- Appendix 12.2A: Proposed HGV Route;
- Appendix 12.3A: Transport Statement (Pig Facility); ~~and~~
- Appendix 12.4A: Transport Statement (Poultry (Facility)); ~~and~~
- Appendix 12.5A: Draft Traffic Management Plan.

Potential Impacts

12.3 Potential impacts include an increase in vehicle movements (compared to current operations) (~~although a reduction to traffic movements associated with permitted development~~) once the Proposed Development is operational.

12.4 Construction traffic consists of the delivery of staff, equipment and materials, and the movement of excavated materials.

12.5 The initial phase of works for the pig facility will require a site strip of approximately 36,700m². ~~36,700m²~~. To avoid disposal off site it is intended to reuse as much of this material for landscaping.

12.6 Both the pig rearing buildings and poultry sheds will be fabricated off site and require minimal construction operations on site. Steel work and cladding will be delivered by low loader and off loaded to the construction site.

12.7 Following the erection of the steel frame, the concrete floor slabs and hard standings will be cast. This will require approximately 25 deliveries of concrete per shed. This process will cause the most potential traffic disruption, but delivery times will be managed to minimise the impact on the local road network and deliveries will be restricted to a maximum of 10 deliveries ~~per~~per day.

12.8 The fit out of the buildings will be carried out using equipment prefabricated off site to minimise the amount of construction required on-site.

12.9 The construction plant on-site will be limited to small lifting equipment, excavators, and telehandlers.

12.10 By reusing excavated material on-site and by using prefabricated construction techniques, construction traffic trips will be minimised as much as possible.

12.11 Delivery times will also be managed to avoid disruption during the morning and evening peak hours. This will form part of the Traffic Management Plan (Appendix 12.5A).

- 12.12 Due to the location of the Site, the relatively short construction period, and actions described to minimise construction traffic movements, it is anticipated that the impact of construction traffic ~~is not anticipated to be~~ will not be significant.
- 12.13 Given this, and construction works are temporary in nature, traffic impacts as a result of the construction phase have been scoped out, and are therefore not considered further in this chapter.

Methodology

- 12.14 An Automatic Traffic Count (ATC) was undertaken on ~~the 9th September 2021 for a week period on the B1112 Brandon Road and on 4 October 2022 for a week period on the B1112 Lodge Road~~. This has been undertaken to enable the assessment of base trips to determine existing traffic movements and to support the case that a right-hand turn lane is not required ~~at either the B1112 Brandon Road nor the B1112 Lodge Road~~. The ATC data has also informed the visibility splays.
- 12.15 The scope and content presented in this chapter has been scoped with Norfolk County Council (NCC) Highways. It was agreed that no assessment of the wider highway network was required other than an assessment of the HGV routing.
- 12.16 The main uncertainties are the potential need for a right hand turn lane (RHTL). The existing and proposed traffic movements would not be of a level to require a right hand turn. The need for a RHTL would be based on safety reasons. There are no current safety concerns at the ~~existing or proposed~~ access locations. The ~~proposed additional~~ trips would be managed via a Traffic Management Plan, ~~which would mitigate and manage the timing of deliveries~~, which will reduce potential for conflict and reduce and mitigate safety concerns.
- 12.17 Discussions have been had with NCC Highways with regards to base conditions and impact of the Proposed Development.
- 12.18 The 'Guidelines for the Environmental Assessment of Road Traffic' sets out a number of potential effects relating to highways and transport considerations, which potentially require assessment. Those which relate to this chapter are:
- Severance;
 - Delay (Driver); and
 - Accidents and Safety.
- 12.19 It is considered unlikely that the construction, or operation, of the Proposed Development will generate or attract hazardous loads; therefore, on this basis, it is anticipated that there would be no significant effects relating to hazardous loads. An assessment of hazardous loads was scoped out and has not been considered any further in this chapter.
- 12.20 Severance is defined by the guidance in paragraph 4.27 of the IEMA guidelines.
- 12.21 "Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities".

- 12.22 Several factors are considered in determining the existing level of severance. These include road width, traffic flow and composition, traffic speeds and the availability of pedestrian crossing facilities.
- 12.23 With regards to Delay, consideration is given to driver delay and delay on the local highway network. It was agreed with NCC at scoping stage, that the local highway did not require assessment and no junction assessment was necessary, therefore, capacity and delay of local junction has been scoped out.
- 12.24 The IEMA Guidelines note that the Department for Transport (DfT) has assumed 30%, 60% and 90% changes in traffic levels should be considered as “slight”, “moderate” and “substantial” impacts respectively. The IEMA Guidelines also note that increases in traffic of as little as 5% may be significant in terms of the capacity criteria of a highway but not its environmental effects, and the criteria set out within the guidance make the higher thresholds more relevant to the assessment of the environmental effects of traffic increases.
- 12.25 The key issue in assessing accidents and safety is in understanding the potential for change. There can be some small changes in prevailing road safety conditions arising simply due to having a greater number of journeys being made on a network, hence, the more people that are travelling, the more people that are liable to become involved in an accident. By far, the more important issue to consider is how travel and the design of the transport networks interrelate to affect prevailing road safety. The nature of trips, with increase in HGVs, could have a moderate adverse impact.
- 12.26 The IEMA guidelines do not include a definition in relation to accidents and safety, suggesting that professional judgement is required to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.
- 12.27 It is noted that the Site has a permit for a ~~permission to house a larger number of livestock animals at the Site than current operations, however, to enable a robust assessment the current existing transport movements are being assessed.~~
~~The increase in traffic could be considered to have a minor adverse impact.~~
- 12.28 A Traffic Management Plan (TMP) ~~will~~ has been produced, which ~~will~~ outlines how delivery vehicles and operations will be managed to minimise impact of development traffic. ~~Driver delay, safety etc will be covered within the TMP. The TMP will be updated, as required, to cover construction and operation phases.~~
- 12.29 **Table 12.1** summarises the criteria that has been used to determine magnitude of impacts, However, consideration of the absolute level of an impact is also important e.g. the total flow of traffic or HGVs on a link. This is because an increase of, say, 100% in the traffic flow on a road is likely to still lead to negligible or minor effect if the existing flows are low.

Table 12.1: Magnitude of Impact

EFFECT	VERY LOW	LOW	MEDIUM	HIGH
Severance	Change in total traffic or HGV flows of less than 30%	Change in total traffic or HGV flows of 30-60%	Change in total traffic or HGV flows of 60-90%	Change in total traffic or HGV flows over 90%
Driver Delay	Professional judgement.			
Accidents and Safety	Professional judgement based on qualitative analysis			

12.30 With regards to driver delay, no junction assessment has been undertaken, as agreed with NCC Highways, and given ATC results and base flow movements, it is considered a low impact.

12.31 The main uncertainties are the potential need for a right hand turn lane (RHTL). The existing and proposed traffic movements would not be of a level to require a right hand turn. The need for a RHTL would be based on safety reasons. There are no current safety concerns at the access. The additional trips would be managed via Traffic Management Plan which would mitigate and manage the timing of deliveries, which will reduce potential for conflict and reduce and mitigate safety concerns.

Existing Baseline Conditions

12.32 At present, the Site ~~has the capacity to house 37,000 pigs but is~~ currently operating at reduced capacity, ~~to its when compared to permitted levels,~~ due to the limitations and condition of the buildings on the Site. The poultry sheds on site are in a poor condition and have not been in use as an active poultry rearing facility for a number of years.

12.33 The current level of operations and the associated traffic movements are summarised in **Table 12.2A**.

12.34 ~~The pigs currently arrive from Stoke Ferry, approximately 5 miles north of the Site via the B1112 and remain on-site for 12 weeks when they are transferred to Watton. Table 12.2 outlines the existing traffic movements associated with the Site operating at full capacity.~~

~~**Table 12.2: Existing Annual Traffic Movements (operating at 100%) Capacity**~~

Table 12.2A3: Current Annual Traffic Movements Associated with the Pig Facility (reduced operation)

ACTIVITY	VEHICLE NUMBERS PER TYPE			FREQUENCY
	HGV	Tractor Trailer	Cars/ Vans	
Piglet delivery 7KG	30			3.5 loads over 2 weeks every 12 weeks
Straw delivery	161	161 (9 weeks)		Seasonal July/August average 17.85 loads/ week
Manure Collection	377	377		On average 7.25 loads/week
Feed Delivery	561			10.79 loads/week

ACTIVITY	VEHICLE NUMBERS PER TYPE		FREQUENCY
Collection of Pigs	442		25.5 loads/week for 4 weeks every 12 weeks
Collection of Fallen Stock	26		1 load every 2 weeks
Fuel Oil Delivery	9		1 load every 6 weeks
Veterinary Visits			4 Quarterly
Inspections			3 Per Annum
Field Staff			52 Per Annum
Site Staff			3285 9x Daily
Annual Total	1069 1606	5380	3344 49514950 Annual trips

Evolution of the Baseline Conditions without Development

12.35 Without the Proposed Development, the HGVs would continue using the routes they currently do, which are not considered preferred routes by NCC Highways. The proposal will reroute the HGVs to a preferred route. Management of the route will be undertaken controlled by through the Traffic Management Plan (Appendix 12.5A).

Predicted Impacts

Pig Facility

- 12.36 The Proposed Development includes the demolition of ~~all but four~~ 22 buildings onsite of the ~~existing pig sheds~~ and 14 new, modern pig sheds to be erected in their place.
- 12.37 With regards to the proposed poultry facility, all of the existing poultry sheds will be demolished and replaced with 20 new poultry sheds, storage and administration buildings, four workers' dwellings and associated landscaping. ~~Four workers' dwellings will also be constructed adjacent to the new poultry sheds.~~
- 12.38 ~~The existing access off the B1112 to the north of the Site will continue to be used by both the proposed poultry and pig facilities.~~ The Proposed Development proposal will see associated development traffic access the Site from the B1112 Lodge Road (via Warren Road which is highway), and have a largely one way route within the Site (private access roads), to exit onto the B1112 Lodge Road. There are different entrance and exit junctions with the B1112 Lodge Road.
- 12.39 ~~The Proposed Development will change the way the current pig farm is operated. At present, the Site is used to house piglets, however, the Proposed Development is for pig finishing units housing pigs from 12 – 24 weeks of age. This will result in a reduction in the density of pigs on-site, and will improve animal welfare standards as a result.~~ Currently, the buildings on-site are used to house growing pigs from 35kg to 115kg. Pigs will arrive at the site at 12 weeks old (35 kg), remain on-site for 17 weeks, and depart once a target weight of approximately 115kg is obtained. This would result in a reduction in the density of pigs on-site and a change from Red Tractor stocking rates to RSPCA stocking rates.
- 12.40 ~~The pigs will be housed at RSPCA stocking rates rather than Red Tractor stocking rates.~~

Additionally, the pigs will be kept on straw rather than the current slatted floor arrangement. This reduction in pig numbers subsequently lower density, will result in a decrease in the theoretical capacity of the farm. **Table 12.3A** outlines the proposed annual traffic movements associated with the pig facility.

Table 12.3A: Proposed Annual Traffic Movements Associated with the Pig Facility

ACTIVITY	NUMBER OF EACH TYPE OF VEHICLE ANNUALLY			FREQUENCY ONCE A DAY, TWICE A MONTH ETC
	HGV	Tractor Trailer	Cars/ Vans	
Piglet delivery 35Kg	81			23.3411.67 loads over 2 weeks every 15 weeks
Straw delivery	107	107 (9-weeks)		Seasonal July/August average 11.93 loads/ week
Manure Collection	252	252		4.85 loads/ week
Feed Delivery	339			6.52 loads/week
Collection of Pigs	236			8.5 loads/week for 8 weeks every 15 weeks
Collection of Fallen Stock	26			1 load every 2 weeks
Fuel Oil Delivery	5			1 load every 10 weeks
Veterinary Visits			4	Quarterly
Inspections			3	January
Field Staff			52	WeeklyPer-Annum
Site Staff			2190	6x Daily
Annual Total	6871046	3590	2249	3295 Annual Trips

12.41 As seen in **Table 12.3A**, the proposed pig facility will result in 3,295 annual trips.

Poultry Facility

12.42 With regards to the new poultry facility, eggs will be hatched at the Site and chickens will be reared to 49 days. Chickens will arrive at the Site as eggs from either Great Yarmouth or Kenninghall, with careful routing to ensure HGV’s do not pass-through Brandon. After each chicken rearing cycle, the chickens will be taken to a finishing unit in Eye, again ensuring that HGVs are routed to avoid Brandon.

12.43 **Table 12.4A** outlines the proposed annual traffic moments associated with the proposed poultry facility.

Table 12.4A: Proposed Annual Traffic Movements Associated with the Poultry Facility

ACTIVITY	NUMBER OF EACH TYPE OF VEHICLE ANNUALLY			FREQUENCY ONCE A DAY, TWICE A MONTH ETC
	HGV	Tractor Trailer/ 7.5T rigid	Cars/ Vans	
Litter In	41398			1x 230kg bale per 1,000sqft, 36 bales per load
Bales	28			Top up bales
Nest born Equipment		3035		One machine per 200k birds
Eggs In	6049			134,000 eggs per arctic
Gas	5349			20l gas per sqm per year, 18,000l tanker
General Waste		28		Fortnightly collection
Feed	1,073826			
Fallen Birds	3835			Weekly collection from week 3 of cycle
Moffett	4514			Moffett delivery for catching
Birds Out (Thinning at 1.9kg)	255182			30% of birds thinned, 9,500 per load
Birds Out (Thinning at 2.5kg)	750553			70% of birds thinned, 7,2800 per load
Muck	343	435		Each 1,000 sqft yields, 2.75T – 26T loads
Cleaning Equipment	70	83		Two bowsers and kit per 100k sqft
Wash Water	6049			10,000l per day per gang
Fogging	87			One lorry per site, per turnaround
Site Staff			3,6751120	One member of staff per 100k birds, daily
Site Manager*			-3680	Onsite manager
Catching Team			203147	One catching team per 5 loads
Fieldsman Visits			5349	One visit per week from fieldsmen
Nestborn Team			4514	Two visits per flock
Washing Gangs			465133	1 Gang per bowser, 1 day per 25ksqft
Annual Total	2,4532303	57663	37431463	6772 Annual Trips3829

*A site manager will be permanently based on site for security due to the quantity of birds and therefore their annual trips

as site staff have been subtracted from the overall figure.

12.44 As noted in **Table 12.4A**, the proposed poultry facility will result in **6,772,382** traffic movements annually.

12.45 Overall, the Proposed Development will increase the number of vehicle trips required as per **Table 12.5** below. **Table 12.56A** shows a summary of the development trips for the Proposed Development once operational, compared to the existing situation.

12.46 Annually, the total number of potential vehicle trips will increase from 4,951 to 10,067. An increase of 5,116 per year.

Table 12.5A6: Summary of Development Trips for the Proposed Development

DEVELOPMENT	TRIPS			
	HGV	Tractor Trailer	Cars/Vans	Total
Pig Site Current	1606	0	3344	4950
Proposed Pig	1046	0	2249	3295
Proposed Poultry	2303	63	1463	3829
Total Proposed	3349	63	3712	7123

12.47 Annually, the total number of potential vehicle trips will ~~reduce~~ increase to 7124 per year (from current level of 4950 annual traffic movements). ~~A reduction of 1,430 an annually on the permitted development.~~ The proposed trips are an increase of 2,174 on the current level.

~~**Table 12.5: Change in Traffic Flow per Vehicle Type**~~

VEHICLE TYPE	CHANGE
HGV	2,074
Tractor Trailer	397
Car/vans	2,648

12.48 The Proposed Development will result in a net increase in the potential number of vehicles using the junction onto the B1112. NGC has been consulted and have confirmed that they would have no objection to the Proposed Development provided the following issues are resolved:

12.49 The proposed exit junction has better visibility than the current junction and is, therefore, considered safer when compared to the existing site.

12.50 The peak daily traffic movements for the Proposed Development are summarised in **Table 12.6A**.

Table 12.6A8: Peak Daily Traffic for the Proposed Development

	PEAK DAILY TRIPS
Poultry Site Proposed	54
Pig Site Proposed	17
Total	71

- 12.51 It can be seen from **Table 12.6A8** that the peak daily traffic would be 71 trips for the Proposed Development.
- 12.52 NCC has been consulted and have confirmed that they would have no objection to the Proposed Development provided the following issues are resolved:
- Suitable visibility can be provided and maintained (within highway or on land under the applicants control) from the access in line with DMRB standards for a 60 mph road.
 - This was in relation to the ~~current~~ access for the existing site. ~~Proposals:~~ The Proposed Development will now utilise a different access and exit junction to the south.
 - The access is a suitable width to cater for 2 HGVS to pass (minimum 6.5 metres in width).
 - The new access junction will be wide enough for two HGVs to pass.
 - The access must be constructed in accordance with the local highway authority specification (for the first 20m from the junction with the B1112).
 - The access and exit junction will be constructed to highway standards for the first 20m.
- 12.53 The existing visibility has been measured ~~on-site to be~~ and shown on the visibility plan to be achievable with 2.4m x 160m to the right and 215m to the left. ~~greater than the 2.4x215m recommended.~~
- 12.54 ~~An existing planning application (Warren Energy Ref: FUL/2021/0013) has the requirement for the existing access to be improved. Some improvements have been undertaken but it is understood that some improvements are outstanding. The upgraded access should be provided to meet the planning requirements for the approved application and as per conditions proposed on the aforementioned application. It is assumed that the necessary improvements (to be provided by others) will be undertaken prior to commencement of this development. Assuming the access is upgraded as required by the approved plans, the access is considered suitable for access, as it will enable two HGVs to pass on approach to the junction and have suitable visibility splays. However, in the event that Warren Energy fails to deliver the improvements, the Applicants will deliver the relevant mitigation to make the Proposed Development acceptable.~~
- 12.55 There has been discussion with NCC over whether a right-hand turn lane is required ~~at the access junction~~. The existing traffic movements on the main and minor roads would not require a right turn. The proposed minor arm movements are below the threshold for requiring a right hand turn lane. The only reason a right hand turn lane would be required is for safety reasons. These are not considered to be safety issues, ~~therefore so~~ a right hand turn is not considered ~~to be~~ necessary.
- 12.56 The Applicants have committed to adhering to a traffic management plan which will mitigate ~~and manage the timing of trips~~; the impact of the development trips associated with the proposed development. ~~so there will not be HGVs arriving at the same time and queues forming on the~~

~~B1112 waiting to turn right into the Site. Given the traffic management plan, it is considered that there won't be any safety concerns and a right turn lane is not required.~~

- 12.57 Local residents are a receptor that would be sensitive to additional traffic movements, due to ~~potential for increased~~ noise, vibration, and impact on amenity.

Evaluation of Predicted Impacts

- 12.58 ~~As mentioned above, there will be an annual increase of 5,116 traffic movements which results in a 97% increase in traffic movements annually, which would be considered a "substantial" impact based on IEMA Guidelines note that the Department for Transport (DfT) has assumed 30%, 60% and 90% changes in traffic levels should be considered as "slight", "moderate", and "substantial". The Proposed Development will see an annual increase of 2174 traffic movements compared to the current levels, which results in a 44% increase in traffic movements annually, which would be considered a "slight to moderate" impact based on IEMA Guideline's note that the Department for Transport (DfT) has assumed 30%, 60% and 90% changes in traffic levels should be considered as "slight", "moderate", and substantial".~~
- 12.59 ~~As noted earlier in this chapter, the Site is operating at a reduced capacity to the at permitted level, however, to enable a robust assessment the current existing vehicle trips associated with the current site operations have been used as the baseline figure within this assessment. and proposed trips have been assessed.~~
- 12.60 ~~The development proposals provide improved access arrangements, with largely one way routing internally and exit onto the B1112 Lodge Road at a better location with better visibility and reduced speeds than the current access. The new access provided as part of the Proposed Development includes a one way routing internally, and exit onto the B1112 Lodge Road. This location is considered to be a betterment when compared to the the current access site, given the improved visibility.~~
- 12.61 ~~Although there is a substantial increase in traffic movements, when considering mitigation, and background traffic flows the impact is considered to be minor as. Furthermore, the HGV routing will be controlled to a preferred route as defined agreed with by NCC Highways which will minimise the provide further benefits adverse impact and in fact provide a beneficial impact to some local roads where traffic will be removed.~~

Mitigation

- 12.62 Mitigation will include a proposed HGV Route, which has been agreed with NCC Highways. The proposed routing takes all HGV movements to and from the Site via the B1112 and the A134, with traffic travelling from the Site, east and north along the B1112 and joining the A134 at the B1112 Methwold Road / Bridge Road / A134 roundabout. This transfers all HGV movements to the main roads and removes them from C class roads in the local area of Methwold between the Site and the A134, which is how they currently travel.
- 12.63 The proposed HGV route is shown in **Appendix 12.2A** and **Figure 12.1A** below.

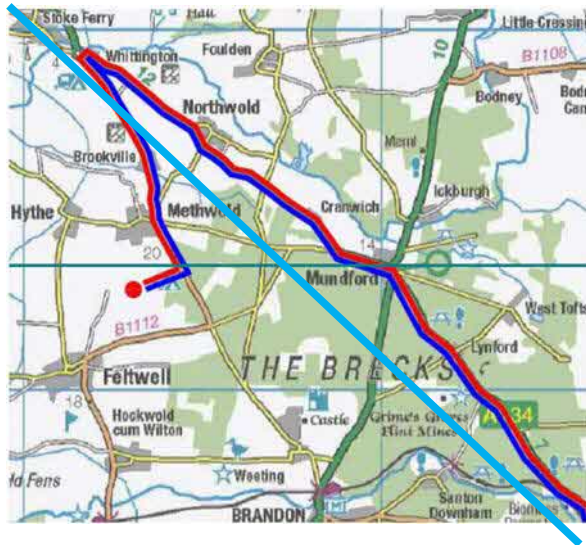


Figure 12.1: Proposed HGV Route



Figure 12.1A: Proposed HGV Route

12.64 Further mitigation as part of the Proposed Development includes a Traffic Management Plan (a draft of the document can be found at [Appendix 12.5A](#)) that will manage the timing of HGV movements, to ensure HGVs do not arrive at the same time and prevent queues forming on the B1112 waiting to turn right into the site. The Traffic Management Plan (TMP) will ensure that the peak pig and peak poultry movements don't occur at the same time.

12.65 Both of the mitigation measures mentioned above will be secured through planning condition. The Applicants will be responsible for implementing and monitoring the effectiveness of the measures.

Residual Effects

12.66 The increase in traffic could be considered to have a slight to moderate negative adverse impact, effect when considering proposed traffic levels against current traffic levels., associated with the current reduced operations:

12.67 The TMP and HGV routing mitigation will provide beneficial effects by managing deliveries to the Site and managing the HGV route on the wider highway network. This will route HGVs to a preferred route as agreed with NCC Highways, providing a minor beneficial impact to the roads where HGVs no longer travel along. There will be a minor adverse impact on the proposed route, although as this is considered a main B-road, the impact is considered minor due to AADT flows.

12.68 ~~The TMP will reduce potential conflict with proposed routing and management within the site and delay at the site access junction, by managing deliveries to ensure the peak pig and poultry movements don't occur at the same time.~~

Cumulative Effects

12.69 ~~The cumulative impact of both the pig and poultry facility are outlined above. In summary, annually, the total number of potential vehicle trips will increase reduce to 7124 per year. A reduction of 1,430 annually on the permitted development. The proposed trips are an increase of by 2,174 to 7124, on compared to the current level of 4950 (annually). increase from 4,951 to 10,067. An increase of 5,116 per year.~~

12.70 There have been a number of developments associated with Warren Energy which have the potential to result in cumulative effects. These projects are:

- FUL/2021/0011 Non-compliance with condition 1 (approved plans), 2 (maximum tonnage of feedstock), and 3 (feedstock source) of permission reference C/2/2017/2003); and
- FUL/2021/0013 (Part Retrospective Application – to retain bund, post, and wire fence, and use of existing hardstanding/track for access/egress to the liquid digestate storage tank; proposed partial use of southern access road (to and from the B1112 Lodge Road)).

12.71 There is one Transport Statement (TS) to support both applications which shows the following proposed traffic movements. **Table 12.7A** below shows Daily Traffic generated by Month of the Year.

Table 12.67A: Warren Energy Development Trips (Daily Traffic by Month of Year

	Feb - April	May - June	July	Aug	Sept - Oct	Nov - Jan
Two-way daily vehicle movements	27.49	53.00	34.63	18.99	66.61	18.99

12.72 The TS states due to noise concerns only 16 movements can use the existing access to B1112 with all other movements (up to 51) would access via the access road to the south.

12.73 There are improvements proposed to the junction to the south, so highways can no longer maintain their objection to use of that junction and have suggested a number of conditions.

12.74 Other committed developments have been reviewed as part of the cumulative assessment are outlined below:

- Land at Former RAF, Methwold (20/01279/FM) - There are no traffic details for this application.
- Methwold Airfield, Brandon Road (16/01963/FM) –The average number of vehicles per week is 9.1 (18.2 movements). In addition to the HGV movements, there will be three staff

movements, although one staff member is likely to live on-site. An extract of the proposed movements (300,000 birds) is shown in **Table 12.8A97** below:

Table 12.78A: Methwold Airfield, Brandon HGV Trips

Proposed – 300,000 Birds

Commodity	Delivery/Collection	Week							Total
		1	2	3	4	5	6	7	
Gas & shavings	Delivery 25 tonnes	6	2						8
Feed	Delivery 38 tonnes	3	6	6	7	7	7		36
Chicks	Delivery 20 tonnes	5							5
Birds	Collection 21 tonnes						15	35	50
Litter	Collection 20 tonnes							16	16
Carcass	Collection 20 tonnes	1	1	1	1	1	1	1	7
Dirty Water	Collection							6	6
Total/Week		15	9	7	8	8	23	58	128

- 12.75 Based upon the available information on the committed developments, it is considered that the local highway network has capacity for the proposed vehicle movements, when cumulatively considering all the developments outlined above.
- 12.76 The ATC results show average 24 hour movements of 1,974 northwest bound and 1,870 southeast bound, giving an average of 3,844 two way vehicle movements over 24 hours on [B1112 Brandon Road](#).
- 12.77 [The ATC results show average 24 hour movements of 1368 eastbound and 1341 westbound, giving an average of 2709 two way vehicle movements over 24 hours on B1112 Lodge Road.](#)
- 12.78 As per DMRB CD123 Geometric design of at-grade priority and signal controlled junctions, the main road flow is under 5000 AADT (Annual Average Daily Traffic) and the minor road flow (2-way AADT) is under 300 movements a simple junction is suitable. If the minor road flow was over 300 two way AADT then a ghost Island right turn would be recommended.

Monitoring

- 12.79 Monitoring should be undertaken at regular intervals by the Site owner to ensure the management plan and HGV routing is being adhered to. Any monitoring should be logged and recorded.
- 12.80 Staff and drivers will need to be made aware of the proposed HGV routing and it made clear that this route must be adhered to.

Summary of Impacts

- 12.81 A summary of impacts is shown in **Table 12.9A8**.
- 12.82 [When you consider the traffic increase \(compared to current levels\) alongside the background traffic flows, road hierarchy, local road network and mitigation the impact significance would be minor adverse.](#)

Table 12.9A8: Summary of Impacts: *Transport*

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE / BENEFICIAL	REVERSIBLE / IRREVERSIBLE	SHORT TERM / LONG TERM	SIGNIFICANCE		ADVERSE / BENEFICIAL	REVERSIBLE / IRREVERSIBLE	SHORT TERM / LONG TERM	SIGNIFICANCE
Impact of additional traffic movements	Low	Mod	Min Adv	Adv	Irrev	LT	Min/Mod Maj	Traffic management plan HGV Routing	Adv	Irrev.	LT	Min/Mod Adv
Impact of proposed HGV route – where HGV removed from roads	Low	Mod	Min Ben	Ben	Rev	LT	Min	Traffic management plan HGV Routing	Ben	Rev	LT	Min Ben
Impact of proposed HGV route – where HGV movements increase	Low	Mod	Min Adv	Adv	Irrev	LT	Min	Traffic management plan HGV Routing	Adv	Irrev	LT	Min Adv

Key:

Mod: Moderate Adv: Adverse Irrev: Irreversible Ben: Beneficial
 Min: Minor Neg: Negligible Rev: Reversible LT: Long-Term

Waste

13

13.0 Waste

- 13.1 No further changes are required as part of this Addendum. Chapter 13 of the submitted ES, dated January 2022, remains unchanged and valid.

Cumulative Assessment

14

14.0 Cumulative Assessment

- 14.1 A search was undertaken on the BCKLWN planning portal on 02/02/2023 to identify if there were any additional committed developments which met the criteria outlined within paragraph 14.5 of Chapter 14 of the Original ES, which needed to be included within the cumulative assessment, however no additional schemes were identified.
- 14.2 Paragraph 14.50 of the original ES states “*The Proposed Development has a number of measures embedded within the proposals to reduce operational noise.*” The Environmental Health Officer at BCKLWN questioned what these are. To clarify, the noise assessment concluded that no specific mitigation measures were required for the operational phase of the Proposed Development. However, the Proposed Development has measures included in the design (embedded mitigation) such as upgrading to modern equipment and fans, which will be beneficial with regards to operational noise levels.
- 14.3 No further amendments are required to the cumulative assessment and therefore Chapter 14 of the submitted ES, dated January 2022, remains valid.

Conclusions

15

15.0 Conclusions

- 15.1 The planning applications prepared to which this ES [Addendum](#) relates, seeks planning permission for the following Proposed Development at Methwold Farm and Feltwell Farm and Airfield Farm as follows:
- Application 1: full planning application for the demolition of all but four of the existing buildings on site and the construction of 14 new pig rearing units, a new straw barn, water service area and associated infrastructure; and
 - Application 2: full planning application for the redevelopment of site comprising demolition of existing poultry sheds, construction of 20 new poultry sheds, four workers dwellings, and associated storage and administration buildings.
- 15.2 The EIA has assessed the likely significant environmental effects which are to arise from the Proposed Development, based upon the plans and drawings and project information provided and detailed earlier in this ES [Addendum](#).
- 15.3 The EIA Regulations require that these planning applications are subject to an EIA. In considering the Proposed Development, the ES also documents the considerations given by the Applicant to other alternative layouts and designs in this location.
- 15.4 In order to determine the scope of the EIA, a formal scoping process was undertaken, and has continued informally, as required, with the LPA throughout the development of the proposals and as the technical work has progressed.
- 15.5 The resultant assessment has been presented, as agreed, with the Council and its consultees within the following environmental topics:
- Air Quality and Odour;
 - Ecology;
 - Flood Risk and Drainage;
 - Ground Conditions and Contamination;
 - Landscape and Visual Impact;
 - Noise and Vibration;
 - Transport;
 - Waste; and
 - Cumulative Impacts.
- 15.6 Each chapter sets out the baseline information for the environmental topic, assesses the potential impacts, recommends mitigation measures (if required) and makes a judgement on the significance of the impact, both at the construction phase and the operational phase of the Proposed Development, and in some cases, during demolition. Each chapter concludes by summarising the results of the assessment in a summary of impacts table. The concluding remarks of each assessment chapter are as detailed below.

Air Quality and Odour

- 15.7 The air quality impacts associated with the Proposed Development have been assessed in Chapter 6. [It should be noted that there are no changes to the conclusions of the Air Quality Assessment, as a result of the additional modelling outlined in Chapter 6.](#)
- 15.8 On the basis that there will be a site-specific CEMP for the Proposed Development, air quality effects as a result of construction demolition, earthworks, and trackout activities will be adequately mitigated and impacts were considered to be **negligible** and **not significant**.
- 15.9 The ADMS dispersion model was used to predict air quality impacts from odour, dust and ammonia emissions associated with the pig and poultry rearing facilities. For the operational phase of the Proposed Development, the assessment concluded the following:
- Odour emissions as a result of both the pig and poultry facility ranged between negligible and minor adverse for sensitive residential receptors;
 - Effects associated with operational phase dust emissions were predicted to be negligible at sensitive residential receptors;
 - Air quality modelling predicted a decrease in ammonia concentrations and nitrogen/ acid deposition rates at all sensitive ecological receptors, as result of the proposed change in rearing operations at the Site. The overall effects of ammonia concentrations were considered to be negligible;
 - Effects associated with operational phase bioaerosol impacts were predicted to be minor adverse at all sensitive receptors; and
 - Effects associated with operational phase road traffic exhaust emission impacts were predicted to be negligible on human and ecological receptors.
- 15.10 The Proposed Development will be subject to an Environment Permit issued by the Environment Agency prior to operation. This will provide additional measures to control environmental impacts and provide legislative reassurance that significant air quality impacts will not occur.

Ecology

- 15.11 Within 10km of the proposed site, there are a total of 23 sites with statutory designation, the nearest being the Breckland SPA located 145m to the east of the poultry rearing facility (east site) which is designated for three species of breeding bird which are stone curlew, woodlark and nightjar.
- 15.12 The Proposed Development will result in a decrease in ammonia-related pollution with a reduction in ammonia concentrations, nitrogen and acid deposition at designated sites. At this stage, the effect of the reduction in ammonia cannot be quantified and is likely to be beneficial in ecological terms. Dust generated during construction would have a **minor adverse** effect on the Breckland SPA, but this can be adequately mitigated though a CEMP which can be secured by planning condition.
- 15.13 The construction phase of the Proposed Development also has the potential to disturb nesting birds and active nests, with stone curlews and barn owls both having specific protection from disturbance. Although the likelihood of disturbance to stone curlews is very low given their absence locally, mitigation should be implemented to ensure legal compliance. It is possible that barn owls could nest in sheds to be demolished. For all nesting birds, legal compliance can be

achieved through timing the start of works to avoid the nesting bird season (March to August) or the use of a watching brief.

- 15.14 Other pathways of potential impacts are assessed as having negligible effect, including general disturbance and visual intrusion with respect to stone curlews. The loss of existing habitat is thought likely to result in the local displacement of some birds rather than the loss of territories.
- 15.15 The Site operations will include vermin control. As such, vermin acting as direct predators of ground nesting birds were considered to be negligible. Other operational phase impacts including noise and lighting on ground nesting birds was found to be negligible and not significant.
- 15.16 The Proposed Development includes detailed landscaping proposals which will result in biodiversity net gain. Specifically, ~~29.75~~-19.4% for both the pig and poultry facility combined.

Flood Risk and Drainage

- 15.17 As detailed in Chapter 8, a Drainage Strategy has been designed for both the proposed pig and poultry facilities.
- 15.18 The proposed drainage strategy for the pig facility is as follows:
- Water from roofs will filter into underground soakaways. The new access track will drain to a French drain on the southern side of the road.
 - Semi contaminated water from access roads will drain to a system of filter strips, prior to draining into a soakaway.
 - Dirty water from shed washdown will be collected and stored in an below-ground tank, prior to being stored in a covered lagoon and then used for spreading on fields.~~clean water from roofs to be collected, filtered, and stored in an underground rainwater harvesting tank. The tank will then overflow into a soakaway. Semi contaminated water from access roads will drain to a system of filter strips, prior to draining into a soakaway. Dirty Water from the yard area will be channelled to a foul sump prior to pumping to an above ground storage tank. The sump and tank will be sized accordingly and emptied monthly.~~
- 15.19 The proposed drainage strategy for the proposed poultry facility is for surface water from the roofs to discharge via infiltration. There will be a separate infiltration basin for the roof area and road/external areas. The surface water from the external areas will be treated via a particulate interceptor for the road areas and an infiltration trench, before reaching the infiltration basin. There will be a penstock valve that is closed during periods of washdown, so dirty water is diverted to the foul system and does not enter the infiltration basin.~~an infiltration trench, before reaching the infiltration basin. The workers' dwellings will discharge surface water via a soakaway. The soakaway will receive roof water and water from the access road.~~
- 15.20 The proposed drainage strategies will result in a **minor beneficial** residual effect with surface water drainage being designed to cater for the 1 in 100 years plus 40% climate change event, and any risk of contamination to groundwater will be fully mitigated by the proposed drainage strategy. Overall, the Proposed Development will result in a betterment of the existing drainage situation.
- 15.21 In terms of construction impacts, following the implementation of a Construction Surface Water Management Plan, which can be secured by planning condition, residual effects were not considered to be significant.

Ground Conditions and Contamination

- 15.22 Based on the Site history, a number of potential sources of ground contamination were identified on the Site. These include asbestos roofing on the existing sheds, on-site former feed liquid and solid feed storage tanks, muck pads, historical airfield operations and dirty water lagoons from the previous farming operations. These sources may result in contamination migrating to sensitive receptors, notably via direct contact with soil, surface water runoff, and seepage into groundwater, which is classified as a principal aquifer. Potential contaminants associated with these sources include asbestos, nutrient nitrogen, phosphorous, ammoniacal nitrogen, biological and chemical oxygen demand, metals, PAH and petroleum hydrocarbons.
- 15.23 Unless suitably decommissioned, exposure of construction and demolition workers to asbestos was assessed as a major adverse impact to human health. In addition, exposure to contaminants at and around muck pads was assessed as a moderate adverse impact to human health and possible leaching to the principal aquifer.
- 15.24 To mitigate the impacts during the construction phase, farmyard structures will be suitably decontaminated and decommissioned as per a suitable Construction Method Statement. In addition, asbestos containing materials (ACM) will be removed by suitably licensed contractors in accordance with the Control of Asbestos Regulations 2012. All residual construction effects were considered to be **minor adverse** and **not significant**.
- 15.25 Once operational, contaminant release from farm operations were assessed as **minor adverse** as the Proposed Development will be designed as operated, as per the Environmental Permit requirements from pollution prevention, control, monitoring to minimise impacts to both human receptors and controlled waters.
- 15.26 Relative to the existing farm buildings and past operations, the Proposed Development infrastructure will be upgraded, repaired, or replaced and designed and operated according to current Best Available Techniques. Furthermore, dirty water will be diverted to a dirty water collection tank rather than the existing lagoons, reducing the risk of contaminant release to soils, surface water, or groundwater. The lagoons at the pig site will be retained and may be used for dirty water storage as needed. The lagoons will be subject to a suitable site investigation and integrity testing, and will be appropriately improved as required by the Environmental Permit. Relative to the existing baseline condition, the impact is assessed as **major beneficial**.

Landscape and Visual

- 15.27 The landscape character of the Site and its context is predominantly shaped by the presence and interaction of medium scale farmland, woodland and tree belts and a very gently undulating landform. The woodland, tree belts and other hedgerows and vegetation enclose parts of the landscape to varying degrees, with the wider landscape to the east generally more enclosed by woodland and to the west as it gently falls towards the Fenlands the landscape is relatively more open.
- 15.28 The settlements of Methwold and Feltwell lie within the wider context respectively to the north and south-west of the Site. A series of generally minor roads including the B1112 also lie within this wider context ~~and vehicular access to the Site is via a small access road/ track from the B1112 to the north~~. Within the Site and its more immediate context are a variety of existing developments and features including the existing pig rearing barns and facilities and a series of redundant poultry sheds. These existing buildings and features lie respectively within the Site areas to the west and east.

- 15.29 A biogas renewable energy unit lies alongside the Site areas as do a grouping of a small number of dwellings which lie between the two respective Site areas. Mature woodland and tree belts also lie within close proximity and are effective in containing this localised landscape and the influence of the existing developments and features.
- 15.30 The Site and its context includes no designated landscapes or features and no landscapes recognised of being of any particular higher value or sensitivity. Within the '*Kings Lynn & West Norfolk Borough Landscape Character Assessment*' (March 2007), the Site lies within the '*Settled Farmlands with Plantations*' Landscape Character Type (LCT) (Ref H) and specifically within the '*Northwold*' LCA (Ref H5).
- 15.31 This Borough wide published study advises for the '*Northwold*' LCA; '*...The simple, mainly arable land cover is relieved by the variety of plantation woodlands. Landscape pattern is quite striking as a result of the patchwork of regular plantations interspersed with predominantly arable farmland. Overall condition is considered to be declining and strength of character, moderate.*' The study also advises (under the headings '*Inherent Landscape Sensitivities*' and '*Landscape Planning Guidelines*') that this landscape should conserve and enhance the existing belts and copses of woodland and ensure that new appropriate development is well integrated into the surrounding landscape.
- 15.32 This Landscape and Visual Impact Assessment (LVIA) has assessed the landscape value and sensitivity of the Site and its immediate context in accordance with recognised guidelines (Guidelines for Landscape and Visual Impact Assessment; 3rd Edition) and concludes that it is Medium. This is supported by the judgements and detail included within the published Landscape Character Assessment Study for the Borough.
- 15.33 The Proposed Development has appropriately considered landscape and visual matters as part of the assessment and design process. The proposals will include new native woodland, tree and hedgerow planting that will represent a gain and enhancement to the existing situation, reflecting the guidelines of the Borough Landscape Study.
- 15.34 The proposed vehicular access and egress will have a very limited effect on the local landscape. The proposed routes utilise some stretches of existing vehicular roads/ tracks and the only new roadway will be relatively limited in its extent and visually distanced from surrounding receptors. Any resultant effects arising from these routes will arise from the influence of the vehicles using the routes on the local landscape and will be no more than limited in landscape terms.
- 15.35 Overall, the landscape effects of the Proposed Development will be limited and localised and effectively contained by the presence of the surrounding woodlands and tree belts. The proposed new native planting will support this and further aid integration in the medium and longer term.
- 15.36 The visual effects of the Proposed Development will also be limited and localised with relatively few receptors having views towards the proposals. The most notable visual effects are likely to arise for the small number of properties that lie between the two Site areas, although even for these residents any available views are likely to be restricted and where visible the proposals will be seen in the context of the existing pig rearing facility, redundant poultry sheds and the biogas renewable energy unit. The nature of the visual change will thus not be marked.
- 15.37 Other views towards the Proposed Development will generally be restricted to very limited stretches of Public Rights of Way and distant glimpsed views from very limited roadside positions and a handful of other distant properties. There will be some visual operational effects

as a result of the proposed access road for users of public access routes, but these along with all other visual effects arising from the completed development were not considered to be significant.

- 15.38 Overall, the Proposed Development will result in only limited and localised landscape and visual effects and not significant effects in these terms. The Proposed Development includes a sympathetic and appropriate landscape scheme, and this will contribute towards local Green Infrastructure and to the Borough wide Landscape Planning Guidelines.

Noise and Vibration

- 15.39 A survey of prevailing background noise levels has been undertaken at locations representative of the nearest existing residences to the Sites.
- 15.40 Appropriate limits, applicable to cumulative noise level of all noise sources to be installed/operated on the Proposed Development Sites, have been determined based on the prevailing background noise climate.
- 15.41 A worst-case assessment of potential noise emissions attributable to HGV and loading/unloading activity on the Sites has been undertaken and it has been concluded that the effects will be of **negligible** to *minor adverse* significance.
- 15.42 The significance of fixed plant and machinery noise is predicted to present **negligible adverse** impact.
- 15.43 An assessment of the potential impact of increased road traffic noise and vibration has been undertaken. It has been concluded that the significance will be **negligible**. ~~of minor adverse impact~~. Good practice guidance on the control of vehicle noise and vibration has been provided.
- 15.44 A qualitative assessment of the potential impact of construction noise and vibration has been provided and it has been concluded that this may give rise to a short-term noise impact of moderate significance during periods where particularly noisy activity is taking place at the closest points to the nearest existing residences. However, for the majority of the time it is anticipated that any impact will be of minor or **negligible** significance, subject to appropriate standard noise mitigation measures.

Transport

- 15.45 The existing pig facility has the capacity to house 37,000 pigs but is currently operating at reduced capacity due to the limitations and condition of the buildings on-site.
- 15.46 ~~The Proposed Development will change how the current pig farm is operated. At present, the Site is used to house piglets, however, the Proposed Development is for pig finishing units housing pigs from 12 - 24 weeks of age which will result in a reduction in the density of pigs on site. This reduction in pig numbers and subsequently lower density, will result in a decrease in the theoretical capacity of the farm and, therefore, vehicle trips associated with the pig facility will also decrease. The assessment in Chapter 12 concluded that annual trips associated with the pig facility will decrease from 4,951 to 3,295 annually. Currently, the buildings on-site are used to house growing pigs from 35Kg to 115Kg. Pigs will arrive at the site at 12 weeks old (35 kg), remain on-site for 17 weeks, and depart once a target weight of approximately 115kg is obtained. This would result in a reduction in the density of pigs on-site and a change from Red Tractor stocking rates to RSPCA stocking rates.~~

- 15.47 ~~With regards to the proposed poultry facility, the assessment predicted a total of 6,772 annual vehicle trips once the poultry facility is operational.~~
- 15.48 Considering both the pig and the poultry facilities together, total annual vehicle trips associated with the Proposed Development were predicted to be 7,124 ~~10,067 trips~~, which is an annual increase of 4,950 ~~5,116~~ above the existing ~~current baseline~~ levels. This is a 44 % ~~97%~~ increase in traffic movements annually and is considered a 'slight to moderate' ~~'substantial'~~ impact based on relevant IEMA Guidance. ~~However, when considering potential mitigation, the residual effect on the local highway network is considered to be minor adverse.~~ Such Mitigation measures proposed include a routing plan for HGV movements to avoid HGVs passing through Brandon and a Traffic Management Plan. ~~that will manage the timing of HGV movements to ensure HGVs do not arrive at the Site at the same time, therefore, preventing queues forming on the B1112 waiting to turn right into the Site.~~ Both the HGV routing plan and Traffic Management Plan can be secured by a suitably worded planning condition. There will be some benefits on some routes as a result of the proposed mitigation, however the residual effect of increased traffic on the local road network will be **minor/moderate adverse**.
- 15.49 As both the pig rearing sheds and poultry houses will be fabricated off-site, the assessment in chapter 12 considered that vehicle trips associated with the construction phase would not be significant and were, therefore, not considered further within the assessment.

Waste

- 15.50 The potential impacts arising from a waste perspective include waste generation from demolition and construction waste and the subsequent increase in demand at local waste treatment and disposal facilities. It was considered that these could be significant, and the assessment of demolition and construction waste was included in the waste assessment detailed in Chapter 13.
- 15.51 The proposed demolition and construction approach and strategy as detailed in the waste assessment will to prevent and minimise waste generation. The effects on waste management will be mitigated by the following initiatives:
- Adherence to the Waste Hierarchy;
 - Reuse of demolition and construction materials on-site or reuse/recycling off-site;
 - Registration of the development with the Considerate Constructors Scheme; and
 - Management of supply chains and good on-site storage of materials to prevent wastage.
- 15.52 With the approach and strategy mentioned above, the Waste Assessment concluded that there will be **negligible** residual effects as a result of the construction phase of the Proposed Development.
- 15.53 In terms of operational waste, given that the current 'muck for straw' arrangement at the existing pig rearing unit will continue, and poultry litter will be removed off-site and taken to a nearby power plant to be used as a renewable energy source, it is considered that potential impacts from operational waste will be insignificant and have, therefore, not been considered within the waste assessment.

Summary of Mitigation Measures and Residual Effects

- 15.54 **Table 15.1A** provides a summary of the mitigation measures proposed as a result of the assessment process for each of the environmental aspects considered, which have been

demonstrated through this ES [Addendum](#) and can be implemented either through planning conditions or legal agreement.

- 15.55 The residual impact are those effects that remain post-mitigation. Each of the technical chapters contained within this ES [Addendum](#) contains a detailed assessment of the residual impacts in respect of both the construction and operational phases of the Proposed Development.
- 15.56 The design proposals have evolved with, and been informed by the EIA process, in order to minimise any identified environmental effects as the design has progressed. However, where this has not been possible to fully resolve through the design, within each technical chapter, a range of measures have been incorporated into the scheme to help mitigate potential negative effects.
- 15.57 A summary of the residual impacts (i.e. those impacts remaining after mitigation) for the Proposed Development is also contained within **Table 15.1A**.

Table 15.1A: Summary of Mitigation and Residual Impacts

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Air Quality and Odour	Construction Dust Emission Impacts	Moderate	CEMP as shown in Table 6.64A	Planning Condition	Negligible
	Operational Phase Odour Emission Impacts	Minor Adverse	None Required	N/A	Minor Adverse
	Operational Phase Dust Emission Impacts	Negligible	None Required	N/A	Negligible
	Operational Phase NH ₃ Emission Impacts	Negligible	None Required	N/A	Negligible
	Operational Phase Bioaerosol Emission Impacts	Minor Adverse	None Required	N/A	Minor Adverse
	Operational Phase Road Traffic Exhaust Emission Impacts	Negligible	None Required	N/A	Negligible
Ecology	Impact of construction dust	Minor Adverse	Industry standard methods to limit dust production and release (see Table 6.64A in Chapter 6)	Planning Condition	Negligible
	Destruction and disturbance of nests (including lighting and vermin)	Moderate Adverse	Timing of the start of works to avoid the nesting season (which runs from March to August) or the use of an ecological watching brief	Planning Condition	Negligible
Flood Risk and Drainage	Impact of additional impermeable area	Minor adverse	Drainage Strategy, maintenance strategy and CSWMP	Planning Condition	Negligible
	Treatment of surface water	Moderate adverse	Drainage Strategy, maintenance strategy and CSWMP	Planning Condition	Minor Beneficial
	Impact on groundwater and abstraction	Minor adverse	Drainage Strategy, maintenance strategy and CSWMP	Planning Condition	Negligible

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Ground Conditions and Contamination	Land Condition Impact Assessment Summary – Construction Phase				
	Impact of hazardous vapours/ soil gas from made ground on Construction workers	Minor Adverse	None warranted	N/A	Minor Adverse
	Exposure of Construction workers to asbestos containing materials during demolition	Major Adverse	Removal of asbestos roofing by suitably qualified contractor as per the Control of Asbestos Regulations	Planning Condition	Minor Adverse
	Impact to Construction workers through ingestion of soil through direct contact from historical site operations	Minor Adverse	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Planning Condition	Minor Adverse
	Impact to Principal Aquifer through contaminants leaking into groundwater from historical site operations	Minor Adverse			Minor Adverse
	Impact to construction workers from contaminated muck pad storage	Moderate Adverse	Decontamination and decommissioning of farmyard structures as required by the Decommissioning plan	Planning Condition	Minor Adverse
	Impact to Principal Aquifer from muck pad storage	Moderate Adverse			Minor Adverse
	Impact to construction site users from surface contamination around the feed bins	Minor Adverse			Minor Adverse
	Land Condition Impact Assessment Summary – Operation Phase				
	Impact on future farm workers through hazardous vapours/ soils from made ground	Minor Adverse	None-warranted	N/A	Minor Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Ground Conditions and Contamination	Impact of contaminants from historical site uses leaching into Secondary Aquifer	Minor Adverse	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Further site investigations can be secured by planning condition	Minor Adverse
	Contaminants from historical site uses impacting Off-site lagoon through surface water run off	Minor Adverse	Site investigation and soil testing of former airfield land, risk assessment, and remediation if warranted	Further site investigations can be secured by planning condition	Minor Adverse
	Impact to future site users from muck pad storage through ingestion of soil	Minor Adverse	Residual risk, relative to the possibility of contaminant release from farm operations are assessed as "minor adverse" since the proposed project will be designed and operated as per the Environmental Permit requirements for pollution prevention, control, monitoring, and environmental management systems to minimise impacts to both human health and controlled waters. This will significantly reduce the risk of contaminant release to environmental media.	Environmental permit included in proposed design	Minor Adverse
	Contaminants from muck pad storage leaching to Secondary Aquifer	Minor Adverse			Minor Adverse
	Contamination of Off-site lagoon from contaminated much pad storage	Minor Adverse			Minor Adverse
	Surface contamination around feed bins impacting future site users	Minor Adverse			Minor Adverse
Landscape and Visual	Construction: Landscape Character – Published Landscape Character Areas	Negligible	Good construction practices and protection of existing conserved trees/ planting where required	Planning Condition	Negligible
	Construction: Landscape Character - Site and Immediate Context	Minor/Moderate adverse	Good construction practices and protection of existing conserved trees/ planting where required	Planning Condition	Minor/Moderate adverse
	Construction: Visual – Overall	Minor adverse	Good construction practices and protection of existing conserved trees/ planting where required	Planning Condition	Minor adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Landscape and Visual	Completed/ Operational Development: Landscape Character – Published Landscape Character Areas	Negligible adverse	New native woodland, tree and hedgerow planting to assimilate the development within its landscape setting	Design and proposed	Negligible
	Completed/ Operational Development: Landscape Character - Site and Immediate Context	Minor Adverse	New native woodland, tree and hedgerow planting to assimilate the development within its landscape setting	Design as proposed	Minor/Negligible
	Completed/ Operational Development: Visual - Overall	Minor Adverse	New native woodland, tree and hedgerow planting to visually filter/ screen the limited available views towards the proposals	Design as proposed	Minor/Negligible
Noise and Vibration	On-site HGV loading/unloading	Negligible	None	N/A	Negligible
	On-site fixed plant	Negligible	None	N/A	Negligible
	Off-site road traffic	Minor-Adverse Negligible	None General best practice recommendations for control of road traffic noise as recommended in this ES Chapter	N/A	Minor-Adverse Negligible
	Construction phase activities	Moderate Adverse	Adoption of Best Practicable Means (as defined in the Control of Pollution Act 1974) and measures recommended in Chapter 11	Planning Condition	Moderate to Minor Adverse
Transport	Impact of additional traffic movements	Major-Minor/Moderate	Traffic Management Plan HGV Routing	Planning Condition	Minor Moderate Adverse
	Impact of proposed HGV route – where HGV removed from roads	Minor		Planning Condition	Minor Beneficial
	Impact of proposed HGV route – where HGV movements increase	Minor		Planning Condition	Minor Adverse
Waste	Increase in waste generation from demolition waste and the subsequent increase in demand at local waste treatment and disposal facilities.	Minor-Negligible	Pre-demolition audit Adherence to the Waste Hierarchy Reuse of materials on-site or reuse / recycling off-site	Planning Condition	Negligible

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Waste	Increase in waste generation from construction waste and the subsequent increase in demand at local waste treatment and disposal facilities.	Minor-Negligible	Considerate Constructors Scheme Adherence to the Waste Hierarchy Site Waste Management Plan(s) (or equivalent) Construction Environmental Management Plan Management of supply chains and good on-site waste storage and segregation	Planning Condition	Negligible

References

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16.0 References

- APIS, (2021). Online at <http://www.apis.ac.uk/>, accessed on 22/10/2021.
- Borough Council of King's Lynn and West Norfolk Development Management Policies (2015).
- BRE (2017). *Waste Benchmark Data*. Location: Publisher
- BS 4142: 2014 + A1: 2019 'Methods for rating and assessing industrial and commercial sound', British Standards Institute.
- BS 5228-1: 2009 'Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise', British Standards Institute.
- BS 7445: 1991 'Description and measurement of environmental noise', British Standards Institute.
- BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings', British Standards Institute.
- BS10175:2011+A2:2017 'Investigation of potentially contaminated sites - Code of practice', the 'Land contamination: technical guidance' collection (Environment Agency, 2016) and 'Land contamination: risk management' (Environment Agency, 2019).
- BSi. *BS5906:2005 Waste management in buildings - Code of practice* (2005). Online at <https://www.rbkc.gov.uk/pdf/BS5906-2005.pdf>
- BTO (online) *British Trust for Ornithology website*. Online at www.bto.org/about-birds/birdtrends/2014/methods/common-birds-census www.bto.org/sites/default/files/u36/downloads/breedingcodes.pdf accessed 17 May 2017
- Byfield A.J. & Wilson P. J. (2005) *Important Arable Plant Areas: Identifying Priority Sites for Arable plant conservation in the United Kingdom*. Salisbury: Plantlife International.
- Canham Consulting, July 2021, Cranswick Country Foods Fresh Poultry, Faxley Proposed New Poultry Farm, Wayland Farms, Feltwell, Norfolk, Proposed Drainage Strategy: Option C, Drawing 216244-CCL-XX-XX-DR-C-3002
- CERC, (2016). Note 105: Setting up Terrain Data for Input to CERC Models.
- CIEEM (2019) *Guidelines for Ecological Impact Assessment (EclA)*. Hampshire: Chartered Institute of Ecology and Environmental Management.
- Collins, J. (2016) *Bat Surveys for Professional Ecologists*. London: Bat Conservation Trust.
- Consolidated Site Layout Revision 7 22-11-2021
- Crown Chicken Ltd, September 2021, Client: Crown Chicken Ltd Drawing No: Breck-Cons Breckland Farm, Brandon Road, Methwold, Poultry Farm Redevelopment
- DEFRA, (2007). AQS for England, Scotland, Wales and Northern Ireland.
- DEFRA, (2009). Characterising poultry dust properties, assessing human health implications, quantifying emission levels and assessing the potential for abatement.
- DEFRA, (2021). LAQM Technical Guidance (TG16).
- DEFRA, Background Mapping Data (2021). Online at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>, accessed 22/10//2021.
- Defra. National Policy Statement for Hazardous Waste (2013). Online at <https://www.gov.uk/government/publications/hazardous-waste-national-policy-statement>

Defra. Our Waste, Our Resources: A Strategy for England (2018). Online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

Defra. UK Statistics on Waste (2021). Online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002246/UK_stats_on_waste_statistical_notice_July2021_accessible_FINAL.pdf

Defra. Waste Management Plan for England (2021). Online at <https://www.gov.uk/government/publications/waste-management-plan-for-england-2021>

Department for Communities and Local Government (2021), 'National Planning Policy Framework'.

Department of Transport (1988) 'Calculation of Road Traffic Noise', HMSO.

Design Manual for Roads and Bridges (DMRB)

DMRB CD123 Geometric design of at-grade priority and signal controlled junctions

EA, (2011). H4: Odour Management.

EA, (2014). Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06.

EA, (2021). 'Air emissions risk assessment for your environmental permit', accessed on 12/11/2021.

EA, (2021). Online at <https://www.gov.uk/guidance/intensive-farming-risk-assessment-for-your-environmental-permit>, accessed on 22/10/2021.

EA, undated. Guidance on the evaluation of bioaerosol risk assessments for composting facilities.

Environment Agency Mapping and guidance on flood risk.

Environment Agency Mapping and guidance on flood risk.

Environment Agency, 8 October 2020 - Guidance on Land contamination risk management (LCRM) ; How to assess and manage the risks from land contamination .

Environment Agency. Waste Data Interrogator: Waste Management Information (2019). Online at <https://data.gov.uk/dataset/d409b2ba-796c-4436-82c7-eb1831a9ef25/2019-waste-data-interrogator>

EU. Directive 2008/98/EC of the European parliament and of the council of 19 November 2008 on waste and repealing certain directives (2008). Online at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098>

Flood Risk Assessments and climate change allowances (N Flood Risk Assessments and climate change allowances – guidance (.gov.uk)

Flood Risk Assessments and climate change allowances (N Flood Risk Assessments and climate change allowances – guidance (.gov.uk)

Froglife (1999) Reptile Survey. Froglife Advice Sheet 10. Halesworth: Froglife.

Fuller, R. J. (1980). A method for assessing the ornithological interest of sites for conservation. Biological Conservation, 17(3), 229-239.

Harris, S., Cresswell, P. and Jefferies, D. (1989) Surveying Badgers. Aberdeen: Mammal Society.

Harris, S.J., Massimino, D., Newson, S.E., Eaton, M.A., Marchant, J.H., Balmer, D.E., Noble, D.G., Gillings, S., Procter, D. and Pearce-Higgins, J.W. (2016) The Breeding Bird Survey 2015. BTO Research Report 687. Thetford: British Trust for Ornithology.

- HM Government. *Hazardous waste (England and Wales) Regulations* (2005). Online at <https://www.legislation.gov.uk/uksi/2005/894/made/data.pdf>
- HM Government. *The Clean Neighbourhoods and Environment Act* (2005). Online at http://www.legislation.gov.uk/ukpga/2005/16/pdfs/ukpga_20050016_en.pdf
- HM Government. *The Control of Pollution (Amendment) Act* (1989). Online at <https://www.legislation.gov.uk/ukpga/1989/14/contents>
- HM Government. *The Control of Pollution Act* (1974). Online at <https://www.legislation.gov.uk/ukpga/1974/40/data.pdf>
- HM Government. *The Controlled Waste (England and Wales) Regulations* (2012). Online at http://www.legislation.gov.uk/uksi/2012/811/pdfs/uksi_20120811_en.pdf
- HM Government. *The Environmental Protection Act* (1990). Online at <https://www.legislation.gov.uk/ukpga/1990/43/data.pdf>
- HM Government. *The Waste (England and Wales) Regulations* (2012). Online at <http://www.legislation.gov.uk/uksi/2011/988/made>
- HM Government. *The Waste and Environmental Permitting etc. (Legislative Functions and Amendments etc.) (EU Exit) Regulations* (2020). Online at <https://www.legislation.gov.uk/uksi/2020/1540/made>
- HM Government. *Waste Duty of Care: Code of Practice* (2018). Online at <https://www.gov.uk/government/publications/waste-duty-of-care-code-of-practice/waste-duty-of-care-code-of-practice>
- HM Government. *Waste Minimisation Act* (1998). Online at <https://www.legislation.gov.uk/ukpga/1998/44/data.pdf>
- <https://www.norfolk.gov.uk/-/media/norfolk/downloads/rubbish-recycling-planning/flood-and-water-management/guidance-on-norfolk-county-councils-lead-local-flood-authority-role-as-statutory-consultee-to-planning.pdf>
- <https://www.norfolk.gov.uk/-/media/norfolk/downloads/rubbish-recycling-planning/flood-and-water-management/guidance-on-norfolk-county-councils-lead-local-flood-authority-role-as-statutory-consultee-to-planning.pdf>
- IAQM, (2016); *Guidance on the Assessment of Dust from Demolition and Construction V1.1.*
- IAQM, (2017); *Land-Use Planning & Development Control: Planning for Air Quality.*
- IAQM, (2018); *Guidance on the Assessment of Odour for Planning V1.1.*
- JNCC (2016) *Handbook for Phase 1 Habitat Surveys*. Peterborough: Joint Nature Conservation Committee.
- King's Lynn & West Norfolk Borough Council. *Local Development Framework - Core Strategy* (adopted July 2011). Online at https://www.west-norfolk.gov.uk/download/downloads/id/712/core_strategy_document.pdf
- KLWNBC, (2011). *Core Strategy*.
- KLWNBC, (2016). *SADMPP*.
- Lead Local Flood Authority Statutory Consultee for Planning Guidance Document, Norfolk County Council, October 2021
- Lead Local Flood Authority Statutory Consultee for Planning Guidance Document, Norfolk County Council, October 2021

Manual for Streets

Ministry of Housing, Communities & Local Government. *National Planning Policy for Waste* (2014). Online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf

Ministry of Housing, Communities and Local Government, (2021). NPPF.

Natural England (2021) *The Biodiversity Metric 3.0. Technical Supplement*. Online at <http://publications.naturalengland.org.uk/publication/6049804846366720> accessed 01 December 2021

[Natural Resource Wales \(NRW\) \(2022\), Reducing ammonia emissions from agriculture.](#)

NE, (2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.

NE, (2021). 353385 EIA Scoping response for Airfield Farm.

[NE, \(2022\). 393905 & 394532.](#)

Norfolk CC. *Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010-2026* (adopted September 2011). Online at <https://www.norfolk.gov.uk/-/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning/core-strategy-and-minerals-and-waste-development-management-policies-development-20102026.pdf>

Norfolk CC. *Waste Site Specific Allocations Development Plan Document* (adopted October 2013). Online at <https://www.norfolk.gov.uk/-/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning/waste-site-specific-allocations-development-plan-document.pdf>

Norfolk Environmental Protection Group: Technical Guidance – Planning and Noise.

Norfolk Road Construction Specification

NPPG, (2021). Online at <http://www.gov.uk/guidance/air-quality--3>, accessed 07/11/2021.

Plandescil, (2020). Design and Access Statement, Proposed Solar Panels, Clough Farm, Methwold.

Risk-based methods referred to in Part IIA of the Environment Protection Act 1990, introduced by section 57 of the Environment Act 1995 and brought into force in April 2000.

Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds*, 114, 723-747.

Storing organic manures in nitrate vulnerable zones DEFRA

Storing organic manures in nitrate vulnerable zones DEFRA

The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for environmental noise impact assessment' (2014).

Trundley September 2020 Proposed Pig Finishing Units At

[UK Supreme Court, \(2015\). Champion v North Norfolk District Council.](#)

Wayland Farms, Feltwell Proposed Site Plan Drawing No. 20-L45-P004G



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