Mallard Pass
Solar Farm

Mallard Pass Solar Farm

Applicant's Responses to ExA's First Written Questions (ExQ1) Appendices A-U

Deadline 2 (15th June 2023)

EN010127
EN010127/APP/9.8

Planning Act 2008
Infrastructure Planning (Examination Procedure) Rules 2010

Planning Act 2008

Infrastructure Planning
(Examination Procedure) Rules 2010

Mallard Pass Solar Farm

Development Consent Order 202[x]

9.8 Applicant's Response to the First Written Questions – Appendices A-U

Regulation Reference:	N/A
Planning Inspectorate Scheme Reference	EN010127
Application Document Reference	EN010127/APP/9.8
Author	Mallard Pass Project Team

Version	Date	Status of Version
Rev 00	15th June 2023	Deadline 2 Version

Table of Contents

Appendix

Appendices

Appendix A Q1.0.4 Substation Elevations and Images

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CADIDRAWINGS\7863_241_PROPSOED ONSITE SUBSTATION IMAGES.DWG

Axminster, Devon 400kv substation

Elstree, London 400kv Substation

Cowley, Oxford 400kv Substation

Iron Acton, South Glos 400kv Substation

New Project Substation, Larks Green
COPYRIGHT : ENSO ALEXPARKYNSMITH

Ryhall, Rutland 400kv Substation

Not to scale

LEGEND

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	12/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Example Substation Images

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NO
EN010127

ISSUED BY	Oxford	T: 01865 887 050	
DATE	June 2023	DRAWN	TB
SCALE@A3	Not to scale	CHECKED	BC
STATUS	Planning	APPROVED	RP

DWG. NO 7863_241 **REV : P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey

North

Z:\9114_MALLARD_PASS_EXAMINATION\7CAD\3D\9114_SUBSTATION.DWG

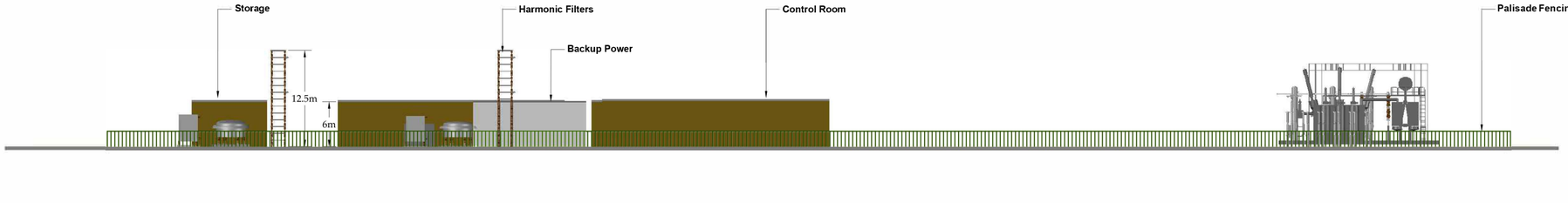
North-east

Control Building and Welfare Facilites

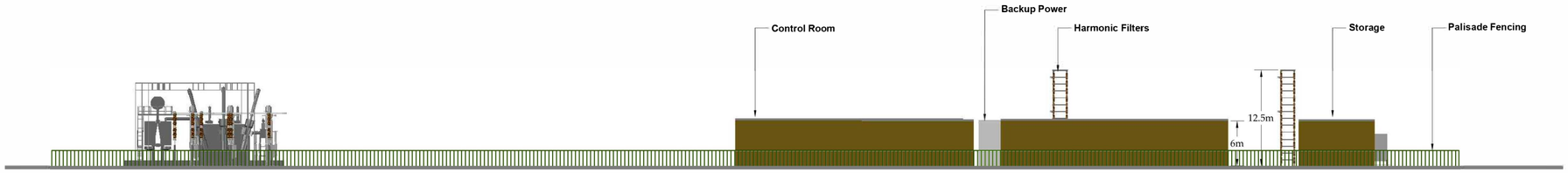
Circuit breakers Transformers and Switchgear

Busbars

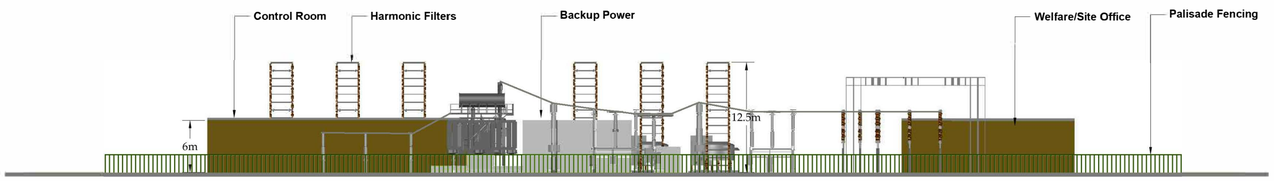
North-west



South-east



South-west



0 20m

North

P0 Examination Deadline 2 Submission RP 07/06/23
REV. DESCRIPTION APP. DATE

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Indicative Elevations
Proposed Onsite Substation

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NO
EN010127

ISSUED BY	Oxford	T: 01865 887 050	
DATE	June 2023	DRAWN	SD
SCALE@A2	1:500	CHECKED	BC
STATUS	Planning	APPROVED	RP

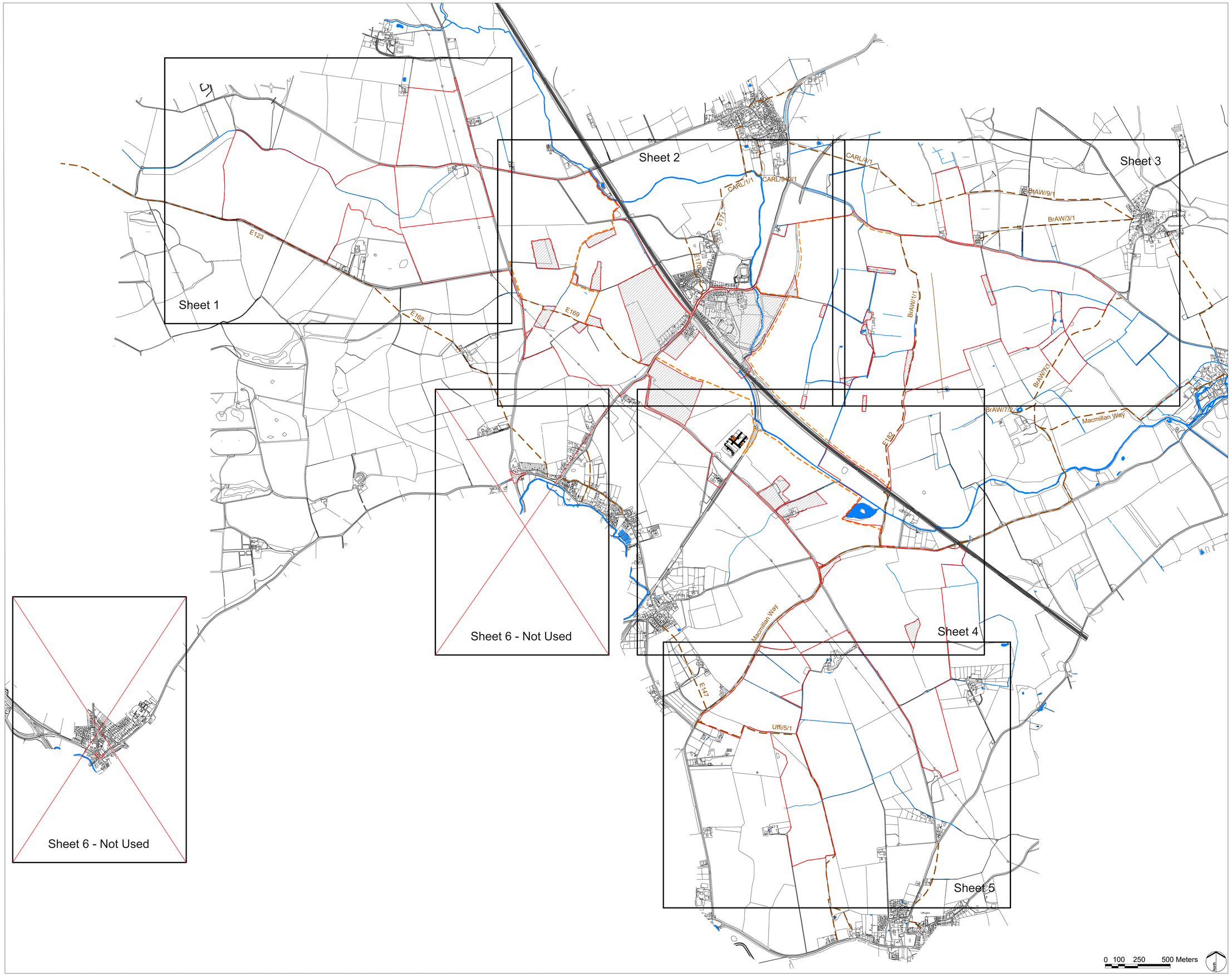
DWG. NO 7863_240 **REV : P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey

Appendix B Q1.0.8 Existing PRoW and Permissive Paths Plans

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CAD\DRAWINGS\7863_0230_0235_EXISTING PROW AND PERMISSIVE PATHS PLAN.DWG



LEGEND

- Order limits
- Area outside of Order limits

Existing Features

- Existing Water Course / Drain
- Existing Waterbody
- Public Right of Way

Proposed Development Features

- Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Existing Public Right of Way and Permissive Paths Plan Key Plan

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

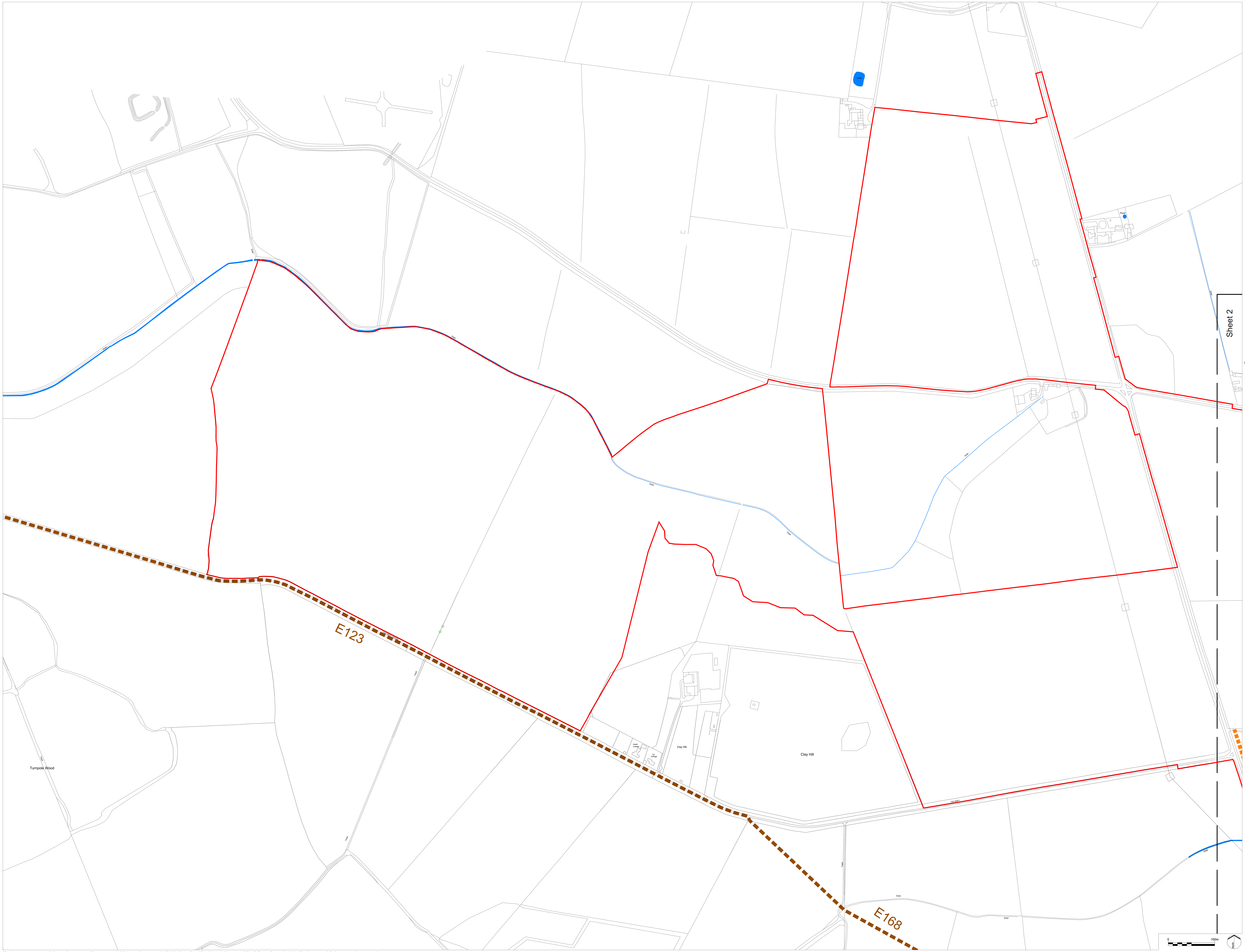
ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A1	As shown	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0230 **REV : P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CAD\DRAWINGS\7863_0230_0235_EXISTING PROW AND PERMISSIVE PATHS PLAN.DWG



LEGEND

Order limits

Area outside of Order limits

Existing Features

Existing Water Course / Drain

Existing Waterbody

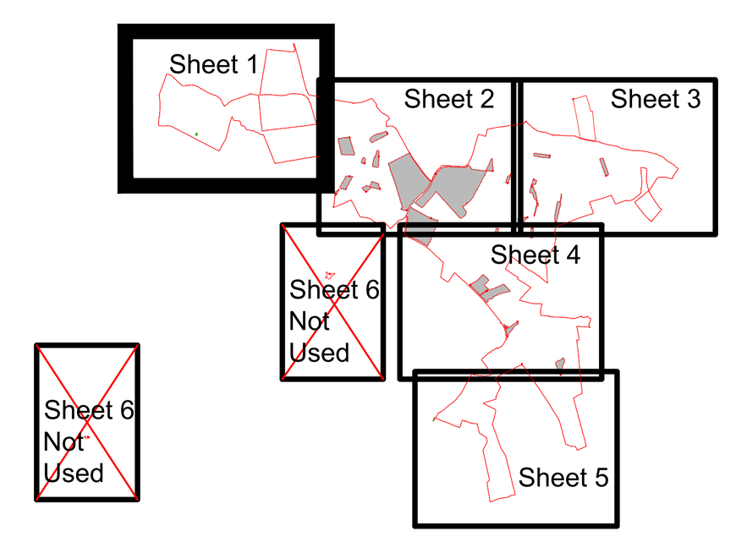
Public Right of Way

Proposed Development Features

Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.



Key Plan

P0	Examination Deadline 2 Submission	RP	14/06/23
REV.	DESCRIPTION	APP.	DATE

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Existing Public Right of Way and Permissive Paths Plan
Sheet 1 of 5

Infrastructure Planning (Examination Procedure) Rules 2010

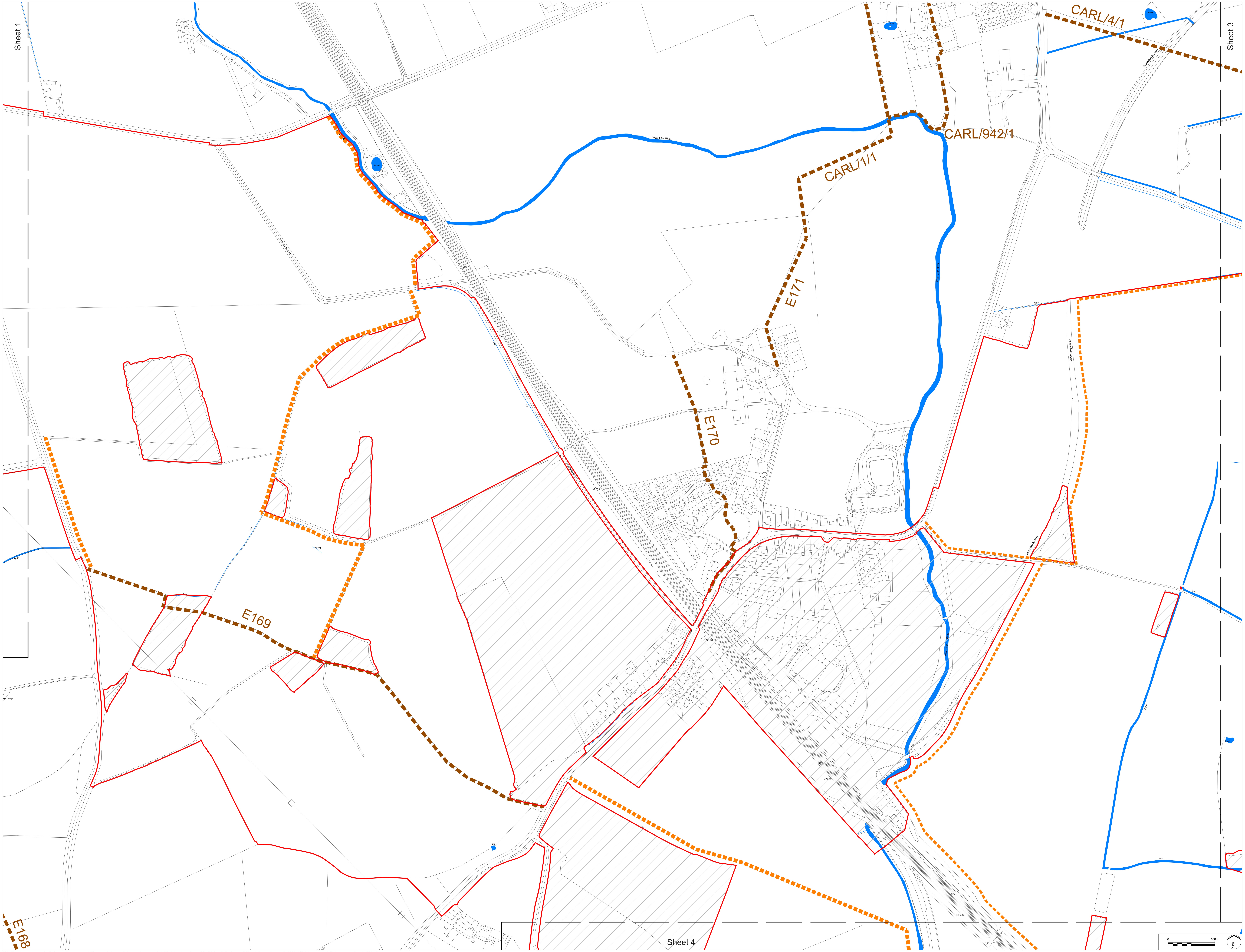
PINS REFERENCE NUMBER
EN010127

ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A0	1:2,500	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0231 REV : P0

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC



LEGEND

Order limits

Area outside of Order limits

Existing Features

Existing Water Course / Drain

Existing Waterbody

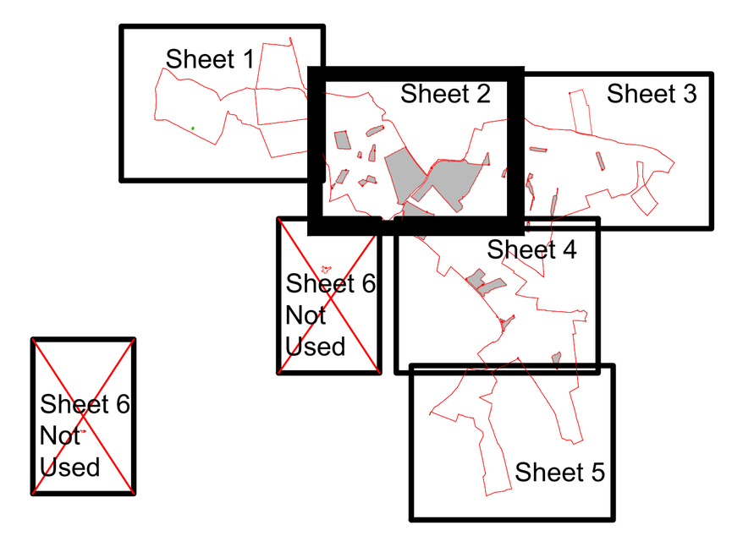
Public Right of Way

Proposed Development Features

Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.



Key Plan

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

Mallard Pass Solar Farm

PROJECT TITLE

MALLARD PASS SOLAR FARM

DRAWING TITLE

Existing Public Right of Way and Permissive Paths Plan Sheet 2 of 5

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER

EN010127

ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A0	1:2,500	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0232 REV : P0

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CAD\DRAWINGS\7863_0233_035_EXISTING PROW AND PERMISSIVE PATHS PLAN.DWG

Sheet 2

CARL/4/1

BrAW/9/1

BrAW/3/1

BrAW/1/1

BrAW/7/1

Macmillan Way

New Plantation

Braceborough Little Wood

Stocking Holt

Braceborough Lodge

Braceborough Hall

Ivy Farm

Sheet 4

Sheet 5

Sheet 6 Not Used

LEGEND

- Order limits
- Area outside of Order limits

Existing Features

- Existing Water Course / Drain
- Existing Waterbody
- Public Right of Way

Proposed Development Features

- Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.

Sheet 1 | Sheet 2 | Sheet 3 | Sheet 4 | Sheet 6 Not Used | Sheet 6 Not Used | Sheet 5

Key Plan

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

Mallard Pass

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Existing Public Right of Way and Permissive Paths Plan Sheet 3 of 5

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

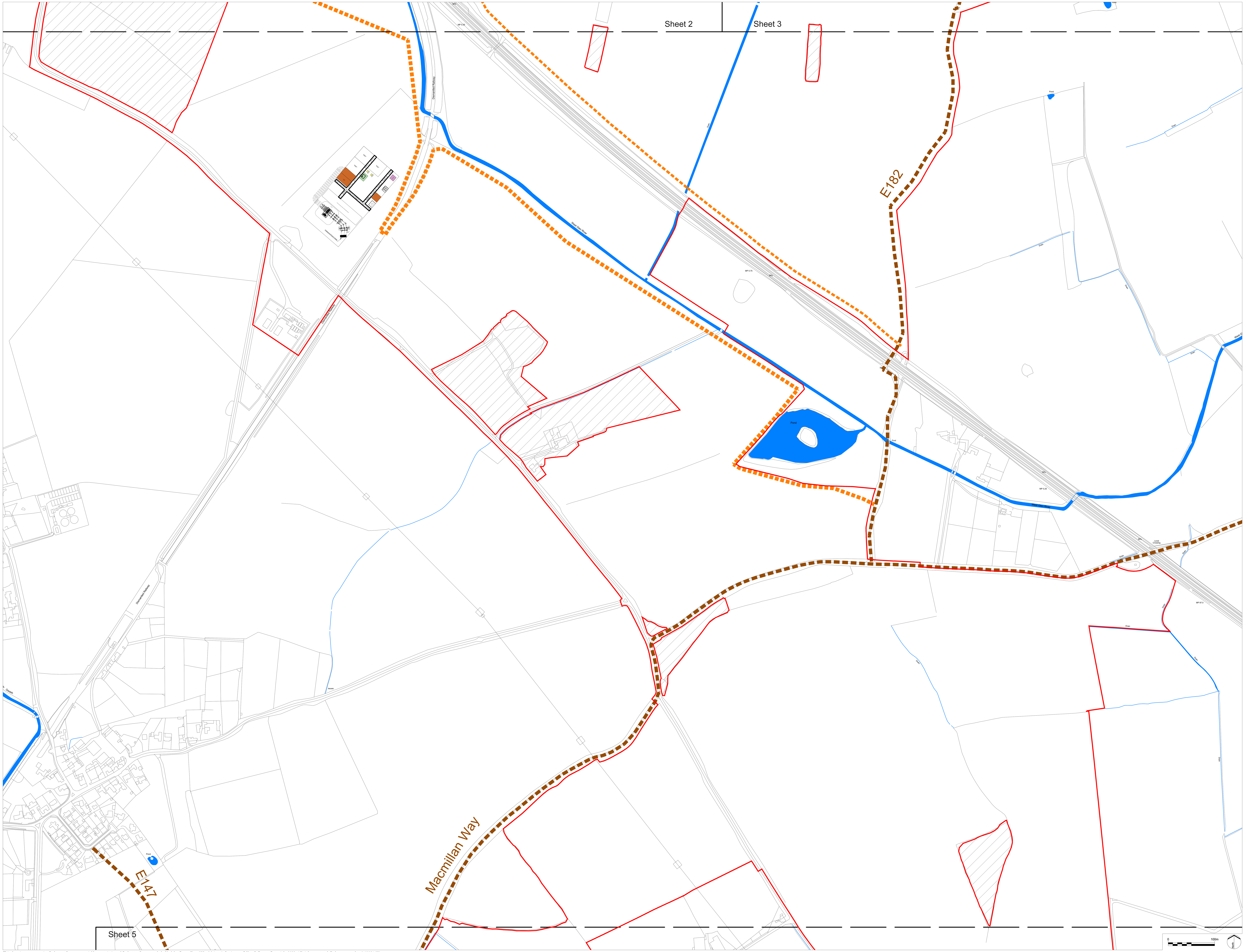
ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A0	1:2,500	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0233 **REV : P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CAD\DRAWINGS\7863_0230_0235_EXISTING PROW AND PERMISSIVE PATHS PLAN.DWG



LEGEND

- Order limits
- Area outside of Order limits

Existing Features

- Existing Water Course / Drain
- Existing Waterbody
- Public Right of Way

Proposed Development Features

- Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.

Sheet 1 | Sheet 2 | Sheet 3 | Sheet 4 | Sheet 5 | Sheet 6 Not Used | Sheet 6 Not Used

Key Plan

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Existing Public Right of Way and Permissive Paths Plan
Sheet 4 of 5

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

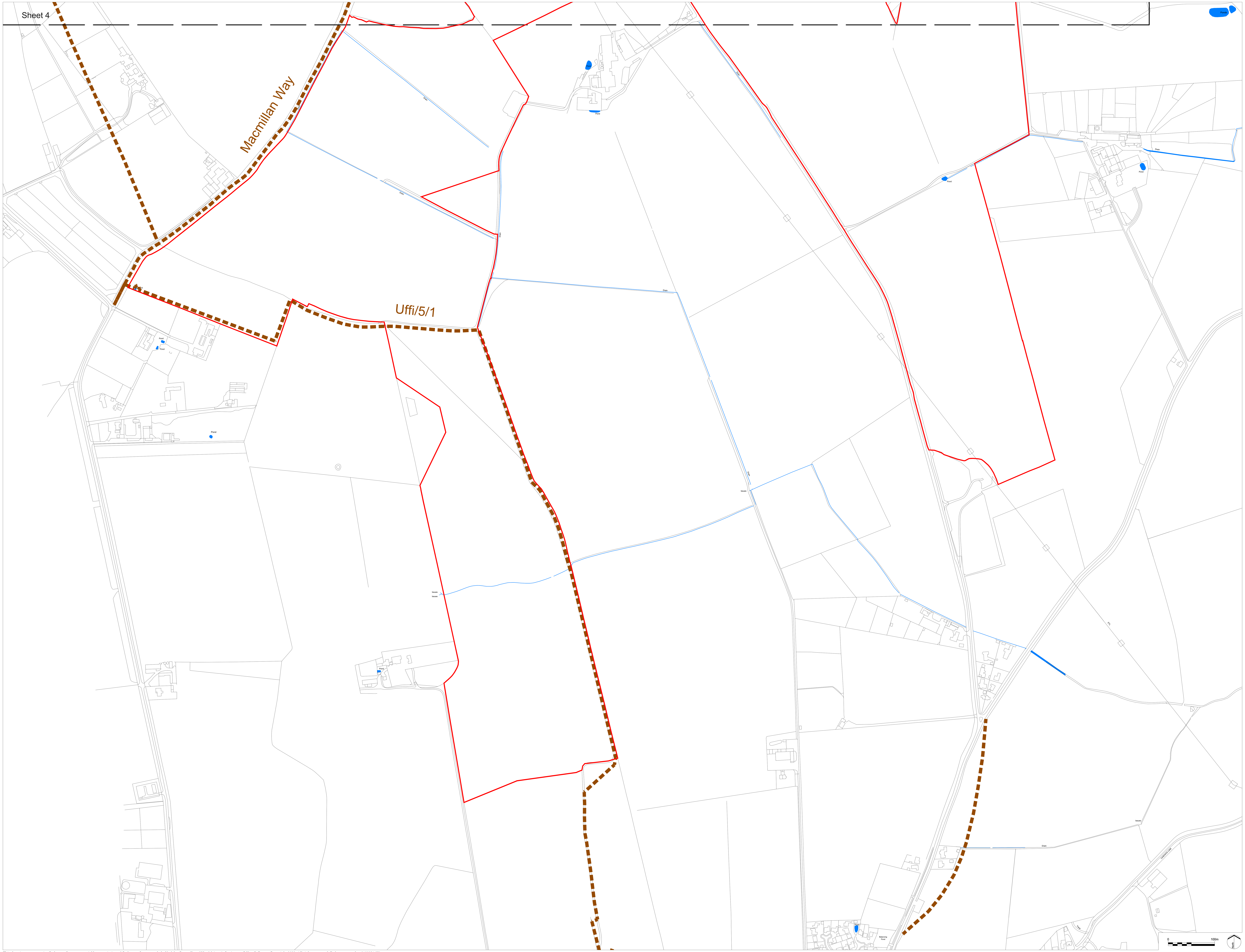
ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A0	1:2,500	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0234 REV : P0

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\7CAD\DRAWINGS\7863_0230_0235_EXISTING PROW AND PERMISSIVE PATHS PLAN.DWG



LEGEND

Order limits

Area outside of Order limits

Existing Features

Existing Water Course / Drain

Existing Waterbody

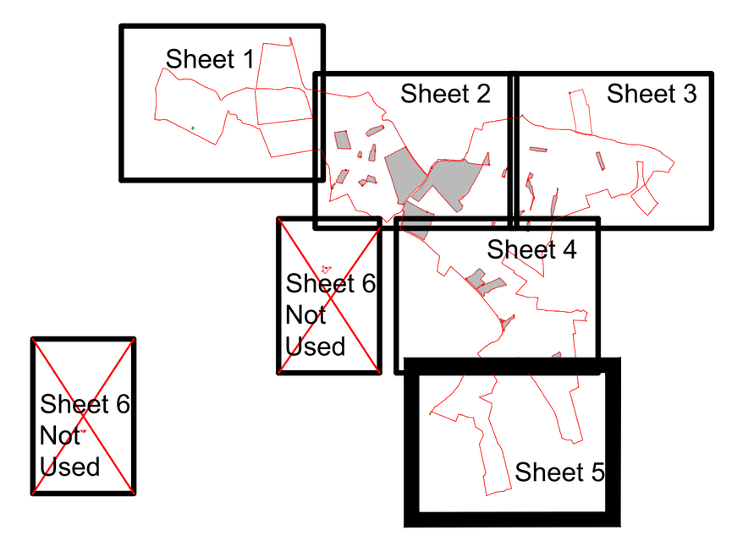
Public Right of Way

Proposed Development Features

Proposed Permissive Path

Notes:

1. The Order limits has been drawn to the Land Registry boundaries and Topographical Survey data. The accuracy of Land Registry and the topographical survey differs from the OS Base Mapping which results in the Order limits not aligning with the line work shown on the OS Base Mapping.



Key Plan

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Existing Public Right of Way and Permissive Paths Plan
Sheet 5 of 5

Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

ISSUED BY	Oxford	T: 01865 887 050	
DATE	14 June 2023	DRAWN	TB
SCALE@A0	1:2,500	CHECKED	BC
STATUS	Final	APPROVED	RP

DWG. NO 7863_0235 REV : P0

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey, LCC and RCC

Appendix C Q1.0.17 Clean Energy Reviews - Most Powerful Solar Panels

Most Powerful Solar Panels 2023

Downloaded from https://www.cleanenergyreviews.info/blog/most-powerful-solar-panels

14th June 2023

CLEAN ENERGY REVIEWS

Most Powerful Solar Panels

Jan 2023 V3.3

Manufacturer	Model	Power (W)	Cell Size	Wafer Type	Cell Technology	Efficiency %	Avail
HUASUN	Himalaya G12 Series	715 W	210mm	N-Type	HJT, Bifacial	23.0%	Q1 2023 *
risen	TITAN	710 W	210mm	N-Type	HJT, Bifacial	22.5%	Q1 2023
中来股份 JOLYWOOD	JW-HD132N	700 W	210mm	N-Type	TOPCon, Bifacial	22.5%	Q1 2022
AKCOME 爱康光电	Chaser-M12 132P	700 W	210mm	N-Type	HJT, Bifacial	22.5%	Q2 2022
Trinasolar	Vertex	670 W	210mm	P-Type	Mono-PERC	21.6%	Q2 2021
ASTRONERGY	Astro 6	670 W	210mm	P-Type	Mono PERC+	21.6%	Q1 2022
CanadianSolar	HiKu7	670 W	210mm	P-Type	Mono PERC	21.6%	Q4 2021
YINGLI SOLAR	Mono GG	670 W	210mm	P-Type	Mono PERC	21.6%	Q1 2022
SUNTECH	Ultra X Plus	670 W	210mm	P-Type	Mono PERC, Bifacial	21.6%	Q1 2022
SERAPHIM	S5 Bifacial	670 W	210mm	P-Type	Mono PERC, Bifacial	21.6%	Q1 2022
TALESUN	BIPRO	670 W	210mm	P-Type	Mono PERC, Bifacial	21.6%	Q1 2022
AE SOLAR alternative energy	AURORA	665 W	210mm	P-Type	Mono PERC	21.4%	Q2 2022
JinKO Solar	Tiger Pro NEO	620 W	182mm	N-Type	TOPCon	22.3%	Q3 2021
JA SOLAR	DeepBlue 3.0	605 W	182mm	P-Type	Mono PERC	21.3%	Q4 2020
Q CELLS	Q.Peak DUO XL-G11.2	590 W	182mm	P-Type	Mono PERC	21.5%	Q2 2022
LONGi Solar	Hi-Mo 6 Explorer	585 W	182mm	N-Type	HPBC	22.6%	Q1 2023
Phono Solar	Draco PS560-M7G	560 W	182mm	P-Type	TOPCon	21.7%	Q2 2022

* Official release date yet to be determined - High volume production estimated early 2023

List of the most powerful panels currently in production or soon to be released with a maximum panel size of 2.4m high x 1.35m wide. Availability and release dates may vary for different regions

Make	Model	POWER	Cell size	Cell type	Efficiency %	Avail
Huasun	Himalaya G12	715 W	210mm	N-Type HC Bifacial MBB	23.0 %	Q1 2023
Risen Energy	Titan	710 W	210mm	N-Type HC Bifacial MBB	22.5%	Q1 2023
Jolywood	JW-HD132N	700 W	210mm	N-Type HC TOPCon MBB	22.5 %	Q1 2022
Akcome	Chaser M12 132P	700 W	210mm	N-Type HC Bifacial MBB	22.5 %	Q2 2022
Trina Solar	Vertex	670 W	210mm	P-Type Mono-PERC MBB	21.6 %	Q2 2021
Astronergy	Astro 6	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
Canadian Solar	HiKu7	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
Yingli Solar	Mono GG	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
Suntech	Ultra X Plus	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
Seraphim	S5 Bifacial	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
Talesun	BiPRO	670 W	210mm	P-Type HC PERC+ MBB	21.6 %	Q1 2022
AE Solar	Aurora	665 W	210mm	P-Type HC PERC MBB	21.4 %	Q2 2022
Jinko Solar	Tiger Pro NEO	620 W	182mm	N-Type HC TOPCon MBB	22.3 %	Q3 2021
JA Solar	Deep Blue 3.0	605 W	182mm	P-Type HC PERC MBB	21.3 %	Q4 2020**
Q CELLS	Q.PEAK DUO XL-G11.2	590 W	182mm	P-Type HC PERC MBB	21.5 %	Q2 2022

HC = Half-cut cells, MBB = Multi busbars. Maximum panel size = 2.4m high x 1.35m wide

Appendix D Q1.2.6 Ofgem Open Letter on Connections Reform

Making a positive difference
for energy consumers

To interested parties

Email: connections@ofgem.gov.uk

Date: 16 May 2023

Open letter on future reform to the electricity connections process

Great Britain (GB) is at a pivotal moment in its journey towards net zero. With the government's recent '*Powering up Britain*' publication promising to deliver the new nuclear, offshore wind and solar power generation essential to achieve our decarbonisation goals, there is a pressing need to ensure our energy system is equipped to enable this substantial increase in generation capacity and growing demand.[1] Ensuring these assets can connect when and where they are needed will be crucial in achieving net zero, as well as in delivering affordability for consumers and maintaining security of supply.

We need to take action **now** in order to ensure we are on track for 2035 and 2050.[2] Over 40% (120GW) of all new generation capacity holding transmission connection agreements today have connection dates of 2030 or beyond – with the impacts of these issues cascading down into the distribution network. This must change – but it must change intelligently, given that we also know that the total contracted capacity exceeds ESO's predicted total future generation under every scenario in 2030 and the majority in 2050.[3]

Many of the building blocks to address this are already coming into place. Through our RIIO regulatory price controls, we are enabling strategic investment in network infrastructure to ensure the network can be built ahead of need, and continue to work with industry to drive forward rapid improvements to connections processes which should start to bring down connection times. However, more action will be needed. There must be a **fit for the future connections regime**. This letter sets out how we, alongside government and industry, will work to reform the connections process for all parties and ensure it is responsive to customers' needs and ultimately fit for the net zero transition. This will build towards a joint

[1] Powering Up Britain - Joint Overview (publishing.service.gov.uk).
[2] References to the "Authority", "Ofgem", "we" and "our" are used interchangeably in this document to refer to GEMA, the Gas and Electricity Markets Authority.
[3] ESO Future Energy Scenarios 2022 | ESO (nationalgrideso.com), figure ES.E.01 at page 155.

action plan with government later in the summer, which we intend to provide clarity on key improvements to deliver the change needed.[4]

Our objective is to see **electricity connection offers with shorter average connection dates which better meet customers' needs and enable a timely transition to net zero**. Considering the scale of the challenge, we will consider whether substantial changes to the current connections queue methodology are required and how changes are applied to both new applicants and those parties already in the queue with a connection agreement, while ensuring progress can be made quickly. This review will sit alongside existing government and industry initiatives.

We will take a **central role** in driving progress on the reform of connections. We will monitor the progress of industry initiatives to ensure these are translating into benefits for consumers, in terms of the scale and management of the queue and, crucially, earlier connection dates. We will convene industry to drive further action as and when needed. Working closely with government, we will provide the necessary leadership and ensure an industry-wide collective focus on the right issues and options, bearing in mind our objective, desired outcomes and the evolving longer-term direction.

We will carefully consider the Electricity Network Commissioner's recommendations on infrastructure and acceleration when published, align with the strategic aims from Ofgem's corporate strategy and the government's '*Powering Up Britain*' package, and continue to engage with and reflect on recommendations by the BEIS Select Committee on decarbonisation of the power sector, and the proposed Strategy and Policy Statement for energy policy.[5]

We welcome views from stakeholders on the proposals presented in this letter to connections@ofgem.gov.uk by **16 June 2023** – in particular, on:

- The nature and priority of connections issues (Section 1 – *The challenge*);
- Priority areas of focus for Ofgem (Section 4 – *What you can expect from us*);
- Our proposed objective, outcomes and guiding principles (Annex A); and,
- The illustrative reform stages and options for consideration (Annex B).

We intend to hold a webinar in June on our proposals and invite registrations of interest to the email address above. We will review and take account of stakeholder submissions, as well as the outcomes of our webinar and roundtable, as we take forward fuller analysis on

[4] Powering up Britain - GOV.UK (www.gov.uk); Strategy and Policy Statement for energy policy in Great Britain - GOV.UK (www.gov.uk)
[5] New Electricity Networks Commissioner appointed to help ensure home-grown energy for Britain - GOV.UK (www.gov.uk); Our Strategy (ofgem.gov.uk); Powering up Britain - GOV.UK (www.gov.uk); Strategy and Policy Statement for energy policy in Great Britain - GOV.UK (www.gov.uk).

the various options and stages of reform under consideration. We will then move to make a robust assessment of key options and associated regulatory questions, to drive forward the solutions we see as essential to accomplish our net zero ambitions. Our joint action plan with government this summer will represent a key milestone in the next phase of connections reform and set the direction for future action to deliver the progress needed.

Yours faithfully,

Akshay Kaul
Interim Director of Infrastructure and Security of Supply

Overview: Review of electricity connections arrangements and future reforms

Here we set out the challenges facing the connections framework, with increasing application volumes contributing to long connection times. We also explore what may be needed to tackle the emerging issues – through strategic network investment, efficient and flexible network management and a fit for the future connections process. We set out the expected stages of reform, and our role in reviewing the electricity connections arrangements, alongside government and industry.

This document has four annexes, which provide further detail. They are as follows:

- Annex A – Proposed objective, outcomes and guiding principles for reform;
- Annex B – Illustrative reform stages and options for consideration;
- Annex C – Key dependencies and longer-term outlook; and,
- Annex D – Support for Distribution Queue Optimisation.

1. The challenge

The scale of energy system transformation as we move towards a net zero system is substantial. The system is facing growing volumes of connections at all voltage levels, with changing characteristics and a changing impact of connections.

Progress to date and emerging issues

The 'Connect and Manage'[6] regime has enabled the rapid connection of significant amounts of renewables to the grid, accelerating generation connections which would otherwise have had to wait for transmission network upgrades. Spare capacity is becoming scarcer – congestion management costs are rising and localised 'enabling' works are increasing.

The step-change in investment in distributed energy resources has also contributed to significant congestion across parts of the distribution networks in recent years. Distribution companies have responded to these constraints by taking steps to unlock capacity and speed up connection dates – introducing non-firm connections and exploring other innovative solutions, supported by our RIIO innovation funding and the Access Significant Code Review (SCR).[7] But generation customers still face delays, increasingly in regions of transmission congestion, alongside more localised constraints. This is the case even while

[6] The 'Connect and Manage' regime introduced in 2010 enables generation to connect to the grid in advance of 'wider' transmission network upgrades, with the resulting congestion managed operationally through market solutions (ie balancing interventions by the ESO).
[7] The Access SCR - Final Decision (ofgem.gov.uk) recently introduced reforms to improve certainty and consistency of non-firm offers, while earlier work on also supported the development of novel approaches.

demand connections are now also growing across the system – a trend that is expected to continue with the electrification of industry, heat and transport.

Increasing application volumes

The crux of the challenge is the substantial increase in volume of connection applications at all voltage levels, putting greater pressure on systems and processes. Over the last five years, the volume of new connection offers provided by the Electricity System Operator (ESO) has grown tenfold,[8] with an increase in applications of 80% in the last year alone.[9] This has led to significant growth in the amount of new generation capacity in the transmission queue, with 280GW now holding connection agreements. This is despite the fact that the total contracted capacity exceeds (in almost every Future Energy Scenario) the ESO's predicted total generation for both 2030 and 2050.[10]

On the distribution network, volumes of connection applications have also increased and are increasingly impacted by transmission constraints, reinforcement works and associated delays – even if there is spare capacity locally.[11] This interaction requires improved coordination across the transmission-distribution interface.

Interactivity and attrition in a first-come-first-served queue

Connection applications are currently managed on a first-come-first-served (FCFS) basis, with each new connection request being considered in light of those in front of it – irrespective of a project's status or viability. In a constrained system, with long lead times to build new capacity and with over 40% of projects at transmission ultimately failing to connect (in part reflecting the excess of contracted capacity against future FES scenarios) customer applications are being significantly delayed by non-viable or slow to progress projects.[12] This creates a risk that, without swift action for all connection agreements, connection delays present an obstacle to meeting our decarbonisation goals.

Long connection times

As a result, over half of generation customers in the transmission queue today (ie holding connection agreements) have a connection offer date at least 5 years in the future, with over 10% due to wait 10 years or more. This trend is continuing, with 70% of recent

[8] ESO, GB Connections Reform - Case for Change, December 2022.
[9] ESO Connections Data.
[10] ESO Future Energy Scenarios 2022 | ESO (nationalgrideso.com), figure ES.E.01 at page 155.
[11] The scale of the transmission contracted background means that increasingly distribution applications also have a potential impact on the transmission network. This interaction therefore needs to be assessed and reflected in their connection offer.
[12] National Grid ESO, *GB Connections Reform: Case for Change*, December 2022. For new applications between 2018-2022, 42% have fallen out of the process (withdrawn, rejected or terminated).

applicants (offered in the last 12 months) receiving connection dates that are 5 or more years away and over a quarter receiving connection dates beyond 2032 – some beyond 2037. While many of these are large, complex projects with long lead times due to a range of factors, this is still too long.

Complexity has increased at all stages of the process, as has the interactivity of assessments needed to deliver a connection offer. This leads to increasing wait times, including the time to receive an offer, reflecting the challenges the existing processes face in adapting to substantial increases in customer demand.

2. What is needed to tackle this

Delivering new connections at the scale required on a sustainable long-term basis will need a combination of three factors: **strategic network investment** to bring forward significant new network capacity efficiently, and at the right time and place; **efficient and flexible network management** to get the most out of the existing network; and a **fit for the future connections process**, which optimises allocation of available capacity so that connections can proceed at pace.

***Strategic network investment*:** We are enabling significant increases in network build, including strategic investment, over the coming years, which will allow more assets to connect. Under our regulation, network companies have been able to undertake investment in anticipation of future demand, but there may have been factors that reduced their willingness to do so. Under the RIIO-2 controls, we have taken active measures to accelerate the investment needed to meet decarbonisation targets, including to encourage the network companies to build *ahead* of investment need (ie, where grid upgrades anticipate new low carbon generation and demand requirements from connecting parties and grid capacity is expanded in a planned, co-ordinated manner). This represents action we are taking **now** to equip GB with the infrastructure needed to connect the 50GW of offshore wind planned by 2030 and further decarbonise the GB energy system. Government also recognises the need to accelerate transmission build and has ambitions to halve the time it takes to build this infrastructure.[13]

This increased investment in anticipation of future demands approach has already begun – with the c.£20bn Accelerated Strategic Transmission Investment (ASTI) framework at transmission, our load related funding settlement in RIIO-ED2 covering the local distribution networks (which has almost doubled annual allowances in network upgrades and includes a suite of uncertainty mechanisms to enable funding to increase further if

[13] British Energy Security Strategy, at page 24.

more demand emerges than anticipated), and will continue through our consideration of models for future price controls.[14] We are working to introduce a Centralised Strategic Network Plan (CSNP) to identify the network upgrades needed to meet 2035 and 2050 decarbonisation targets, and work is underway to determine the scope and governance of local level 'Regional System Planners' (RSPs).

***Efficient and flexible network management*:** We must use all available network capacity – new and existing – as effectively as possible to enable us to maximise the number of parties that can be connected. To do so, we will need improved network monitoring at all voltage levels, with widely available, standardised data enabling the use of flexibility. This network monitoring is being delivered through the RIIO-ED2 price controls, where DNOs have received substantial IT & Telecoms (IT&T) funding, including to cover the £166m of forecast costs to install monitoring equipment submitted by DNOs. When utilised in conjunction with advanced modelling techniques and aggregated smart meter data, DNOs will have a more detailed understanding of network conditions.

In addition to the improvements being delivered in RIIO-ED2, our consultation on the future of local governance and institutions sets our proposals to ensure the roles and responsibilities for the delivery of key distribution system operation functions are fit for future to deliver the system we need. These include introducing a market facilitator for flexible resources to support unlocking greater value from flexibility and focusing the DNOs role on enhanced system operation to ensure efficient and flexible network management.[15]

***A fit for the future connections process*:** Alongside network investment, substantial reforms are needed throughout the connections process to address the underlying bottleneck in capacity awaiting connection today and in the near future.

To guide us in this crucial stage of reform, we have devised a clear overarching **objective**: *to see* ***electricity connection offers with shorter average connection dates which better meet customers' needs and enable a timely transition to net zero.*** Further to this, we have set out the **outcomes** we think we need to achieve, alongside **principles** to help guide our reform work, in Annex A to this letter.

More transparent and standardised information across the system should help customers more readily identify suitable connection locations, reducing pressure on application systems. We have been supporting the industry to develop a standard for network data provision and signalled our intent for it to be used widely across industry. We encourage

[14] Decision on accelerating onshore electricity transmission investment | Ofgem; Consultation on frameworks for future systems and network regulation: enabling an energy system for the future | Ofgem.
[15] Consultation: Future of local energy institutions and governance | Ofgem.

industry to move swiftly to implement and extend this consistency in providing transparent, accessible data for customers.[16]

Reforms to how the queue is modelled and managed, alongside better coordination across system boundaries, can help streamline and reduce offered connections times to ensure projects which are ready to proceed can progress more quickly.

We are actively considering options which could deprioritise projects which are not making progress to allow well-developed projects to proceed. The scale of the challenge today means we will consider all necessary reforms (applicable to both the existing queue and future applicants) in order to deliver the level of change required (ie to meet our overarching reform objective). When network capacity becomes available, we will explore how to ensure we can make best use of this capacity to advance connection dates (eg by allocating to projects that are ready to connect).

Further reforms may be needed to integrate connections processes with strategic investment approaches and to better reflect the realities of the changing system, as the scale of connections means offers become increasingly complex and interactive.

Overall, an improved connections process – underpinned by the right network infrastructure and management – will help to reduce grid congestion, enhance innovation and investment (current and future), lower consumer bills (through fewer balancing interventions by the ESO), as well as accelerate our progress to net zero.

3. How we are delivering this

There is an urgent need for rapid progress to address the scale of the queue and to start to bring forward connection dates for both generation and demand customers. We are supporting near-term industry initiatives to deliver improvements and benefits in the next 12 months. However, we must prepare to go further, considering wider reforms over the medium-term, and ultimately will likely need to reform the connections process to one which is more fundamentally suitable for a growing and more strategically planned future network.

***Short-term action (2023)*:**

We will continue to work with and challenge the network companies, ESO and industry stakeholders to drive forward targeted measures at pace to address key issues.

[16] We have signalled our intent for an industry-wide standard here: The Common Information Model (CIM) regulatory approach and the Long Term Development Statement | Ofgem. This should support improved, standardised information to support whole system visibility for generation connections.

These improvements are being progressed primarily by two industry bodies: the **Energy Networks Association** (ENA) and the **Electricity System Operator**. Their work programmes (covering both distribution and transmission) are taking forward initiatives that include better connections queue management and improved network modelling assumptions underpinning connection offers. More detail on these initiatives can be found in Annex B and in associated industry updates.[17]

We are pushing forward this work, providing regulatory guidance and direction, to ensure rapid and material progress. We expect that these targeted improvements will deliver tangible benefits to customers, removing projects which are not progressing from the queue, improving connection dates and enabling shovel-ready projects to connect ahead of those who may not be. Through the ESO's 5-point plan, it is expected that the majority of existing projects (representing 280GW capacity) will see improvements in connection dates of between 2-10 years, with new offers by March 2024 and reduced transmission reinforcement works in many cases. The ESO will produce a programme by the end of May, for the period up to March 2024, indicating when customers should expect to hear about the impacts of remodelling on their connection contracts. This benefit will also carry through to new applications and distribution connections that impact transmission, many of which will also see shorter connection timescales.

At distribution, initial proposals on queue management have the potential to remove over 1GW of older projects in the connections queue and bring forward connection dates for up to 6GW capacity, while other initiatives are expected to bring additional benefits. We confirm our explicit support for Distribution Queue Management at Annex D of this letter. We are monitoring the impact of these changes closely to determine the extent of further interventions needed.

***Medium-term improvements (now – 2025)*:**

While targeted near-term measures should deliver swift improvements, we expect industry initiatives, with support from Ofgem and government, to consider wider reform options across transmission and distribution. The ESO's Connections Reform Project and the ENA's Strategic Connections Group are working collaboratively to consider the case for change, and exploring options for more substantial reform of connections processes.

We are closely engaged in this important work and will assess the progress made and emerging direction to ensure any gaps are identified, rapid and substantial progress is

[17] Improving and accelerating customer connections – Energy Networks Association (ENA); Our 5-point plan to manage constraints on the system | ESO (nationalgrideso.com); Two-Step offer process | ESO (nationalgrideso.com) – letter to industry.

delivered and any further areas for reform can be identified. We will provide regulatory guidance and direction on strategic questions and the emerging direction of reform as needed, informed by our own work to identify the scale and type of reform required to deliver a more fit-for-purpose electricity connections framework.

Over this timeframe, we expect to see a revised connections process alongside wider coordinated improvements to the connections regime, and substantial shifts in the quality and transparency of data available to connecting parties. This, in tandem with the wider work underway to accelerate network investment, will collectively deliver tangible benefits for connecting customers in the shape of earlier connection dates, while ensuring the connections processes keep pace with developments on the system and are fit for the future to manage the changing nature and scale of applications.

***Longer-term outlook (2025 – 2030+)*:**

For the longer-term, we will need to ensure the connections regime and access arrangements develop in line with wider system changes.

Wide-ranging energy market and system planning reforms are under consideration on this timeframe: through REMA[18], the introduction of the Future System Operator (FSO)[19], network charging and access reforms, work on regional system planners (RSPs), and evolving strategic planning approaches. The Electricity Networks Commissioner's findings on how we can accelerate progress on network infrastructure are also anticipated to inform the future direction.

Our immediate focus is on the short and medium-term process reforms which are necessary to deliver material improvements to connection times. In taking this work forward, we will seek where possible to align with, or ensure arrangements are adaptable to, potential longer-term directions under consideration.

In due course, once the wider direction of travel is clearer, we will consider the most suitable enduring connections and access arrangements and any further changes which may be needed to ensure that the connections regime works effectively with wider system and market reforms. This could involve changes to charging signals and access allocation, including through mechanisms such as auctions. The connections regime could potentially become more closely integrated with system planning, and may involve changes to arrangements such as Connect and Manage.

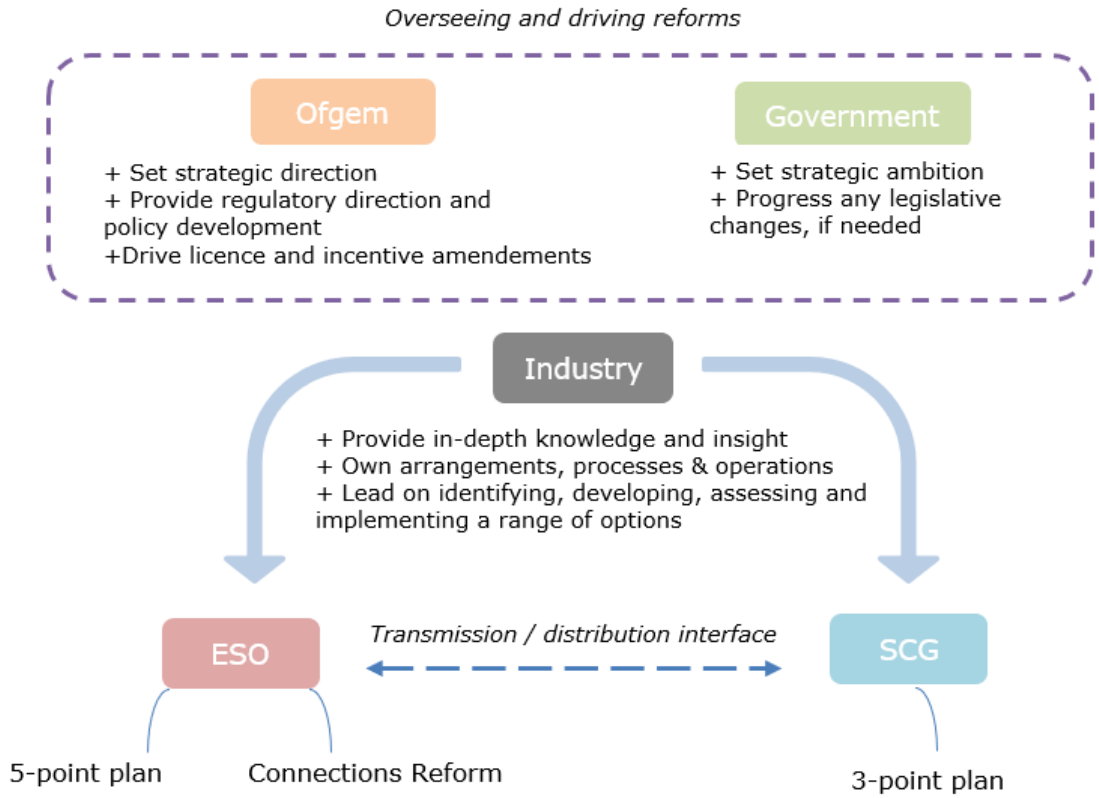
In Annex B, we outline an illustration of how stages of reform could progress.

[18] Review of electricity market arrangements - GOV.UK (www.gov.uk)
[19] Joint Statement on the Future System Operator - GOV.UK (www.gov.uk)

4. What you can expect from us

Ofgem, government and industry must all play their part to deliver the rapid and ambitious change we need to see. Industry initiatives – notably the ESO's 5-point plan, its Connections Reform programme and the ENA's Strategic Connections Group – are beginning to deliver important change in the near term and developing thinking on wider reform options. We will monitor the progress of these initiatives to ensure they are translating into benefits for consumers, in terms of the scale and management of the queue and, crucially, earlier connection dates. We will convene industry to drive further action as and when needed.

***Figure 1** – Our role within the review of electricity connections arrangements and future reforms*



We will take a **central role** in driving progress on the reform of connections arrangements, including through the industry initiatives. Working closely with government, we will provide the necessary leadership and ensure an industry-wide collective focus on the right issues and options, bearing in mind our objective, desired outcomes and the evolving longer-term direction. Close collaboration with key stakeholders (including the ESO, notably on its upcoming consultation on Connections Reform) will be essential to inform this direction. **Figure 1** illustrates the collaboration between Ofgem, government, the ESO, SCG and industry initiatives.

As signalled in the government's *Powering up Britain* report, a connections action plan is underway, due for publication later in the summer. We are working closely with government on connections arrangements – with broad alignment on our goals and aspirations for reform – and intend to deliver this plan together. This will provide clarity and direction on the key reforms to be considered and the way forward as we move towards implementation.

Solutions could cut across multiple processes and rules including those owned by industry. We will work with and drive all partners to enable delivery depending on the outcomes, building on the strong engagement with industry-led initiatives and convening stakeholder groups as necessary to fully explore key options. To accelerate momentum towards reform, we and government will shortly be jointly hosting a connections roundtable with network company leaders.

Our work

To inform the action plan, we will be reviewing incremental improvements to the current connections regime. In parallel, we will consider and assess the range of potential further solutions, building on industry thinking and providing guidance around the nature and stages of reform that may be required to move towards a more fit for the future electricity network connections framework which allows the new generation and demand projects needed for net zero to connect efficiently and cost-effectively.

Assessing emerging options and direction of travel

In view of the scale of the challenge, we will consider whether substantial changes to the current connections queue methodology are required and how changes are applied to both new applicants and those parties already in the queue with a connection agreement. We will consider whether access to the system needs further controlling, and the different ways that this could be done, looking across both generation and demand. We will also consider how to prioritise to make best use of the available capacity, including the potential roles for connectees in making those trade-offs, and ensure those that are ready to connect can do so more quickly.

We are not seeking to duplicate industry thinking to date, but to complement it. We will build on the options developed in the ESO's upcoming consultation, support and facilitate further industry action, and provide regulatory direction and support where needed.

In the longer-term, we will consider whether charging and access signals or other reforms are required to improve utilisation of the system and allocation of capacity. We are conscious that connections reform will occur in the context of potential wider longer-term

reforms and that those interactions must be considered. We set these out in more detail in Annex C.

Monitoring and driving progress

We will continue to work with the ESO and SCG, wider stakeholders and government to ensure the connections process is an enabler of decarbonisation and not an obstacle. We will support creating a clear and transparent picture of the current status of connections across the system, through improved data and close monitoring, as a basis to assess the impacts of reforms and allow progress to be tracked. Where we identify a risk of gaps in priority areas, or the need for action to support swift delivery of benefits, we will work with all parties to address this.

Providing regulatory direction and taking forward actions

We intend to focus on key strategic and regulatory questions, where we anticipate reforms may need clarity to proceed to their fullest extent, and areas where we need to take specific action. Notably, we expect to consider questions which may involve: changes to existing obligations or principles, those which involve trade-offs between individual customers and the wider system, and navigating the application of reforms to existing customers.

Informed by this picture, we will also actively consider any changes which may be required to obligations and incentives for DNOs, TOs, and the ESO to ensure standards and metrics support good connections service, including timely connection offers and appropriate connection times, underpinned by accessible, standardised data. This will include considering the extent to which Connections Standards of Performance [20] might need to be amended to support these wider reforms, and ongoing work to ensure DNOs' Long Term Development Statements are based on consistent data standards, in addition to further work to improve this for wider data sources across distribution and transmission.

[20] This refers to the Electricity (Connection Standards of Performance) Regulations 2010.

Annex A: Proposed objective, outcomes and principles for reform

Our objective for connections reform is to see **electricity connection offers with shorter average connection dates which better meet customers' needs and enable a timely transition to net zero**. This should be part of a transparent and auditable process, underpinned by standardised and accessible data. This objective is underpinned by our principal objective to protect the interests of current and future GB energy consumers (and our other statutory duties). It is also guided by our Consumer Interests framework and strategic priorities, by ensuring connections arrangements are fit for the future and support a timely and efficient transition to a secure and resilient net zero future system, in line with government decarbonisation and energy security objectives.[21]

We have identified a set of reform outcomes which we consider are key to delivering our aims for connections arrangements - we will continue to consider any potential for more specific supporting target outcomes or indicators of success and welcome stakeholder views:

- **Transparent, consistent data giving applicants advance, granular insight into expected grid capacity and level of network investment needed** – to equip parties across the system with information on when and where is optimal to connect, enabling streamlined, well-informed applications.
- **More robust connection applications, enabling well-progressed projects to proceed** – to ensure well-developed connection projects, including new technologies and business models, can deliver when ready and are not unduly delayed by projects which are not ready to proceed.
- **Reforms deliver improvements swiftly, enabling shorter average connection dates to be offered to customers** – at both transmission and distribution, to meet net zero pathways for a secure, resilient low carbon system, through improved connection processes and planning assumptions and approaches.
- **Greater coordination and consistency across system boundaries, supporting more consistent outcomes and efficient and coordinated approaches -** particularly across transmission and distribution, and to support the planning of network expansion and efficient use of network capacity on a whole systems basis.

We have also developed a set of overarching principles[22] to guide our review, alongside our wider statutory duties, as shown in **Table 1**. They will be integral in our assessment of the options already identified by industry, as well as the illustrative stages of reform.

[21] 2023/24 Forward Work Programme | Ofgem at pages 6-8.
[22] To be clear, these guiding principles have been informed by, and are consistent with, our statutory duties and do not take precedence over our statutory duties.

***Table 1**- Our overarching principles that will guide the review of electricity connections arrangements*

	Guiding Principle	Description
1	***Reforms deliver benefits to current and future consumers***	• Reforms to the connections framework reflect the needs of customers generally and align with Ofgem's consumer interest framework by[23]: ○ Delivering fair prices for consumers; ○ Supporting a low-cost transition to net zero; ○ Providing quality and standards so that all connections customers receive good service that meets their needs; and ○ Being attractive for long-term investment, supporting competition between generation projects (including for Contracts for Difference and Capacity Market contracts), and supporting reliable supply for consumers.
2	***Reforms accelerate progress towards net zero***	• Electricity connection arrangements facilitate timely progress toward a fully decarbonised power system by 2035, in line with government targets by enabling more access to low carbon technologies and increasing flexibility. • Reforms should also facilitate maintaining a secure, resilient net zero system, via timely connection of generation and storage capacity.
3	***Reforms begin to deliver as soon as possible, with impacts seen by 2025***	• Connections reforms make clear progress between now and 2025, delivering rapid, early improvements for connection customers. • Further reforms progress as needed to deliver considerable impact on development timelines to 2035 and 2050, in line with government net zero targets. • Reforms are not automatically ruled out if they cannot deliver by 2025. Improvements that will come later than this timeframe may also be considered, provided they do not compromise the necessary progress in the short to medium-term.
4	***Reforms support improved coordination across the onshore and offshore networks on the transmission and distribution grids***	• Reforms seek to support consistent outcomes across the Transmission and Distribution networks, both onshore and offshore, with aligned and well-integrated approaches to the application process for all connectees. • Electricity connections arrangements take a whole system approach by facilitating interactions with other markets, including natural gas, and future markets for hydrogen and Carbon Capture and Storage.
5	***Connections reforms are resilient to wider reforms***	• The connections framework should be future-proofed and work effectively with reformed market, system planning, charging and institutional arrangements. • Connections reforms should consider alignment with relevant wider reform programmes (eg REMA, FSO, local energy institutions and governance, and future systems and network regulation), their overarching policy objectives and strategic priorities, to the extent necessary without unduly delaying implementation. • For clarity, this does not mean waiting on the outcomes of these reforms, but balancing benefits with any risks of misalignment and considering adaptability of new arrangements.

[23] Ofgem's Forward Work Programme - Consumer interest framework (Page 8).

Annex B: Illustrative reform stages and options for consideration

Near term improvements

As noted above, we welcome the work already being led by industry to improve the connections process in the near term under the ESO's 5-point plan[24] and the SCG's 3 step plan[25], summarised in the table below. **Table 2** sets out the initiatives, structured into three themes – queue management, storage and coordination:

Table 2 *- Summary of the ESO's 5-point plan and the SCG's 3 step plan, structured by themes*

Theme	ESO 5-point plan	ENA Strategic Connections Group 3 step plan
Queue Management	**TEC Amnesty**: allowing projects to exit the transmission entry capacity queue without penalty.	**Queue management**: promoting mature projects closer to delivery above those that could be 'blocking' the queue.
	Queue management: developing new contractual terms to manage the queue more efficiently, whereby projects which do not meet milestones are removed.	
	Improved background modelling assumptions: improve background Construction Planning Assumptions (CPAs), updated with current connection rates, and reducing the assumption that all projects in the queue will connect.	
Storage	**Modelling of storage**: altering how it is treated on the network, allowing it to connect faster and increase network capacity for other projects.	**Storage:** Greater flexibility for storage customers through new contractual options, in order to alter how it is treated on the network to facilitate faster connections and increase capacity for other projects.
	Interim offer for BESS: to offer an interim, non-firm connection option for Battery Energy Storage System to connect sooner, albeit with the potential of being switched off when the system is under stress, without initially being paid to do so.	
Coordination	*Links to developing thinking under the ESO's Connections Reform Project*.	**Coordination with transmission**: changing how transmission and distribution networks coordinate and improve management of interactions.

[24] Connections challenges: what are we doing now? | ESO (nationalgrideso.com).
[25] Energy networks launch action plan to accelerate grid connections – Energy Networks Association (ENA)

It is crucial that rapid progress is made to improve offered connection dates, ensuring confidence for customers. The application of revised Construction Planning Assumptions to the modelling of system impacts on both new and existing connections will reduce the expected works required on the transmission system, thereby significantly improving connection dates for customers in the short-term.

Over 280GW of existing connection agreements will be re-modelled using these revised assumptions over the coming months. Through these changes and other elements of the 5-point plan, the ESO predicts that the majority of existing connection agreements will see improvements in connection dates of between 2-10 years, with reduced transmission reinforcement works in many cases. Improved dates for existing customers are expected be communicated by March 2024 and offers for new applicants will also reflect this improved background.

The impacts on specific customer connection dates will vary depending on local constraints and the characteristics of other connections, but as an example: we would expect to see the most significant improvement in connection dates for smaller solar, wind and storage connections, currently impacted by significant reinforcement works on the transmission system. The greatest benefits are likely to be felt by customers with the longest wait times. Up to 95GW of energy storage projects will see further reductions in connection dates, as a result of the changes in the way that this technology is modelled and other initiatives under the ESO's 5-point plan, enabling them to come forward more quickly.

In addition, up to 8.2GW of generation projects holding transmission connection agreements are in the process of being removed from the connections queue following the TEC amnesty, which closed on 30th April 2023. Queue management improvements at both transmission and distribution will further accelerate the removal of projects that are not meeting progression milestones in their connection agreements and ensure that projects that are ready to connect can be moved forward in the queue. For distribution, this approach could impact up to 7.2GW capacity. At transmission, queue management could also have a material impact, depending on the implementation approach. Code modification proposal CMP376, relating to queue management, will be issued to Ofgem for decision in June.[26]

Illustrative stages of reform

While we expect significant improvements to be delivered in the near term, we share stakeholders' concerns that these targeted initiatives will not go far enough and further

[26] CMP376: Inclusion of Queue Management process within the CUSC | ESO (nationalgrideso.com).

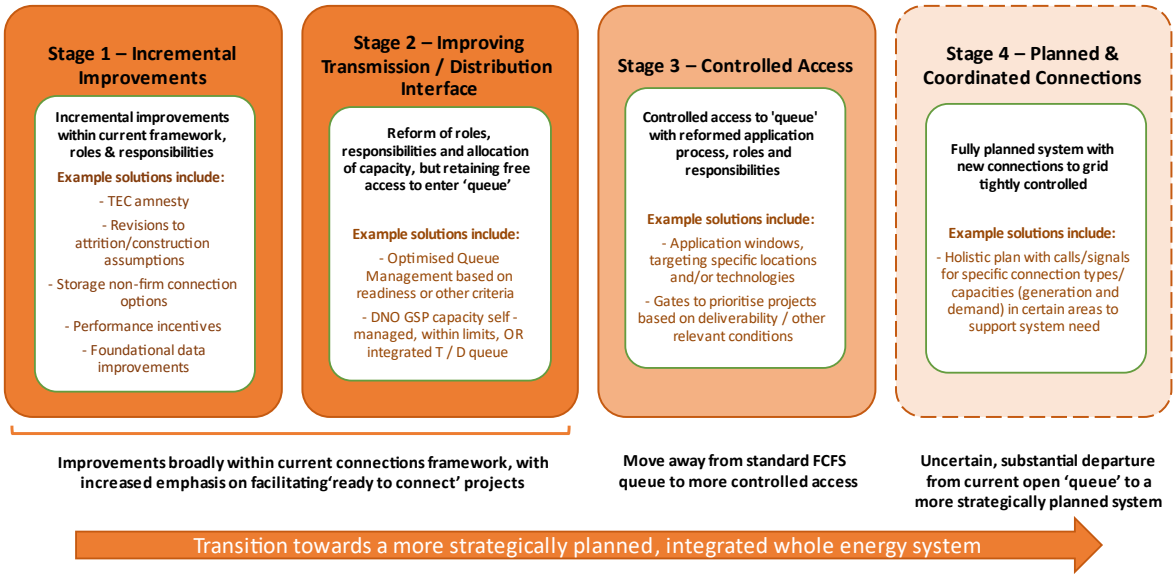
reform is needed. We are therefore considering a range of wider reforms to the way in which grid capacity might need to be allocated in the future, building on the work underway across industry (notably through the ESO's Connections Reform project) and developing thinking under the ENA's Strategic Connections Group.

We are encouraged by and supportive of the ESO's upcoming consultation on options for further reform, expected to be published in June. We expect this to help enable long-lasting change at pace and identify what reforms should look like, as well as proposing approaches to their implementation. We will continue to provide strategic and regulatory leadership in this process to ensure reform projects complement one another and drive sufficient progress.

There are a range of potential solutions, likely to be progressed through a series of incremental stages that move the industry progressively towards a more fit for the future connections framework. This will be better suited to managing the volume and complexity of connections being seen today, and overall aligned better with the more holistic and strategic approaches to whole system planning we are moving to adopt. Illustrative stages of the reform are shown in **Figure 2**. We also describe these stages in further detail below. We expect to review and adapt them as needed in response to feedback, both direct and in response to the ESO's upcoming consultation, and as our thinking evolves.

The extent to which we move towards stages 3 and (if at all) 4 will depend on the effectiveness of the earlier stages in meeting the outcomes. We are prepared to drive reforms as far as is necessary to achieve our objective and desired outcomes.

***Figure 2** – Illustrative stages of reform as the system transitions towards a more strategically planned, integrated whole energy system*



Stage 1: Incremental improvements are underway within the current framework. Led by industry – including the ESO's 5-point project and the ENA's 3-point plan – these will bring forward improvements to various aspects of application and queue management processes, as well as network impact modelling assumptions. This should build on foundational improvements to pre-application data and processes across the system (such as network heat maps) which could become more standardised, transparent and dynamic. A more proactive approach to queue management – with an ability to remove projects which are not progressing from the queue and an emphasis on enabling projects which are ready to progress, while minimising impact on other parties – is an important feature. Industry may also explore ways to enable connectees to help offer or shape solutions, for example through flexible connections or connections which otherwise reduce the overall grid impact in an area. While the precise approach to queue management might change in later steps, much of this foundation is likely to endure.

Stage 2: Improving transmission/distribution interface builds on Stage 1 by improving coordination across the interface between the transmission and distribution networks, with the potential for adaptation of certain roles and responsibilities in managing connections with impacts across the boundary. This is becoming increasingly important with constraints at Grid Supply Points (GSPs), meaning that a greater number of distribution connections have impacts on transmission. Solutions are being considered that would simplify and streamline these interactions, create greater consistency, reduce friction and improve connection timescales across system boundaries. Additionally, reforms in this stage could see queue management evolve more substantially, whilst remaining broadly within the current framework. This would see them going further to make fullest use of available capacity, eg based on customers' readiness to connect.

Stage 3: Controlled access considers a more fundamental move away from the current queue-based application process, introducing the concept of controlled access – either through application windows or with the introduction of stricter qualification gates. Applications within these windows could be managed under different approaches, from FCFS to other approaches to prioritisation (including scope for customers to play a greater role) with potential trading or auction-like mechanisms. This would require more fundamental changes to roles and responsibilities of the parties involved and to existing processes. This stage and the next (Stage 4) also rely to a significant extent on the ability to visualise and analyse the contracted background (including demand)[27] as a set of interactive projects with

[27] Defined as all contracted projects both connected and future.

specific locational characteristics, rather than a linear queue. This may better reflect the realities of planning processes and interdependencies.

- **Stage 4: Planned & coordinated connections** builds on the concept of controlled access by considering a longer-term future network that is substantially planned and co-ordinated, with specific connection types or capacities incentivised or procured in certain areas to support system needs. This longer-term approach is highly uncertain and would strongly depend on wider and as yet uncertain reforms to the energy market and future system planning. These links would need to be carefully considered, including the suitability of such approaches for different connection types and sizes.

We recognise that these stages represent a spectrum of possible changes and that there may be models which fall between them or even combine them. We welcome comments from stakeholders on whether these stages resonate, whether and how they see these 'steps' progressing, and what would steer us towards certain packages of reforms. We are also interested in feedback on the extent to which different arrangements may be more appropriate for different parts of the system or on different timeframes.

Annex C: Key dependencies and longer-term outlook

Future connection arrangements will need to be compatible with the outcomes of wider reform programmes, including REMA, the Access SCR, the introduction of the FSO and approaches to strategic planning. We will consider these reform programmes when shaping views on near-term reforms to connections, while also ensuring the development of enduring and fit-for-purpose arrangements in the long-term.

The current focus for REMA is how locational signals can best be improved to deliver effective signals in operational and investment timescales to drive down the costs of energy for consumers in the long run. Once there is greater certainty on longer-term planning arrangements and market direction, the exact model for connections and access can be developed. This may include signals to customers on where to connect.

A number of initiatives, such as the introduction of a Centralised Strategic Network Plan (CSNP) under the FSO and potential Regional System Planners (RSPs), are underway to embed strategic planning processes within the framework of future system and network regulation. These will enable the connection of significant quantities of generation and demand. Future connection approaches are likely to evolve to integrate with a strategic system planning approach. Connecting customers will likely need to engage with system-wide and any more localised network plans, to optimise their location and the type of connection. Further policy development will confirm the full range of FSO capabilities and the regional system planners RSPs design features.

The recently implemented Access SCR will shape the potential use of non-firm connections products and reduce costs of connection for many connecting customers at distribution where their connections require reinforcement. It will also better support the DNOs in taking a more strategic approach to planning and investing for connections in future.[28]

Additionally, government is taking forward work on important enablers in relation to planning and land rights. The enablers aim to ensure that electricity infrastructure can be built without undue delay through planning process improvements. The next steps include guidance on the benefits that communities receive from hosting transmission network infrastructure and the development of alternative dispute resolution processes should landowners disagree with the compensation offered by network operator when land or rights to access land are acquired. The government also plans on publishing a response to

[28] Access SCR - Final Decision (ofgem.gov.uk)

stakeholder views on whether the land rights and consents process enable the transformative change required.[29]

We will continue to monitor and engage with these programmes to ensure that the options for enduring connections arrangements align with the broader principles of wider market reform, considering government priorities. This may include considering aspects beyond the scope of thinking in the nearer term (focused on connections processes) such as more fundamental changes to signals and access allocation arrangements.

[29] HM Government, Powering up Britain – Energy Security Plan, March 2023, p.48.

Annex D: Support for Distribution Queue Optimisation

Queue optimisation refers to the prioritisation of projects that are progressing as planned, have met their progression milestones and are ready to connect to the distribution network – ahead of projects that are delayed and have not met their milestones.

Whilst most distribution connection agreements signed after 2017 contain milestones, this is not the case for older connection agreements. Furthermore, these older connection agreements generally relate to projects that are delayed. Without milestones, these older, delayed projects, occupy a place in the DNOs' connection queues and prevent other projects – that also have connection agreements – from being able to connect to the distribution network.

Ofgem, therefore, supports the principle of DNOs introducing progression milestones into older connection agreements to facilitate the more active management of distribution connection queues. Any such changes to connection agreements should be agreed through bilateral discussions between the contracting parties, under the terms of these existing connection agreements.

Ofgem also supports the principle of DNOs optimising the capacity headroom in distribution connection queues by actively accelerating projects that are ready to connect, ahead of projects that have failed to achieve their progression milestones and/or that are unable to connect currently due to the amount of capacity available.[30] It is important that there is a consistent approach to determining which projects are ready to connect, and DNOs should work closely with each other, the TOs and ESO to agree relevant definitions.

Any such advancement should occur only where the distribution network can connect a project that is being advanced without undue delay to other connecting parties and where the project can be connected without the need for reinforcement works – at either distribution or transmission level. Any advancement of projects under this queue optimisation process shall be in accordance with the terms of existing connection agreements and should not be to the detriment of any party that has met the terms of their connection agreement, including achieving their progression milestones.

[30] The action by the DNOs to connect smaller capacity connections would not be to the detriment of the larger customer, who would retain their connection date subject to meeting their milestones. This means that the headroom is not sterilised by the larger connection in the meantime.

Appendix E Q1.2.6 ESO Press Release on Connections Reform

ESO leads the way with major initiative to accelerate connections to the electricity transmission grid

Future energy / 27 Feb 2023 - 4 minute read

- **New two-stage offer process will increase certainty for developers**
- **Updated modelling assumptions to reflect current connection rates as only 30-40% of projects in the queue go on to deliver and plug in**
- **Developing an interim option for battery and storage projects to connect to the grid sooner**
- **Five-point plan of action in the short term combined with longer term reforms will free up space in the queue and speed up connections**

The Electricity System Operator (ESO) is initiating a five-point plan to update the existing connections process for the electricity transmission grid to complement its programme of longer-term reform.

THE SITUATION: The existing connections process was designed 20 years ago for a time when connections applications were made by a small number of large fossil fuel generators. Great Britain's rapid and positive progress on decarbonisation particularly over recent months and years has led to an unprecedented number of applications to connect to the electricity transmission system. Connections applications come from a diverse range of generation and storage projects at varying sizes and scales across Great Britain.

The ESO Future Energy Scenarios modelling shows that Great Britain needs between 123-147 GW of low carbon transmission generation by 2030 to be on a net zero compliant pathway, and there is already 83 GW connected. As of February 2023, Great Britain had 257 GW of generation with contracts for future connection to the transmission system. That's three times as much than is needed.

ESO analysis shows that only 30-40% of projects in the queue make it to fruition, but the queue operates on a first-come-first-served basis. This can result in projects further up the queue holding back those that are more readily able to supply Great Britain with the energy it needs, even if those further up the queue are not ready to plug in.

THE SOLUTIONS FOR THE SHORT TERM: The ESO already recognises that the existing process needs to change and be widely reformed to give investors and developers better certainty, to ensure we can deliver our decarbonisation targets at scale and to develop the evolved network we need for the future at the least cost to the consumer.

ESO's five-point plan to speed up the current connections queue is as follows:

1. Operating a Transmission Entry Capacity Amnesty until April 2023, allowing developers to terminate their connection contracts without incurring liabilities, freeing up capacity in the queue.
2. Updating our modelling assumptions to reflect current connection rates and reducing the assumption that most projects in the queue will connect.
3. Changing the treatment of storage, including batteries on the network to allow them to connect faster and free up capacity for other projects.
4. We are developing new contractual terms for connection contracts to manage the queue more efficiently so that those projects that are progressing can connect and those that are not can leave the queue.
5. And finally, we will soon offer an interim option for storage projects to connect to the network sooner, but with the caveat that they may be required to turn off more frequently when the system is under stress without initially being paid to do so.

To begin initiating this plan, from the 1st March for applications received in England and Wales we will be implementing a new two-step process, this will reduce uncertainty for developers in the longer term as we apply our new modelling and storage assumptions. In Scotland, these changes will be applied without the need to implement a new two-step process.

WIDER REFORMS ARE NECESSARY: Further to these short-term actions, the ESO has already begun a programme of longer-term reform as part of its Connections Reform Project. The ESO recognises the challenges its connections customers are experiencing and is working with them and our other key stakeholders to address the challenges with existing connections process. The Phase 1 report published in December 2022 sets out the Case for Change and the ESO is now in the Design Phase to identify the longer-term reform solutions which will be set out in the coming months before implementation later this year.

The ESO has worked collaboratively with Great Britain's Transmission Owners (TOs) to develop these crucial short-term actions and the wider reform work. The TOs are: National Grid Electricity Transmission (NGET), Scottish Power Transmission and Scottish Hydro Electric Transmission.

Julian Leslie, ESO Head of Networks and Chief Engineer said:

We're evolving our network to make it fit for the future, to deliver net zero and keep clean power flowing to the growing number of homes and business across Great Britain, fuelling our economy.

We recognise the frustration some of our connections customers are experiencing and through this package of short-term initiatives and longer-term reforms we are determined to address the challenges with the current process which was not designed to operate the sheer scale of applications we are receiving today.

Similar reading

The future of the ESO and Artificial Intelligence

26 May 2023 - 2 minute read

In celebration of the release of our refreshed ESO Innovation Strategy, we're highlighting one of our Innovation funded projects, the Energy AI (Artificial Intelligence) Centre of Excellence.

Future energy

Our commitment to delivering zero carbon operations by 2025 on Earth Day

21 Apr 2023 - 5 minute read

Our mission is to drive the transformation to a zero carbon electricity system by 2035 which is reliable, affordable, and fair for all. Through the work we do, we are now getting close to our ambition of delivering periods of 100% zero carbon operations by 2025, leading to a zero carbon electricity system by 2035.

Future energy

First phase of stability pathfinders delivered

5 Apr 2023 - 4 minute read

As part of the ESO's legal separation from the National Grid Group in 2019 the ESO announced a new ambition, to be able by 2025 to operate for the first time, a 100% zero carbon national electricity transmission network.

Future energy

Appendix F Q1.3.1 Essendine - Early Site Environmental Red Flag Review

Essendine

Environmental Review

June 2021

View looking south across Field W1

Contents

Version:	2
Version date:	22 June 2021
Comment	Final

This document has been prepared and checked in accordance with ISO 9001:2015

1.0 Introduction

Figure 1.1: Site Location (Aerial)

1.0 Introduction

This report has been jointly prepared by LDA Design, Pinsent Masons, Humbeat, DWD and Counter Context.

1.1 Brief

1.1.1 Windel are proposing to apply for a Development Consent Order (DCO) for a Nationally Significant Infrastructure Project (NSIP) for a solar farm development near Essendine. Windel have secured, or are in the process of securing, Heads of Terms with landowners. This report provides the consultant team's review of the suitability of the land being considered for solar development.

1.1.2 The purpose of the review is to identify any 'show-stoppers' that are likely to constrain solar array development from an environmental perspective.

1.1.3 The report has been based on a high-level desk-based appraisal of constraints and a site visit from publicly accessible locations

1.1.4 The landholdings under review are indicated on the plan opposite (Figures 1.2 and 1.3).

1.1.5 We are aware that some of the Parkinson land is excluded for arrays due to existing commercial use, and that part of the Mair land is to be excluded/retained for agricultural use (including land to the north and east of the Braceborough Grange).

1.1.6 The appraisal consists of a topic based RAG (Red, Amber, Green) review of environmental factors relating to the suitability of the site for solar arrays, which are presented by land holding and are based on the individual topic based appraisals, using professional judgement.

1.1.7 The assessment is based on the suitability of fields to accommodate solar arrays. It is noted that the preferred solar technology for the project is still to be determined, as such no assumption is made with regard to use of fixed south facing or east / west facing or single axis tracking arrays. The report does not consider placement of supporting infrastructure such as inverters or substations, which will be considered and resolved during design development.

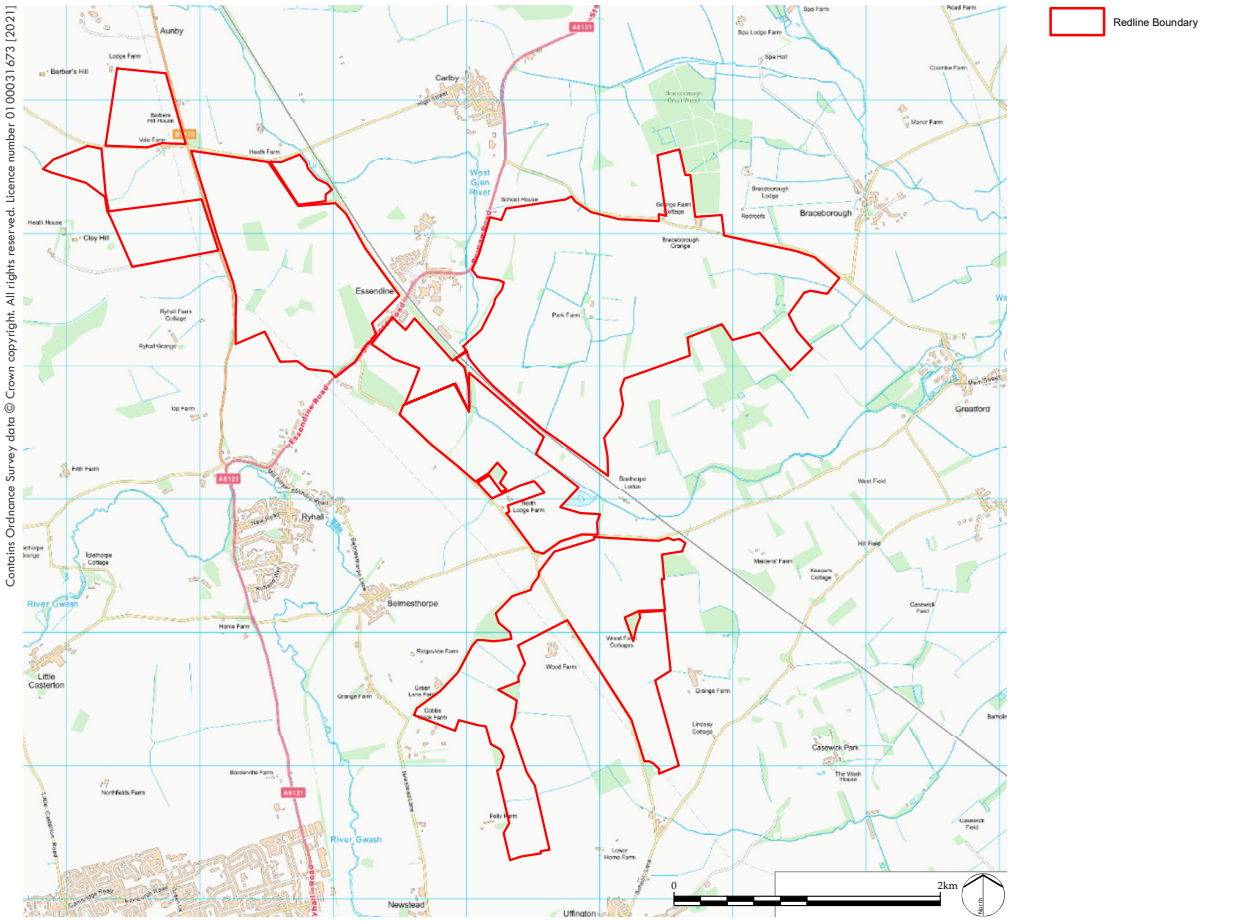


Figure 1.2: Site Location

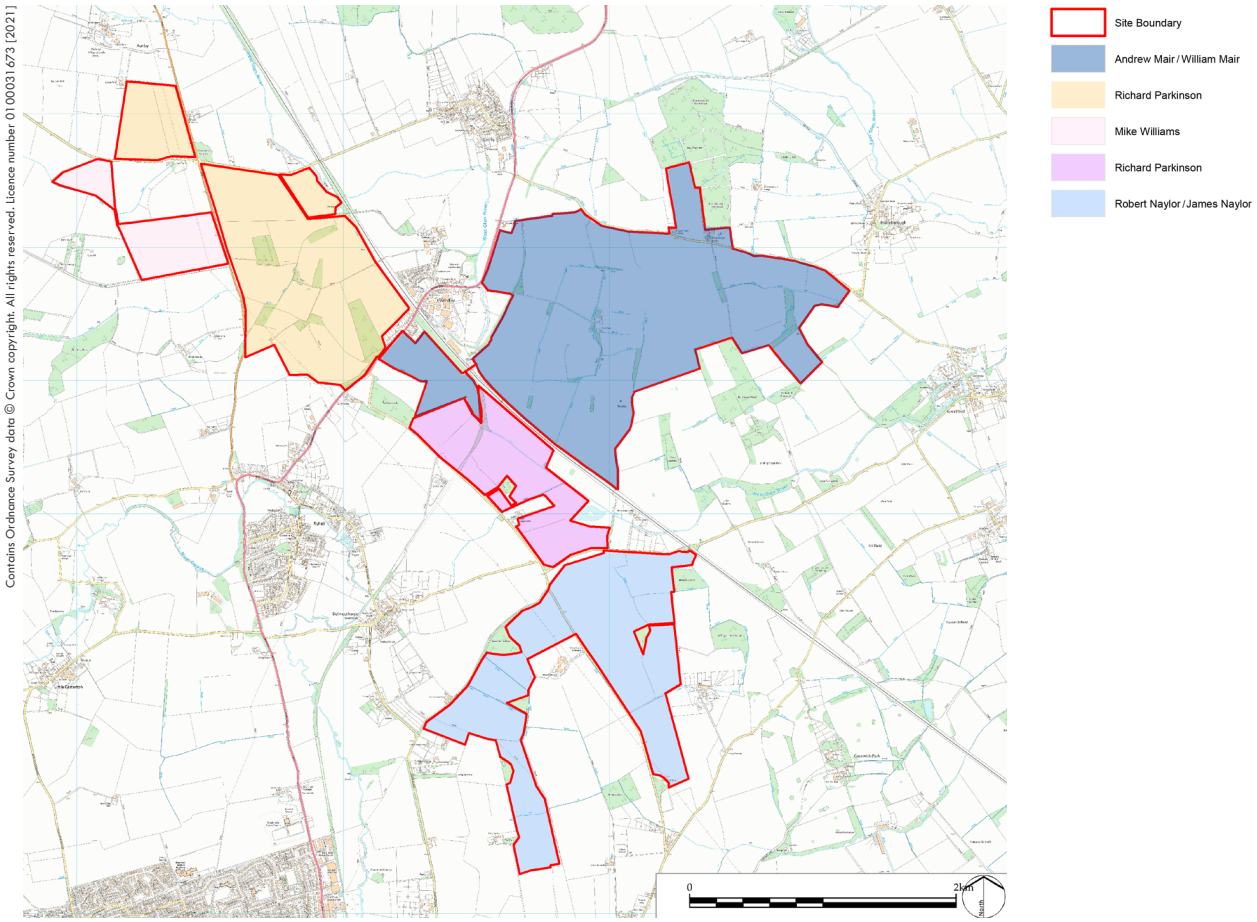


Figure 1.3: Land Ownership

2.0
Environmental Review

53

View looking east towards Essendine

2.0 Environmental Review

RAG Methodology

2.1 RAG Methodology

2.1.1 The environmental team have undertaken a review of the site and provided an initial review as to whether there are any environmental constraints / risks that are likely to be considered 'show-stoppers'.

2.1.2 The focus of the assessment is on the risk of accommodating solar arrays at this stage. The appraisal hasn't reviewed suitability for locating associated infrastructure (inverters / substations / energy storage internal access tracks etc.) as this will form part of the next stage in the design process albeit the environmental team have provided high level commentary on some of these aspects. The report does not identify additional land that may be required for supportive green infrastructure or mitigation, as the strategy, location and quantum of land required will be informed by the capacity strategy and the land parcels to be taken forward for development.

2.1.3 The following environmental topics have been considered as part of this review process.

* Ecology
* Highways and Access
* Ground Conditions
* Flood Risk
* Landscape
* Heritage
* Best and Most Versatile Land Potential

2.1.4 The review process has been informed by a desk-top review of baseline information. Site visits have been undertaken by the legal, planning, masterplanning and engagement teams as well as the Ecology, LVIA, Heritage and Transport teams to inform their review and judgements. Further baseline survey work will need to be undertaken in due course in order to refine the layout of the solar array within individual fields, location of internal infrastructure and the green infrastructure strategy. The further baseline surveys will also be required to inform a robust assessment of the project for the purposes of EIA Scoping, Preliminary Environmental Information Report and Environmental Statement. We have not undertaken an ALC survey at this stage and advice is provided on the potential for Best and Most Versatile Land based on available desktop mapping.

2.1.5 The environment team have provided a Red, Amber or Green rating for each of the fields based on the criteria set out below.

2.1.6 Green – No known constraint or standard design offsets / mitigation measures to inform extent of arrays and/or detailed design

2.1.7 Green/Amber hatch – Potential constraint, further site investigation /modelling required to inform extent of arrays and/or detailed design

2.1.8 Amber – Potential constraint - Further modelling / site investigation / design / mitigation work required to inform design.

2.1.9 Red – Known constraint – Difficult to resolve through design / mitigation / likely significant impacts on environment.

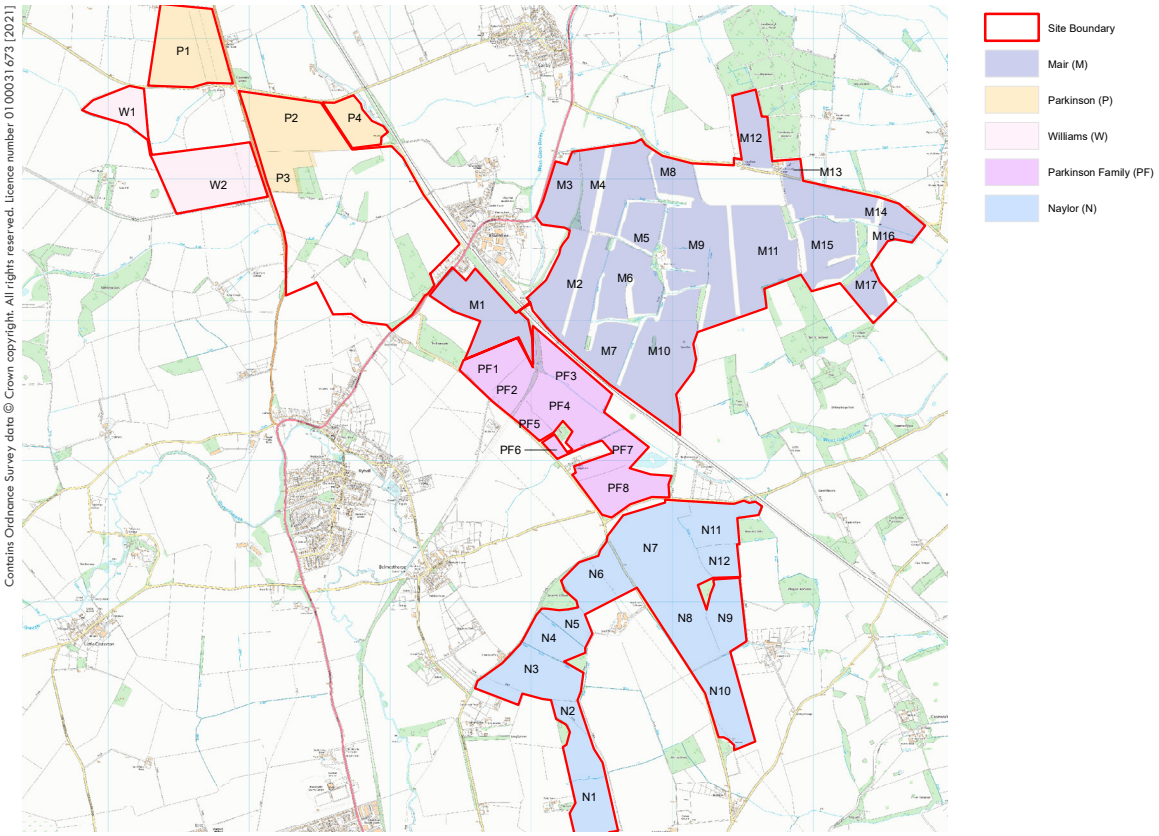


Figure 2.1: Field Numbers

2.2 Summary of Ecological Surveys

2.2.1 The following ecology surveys have been undertaken for the land being considered within the Redflag Review.

* A desk study and data review;
* Extended Phase 1 habitat survey;
* Breeding Bird Survey;
* Water vole and otter survey;
* Great Crested Newt Survey of the onsite ponds.

2.2.2 While the site does contain suitable habitat for bats, reptiles and dormouse, it is anticipated that surveys for these species will not be required on the basis that the existing hedgerows and ditches would be retained, albeit small breaks for internal access routes and/or cable routes are acceptable. If substantial areas of these habitats are to be lost as a result of the project then surveys will need to be undertaken in due course.

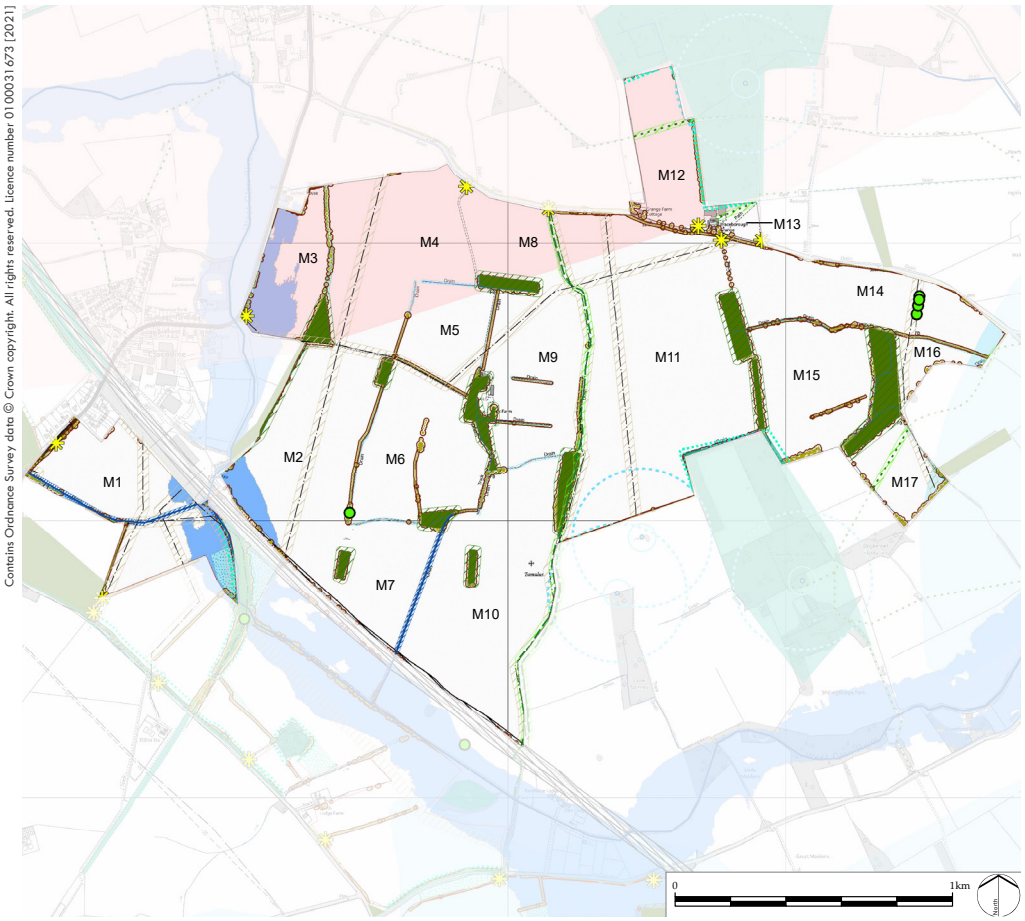
2.2.3 In addition to the hedgerows and ditches, the Phase 1 habitat survey has identified more specific areas suitable for reptiles. If the areas are to be lost, reptile surveys would be required which would need to be undertaken in September.

2.2.4 There are a number of trees with bat roosting potential across the site which should be retained within the site layout.

2.2.5 Potential badger setts have been identified which ideally will be retained within a 30m buffer. If setts are to be removed an ecological license will be required to close the setts. Please note that this report contains sensitive information about the location of badger setts which should not be shared outside of the project team. (Note this information has been removed).

2.2.6 Great crested newts have not been recorded within the onsite ponds. Nine ponds within 250m of the site boundary have been identified. These have not been surveyed at this time due to the sensitivity around site access as advised by Windel. If access can be arranged the ponds will need to be surveyed in Spring 2022. The final layout and consultation with stakeholders will determine the need and approach for these surveys.

2.2.7 The Glen River and ditches within the site offer suitable habitat for water voles with some onsite ditches offering limited potential. No otter holts have been identified within the riparian vegetation on site or immediately offsite.



Site Boundary

Existing Features

- Existing Field Access
- Trees Suitable for Bat Roosts
- Potential GCN Ponds (offsite)
- Main River
- Ditches and Streams

Public Rights of Way

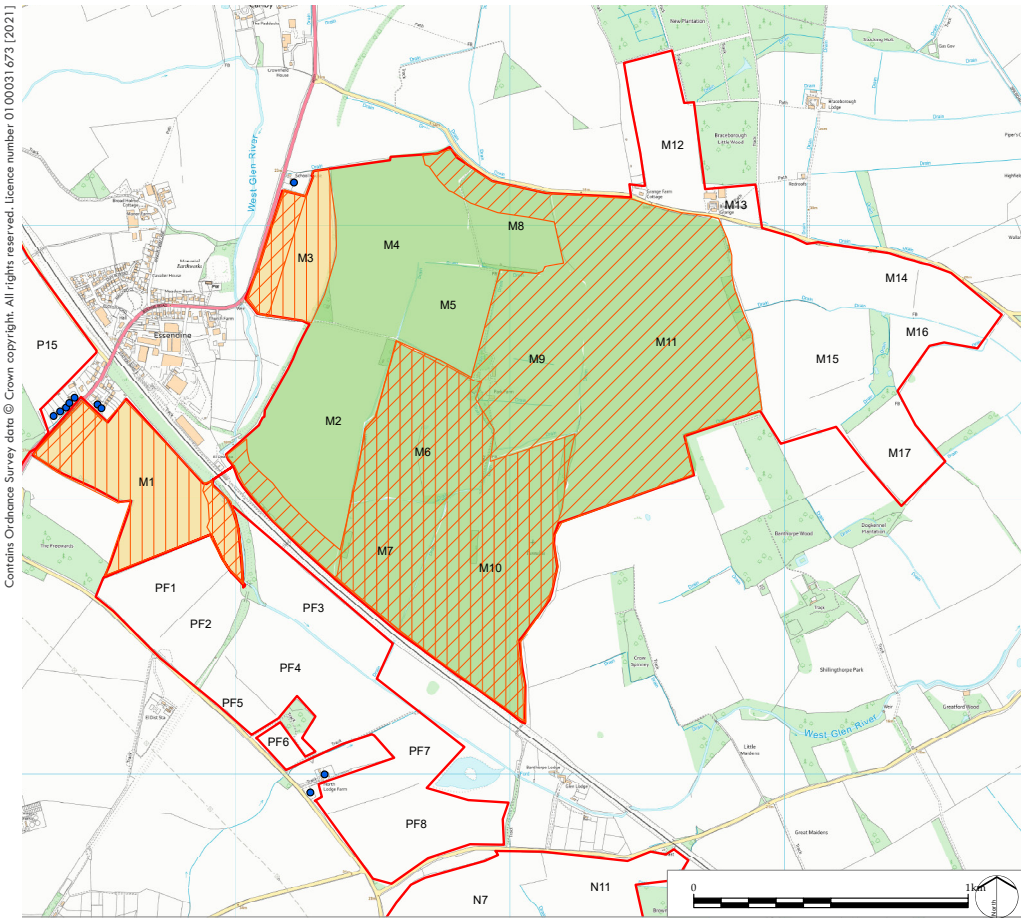
- Footpath
- Bridleway
- Utilities
- Local Wildlife Sites (LWS)
- Woodland
- Hedgrow and Trees
- Reptile Habitat
- Source Protection Zone 3
- Combined JFLOW and EA Flood Data
- ALC Grade 2

Proposed Buffers

- Potential GCN Ponds Buffer (50m)
- Potential GCN Ponds Buffer (250m)
- Public Rights of Way Buffer (10m)
- Utilities Buffer (20m)
- LWS Buffer(15m)
- Woodland Buffer (15m)
- Hedgerows and Trees Buffer (15m)
- Main Rivers Buffer (10m)
- Ditches and Streams Buffer (5m)
- Rail Embankment Buffer (10m)

Note: River corridor habitat, where present, will be protected with a 10m buffer from the top of the river bank.

Figure 2.2: Mitigation Buffers: Mair



Site Boundary

Fields Scoring Green

Indicative areas where further baseline analysis and/or technical modelling is required to determine the extent of panels and/or details design as a result of the following:

- Glint and Glare: Indicative offset of 100m from road and railway line. Further modelling is required to inform the need for mitigation planting and/or the extents of the solar arrays.

- Hydrology: Further modelling is required to establish flood depths and feasibility of raising the solar panels.

Areas of higher potential for buried archaeology. Further field work required to inform detailed design and/or layout of solar arrays. Note it is recommended that all fieds are subject to a geophysical survey.

Fields Scoring Amber

Fields Scoring Red

Noise sensitive receptors that require noise modelling to inform suitable offsets to onsite plant

Note: Fields requiring further investigation of made ground are shownin green. Further work is required to establish extents of made ground and suitability for solar pabels and/or associated infrastructure.

Fields shown in amber indicate fields wihich comprise Grade 2 (BMV) agricultural land.

Mair Family	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
Overall RAG Score											
Air Quality											
ALC											
Glint and Glare											
Ground Conditions											
Heritage											
Hydrology											
Landscape											
Noise											
Transport (site access)											

Figure 2.3: Red Flag Review: Mair

2.3 Mair Land

2.3.1 We are aware that the landowner has excluded fields M12 to M17 from solar arrays so that these can continued to be farmed.

2.3.2 M1 is constrained by a number of factors. The only meaningful area for solar development within M1 is located in the north adjacent to residential properties and road, both of which would require appropriate offsets and buffer planting, further reducing the areas available for solar development.

2.3.3 Fields M1 and M3 are considered to be the most sensitive because of the perceived impacts associated with landscape (proximity to the village) and heritage (proximity to the scheduled monument and listed building).

2.3.4 Fields M12, M16 and M17 have been identified as being the most sensitive to overshadowing. Appropriate offsets will be determined through detailed modelling.

2.3.5 The majority of the land holding has been identified as having potential for archaeological features which will need to be investigated through field survey. This will inform the detailed design and layout, although taking the field out of a regime of ploughing could protect any buried archaeological remains.

2.3.6 While it is likely that the assessment will identify that no harm is likely to come to the heritage significance of the potential barrow and associated buried remains in Field M10, it could be a constraint and further field work will be required.

2.3.7 Local Wildlife Sites and areas of Ancient Woodland are located along the boundaries of the land holding. A sensitive design response could provide further protection and enhancement to these designations.

2.3.8 The appropriate buffers have been applied to the ecological features within the land holding and have assumed that the existing ditches, hedgerows, trees and woodland will be retained so to avoid impacts on species such as dormouse, bats and reptiles. Occasional breaks for cable routes and internal access tracks can be accommodated. We have not undertaken a dormouse or bat survey as it is considered disproportionate. The approach to ecological surveys will be confirmed through the EIA Scoping Request.

2.3.9 No onsite ponds have recorded the presence of Great Crested Newts and there is one offsite pond within 250m of Field M11. All core habitat (within 50 m of the pond) will not be impacted and the majority of the suitable habitat on site is unimpacted (e.g. hedgerows, woodlands and rough grassland margins) and that the very low suitability habitat (arable fields) will potentially be enhanced in the long term for this species, the favourable conservation status of GCN would therefore be improved. Work is ongoing to survey the offsite ponds.

2.3.10 Glint and Glare has been identified as potential risk along the road corridors and the signals along the railway, especially as it is elevated on an embankment. Early modelling work will need to be undertaken to inform the layout and/or requirement for suitable landscape screening.

2.3.11 Boreholes data within the vicinity suggest that there is a shallow rockhead. No mining has been recorded within the area.

2.3.12 Made ground has been identified within Fields M1, M2, M7, M9 and M10.

2.3.13 Early engagement with the EA is recommended to discuss the placement of construction compounds and inverters as a large area of the site has been identified as being within a ground water protection zone.

2.3.14 Modelling will need to be undertaken to establish the depths of surface water flooding within Fields M6, M7, M9, M10, M11, M14, M15 and M16 as well as river flooding in Field M1 (indicative depth 0.9m). Subject to the depth of the water and design, the solar arrays will need to be raised above the flood level.

2.3.15 A number of sensitive receptors (blue dots) are located within close proximity, noise modelling will be required to inform the location of onsite infrastructure and/or setting design criteria for onsite plant in order to meet the required noise limits.

2.3.16 All the fields appear to have good access and visibility from the highway, with the exception of M12, which may require the relocation of the telegraph pole to make it suitable for HGV traffic – although it is noted that it is used by farm machinery currently.

2.3.17 The majority of the land holding is identified as Grade 3 agricultural land, with a small area of Grade 2 in the eastern extents. The predictive Best and Most Versatile (BMV) Maps show the majority of the land holding as having low likelihood of BMV (<=20% area bmv) and the eastern extents as High likelihood of BMV(>60% area BMV).

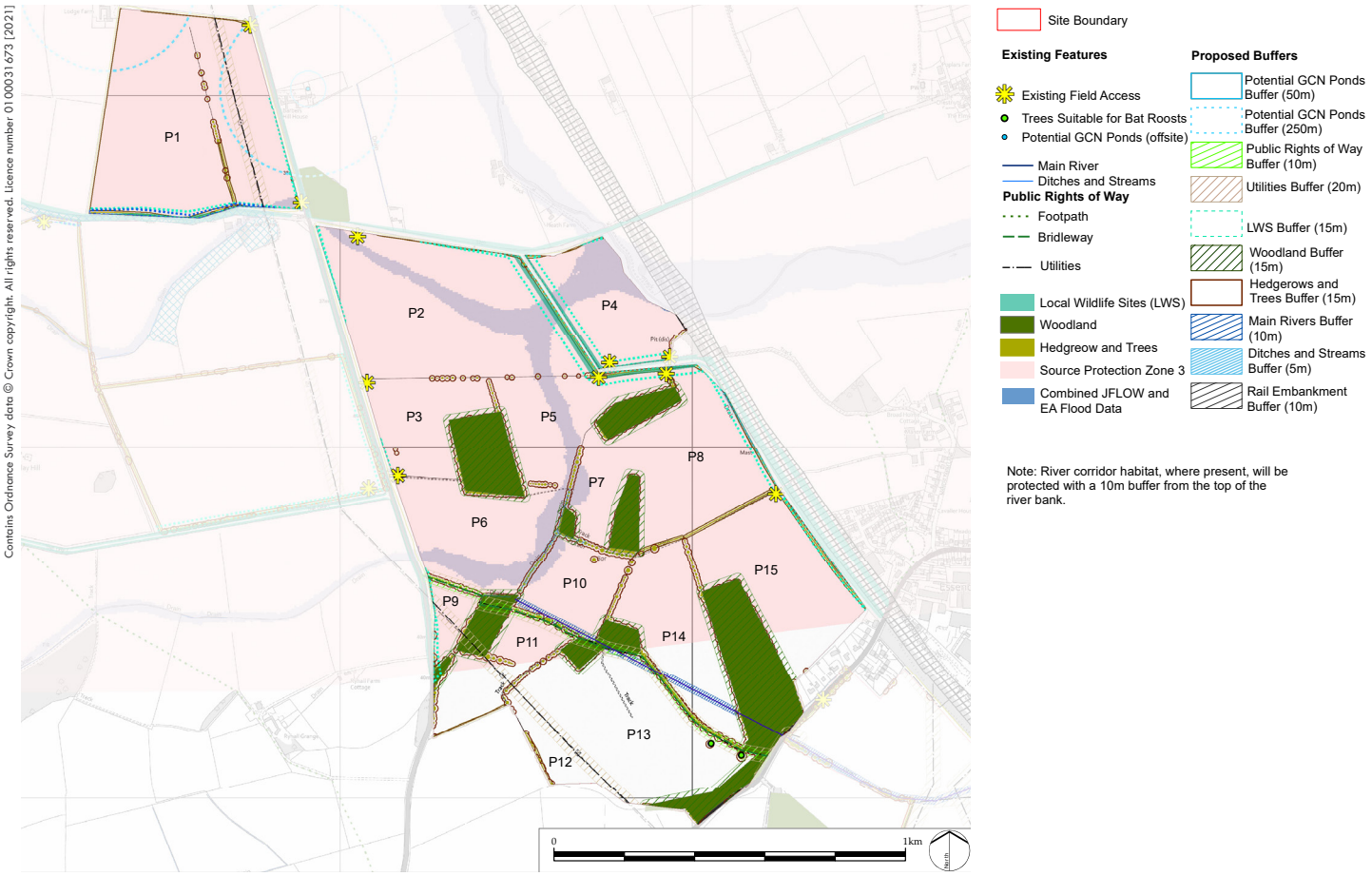
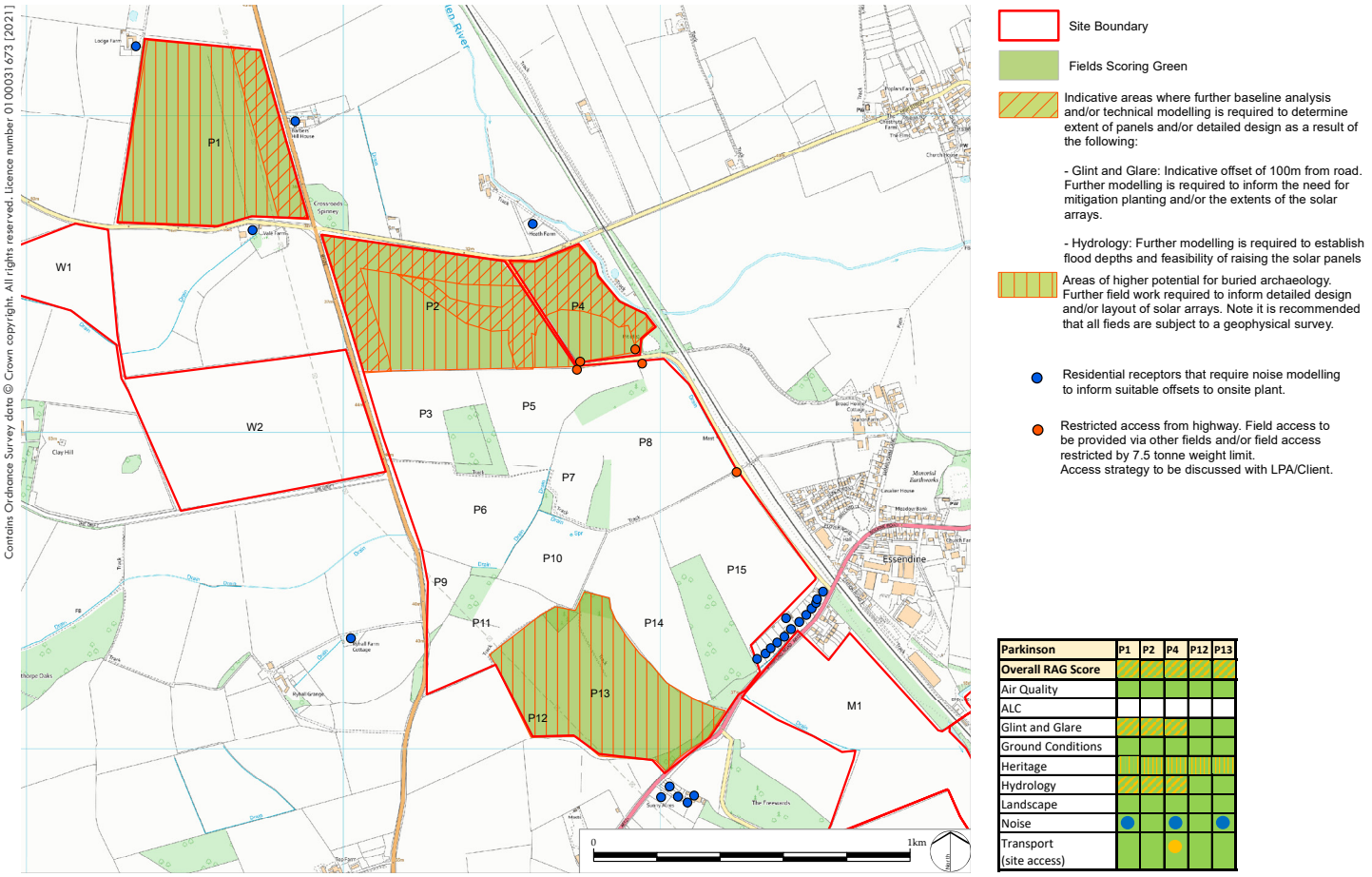


Figure 2.4: Mitigation Buffers: Parkinson



Parkinson	P1	P2	P4	P12	P13
Overall RAG Score					
Air Quality					
ALC					
Glint and Glare					
Ground Conditions					
Heritage					
Hydrology					
Landscape					
Noise					
Transport (site access)					

Figure 2.5: Red Flag Review: Parkinson

2.4 Parkinson Land

2.4.1 We are aware that Fields P3 to P11, and P14 and P15 are currently used for a commercial purpose and therefore are not available for solar arrays, although the land is available for internal access and cable routes should it be required.

2.4.2 Field P1 slopes from north to south and Fields P3, P7, P13, and P15 have been identified as being the most sensitive to overshadowing. Appropriate offsets will be determined through detailed modelling.

2.4.3 The majority of the land holding has been identified as having potential for archaeological features which will need to be investigated through field survey. This will inform the detailed design and layout, although taking the field out of a regime of ploughing could protect any buried archaeological remains.

2.4.4 The eastern half of Field P1 is considered potentially constrained by the roadside LWS, overhead powerline and the hedgerow.

2.4.5 A SSSI and Local Wildlife Sites, associated with the roadside verges and railway corridor. A sensitive design response could provide further protection and enhancement to these designations.

2.4.6 The appropriate buffers have been applied to the ecological features and have assumed that the existing ditches, hedgerows, trees and woodland will be retained so to avoid impacts on species such as dormouse, bats and reptiles. Occasional breaks for cable routes and internal access tracks can be accommodated. We have not undertaken a dormouse or bat survey as it is considered disproportionate. The approach to ecological surveys will be confirmed through the EIA Scoping Request.

2.4.7 No onsite ponds have recorded the presence of Great Crested Newts and there are two offsite pond within 250m of Field P1. All core habitat (within 50 m of the ponds) is not going to be impacted and the majority of the suitable habitat on site is unimpacted (e.g. hedgerows, woodlands and rough grassland margins) and that the very low suitability habitat (arable fields) will be enhanced in the long term for this species, the favourable conservation status of GCN will therefore be improved. Work is ongoing to survey the offsite ponds.

2.4.8 Glint and Glare has been identified as potential risk along the road corridors and the railway, especially as it is elevated on an embankment. Early modelling work will need to be undertaken to inform the layout and/or requirement for suitable landscape screening.

2.4.9 Boreholes data within the vicinity suggests that there is a shallow rockhead. No mining has been recorded within the area.

2.4.10 Early engagement with the EA is recommended to discuss the placement of construction compounds and inverters as a large area of the site has been identified as being within a ground water protection zone.

2.4.11 Modelling will need to be undertaken to establish the depths of river flooding within Fields P1, P2, P4, P5, P6, P7 and P10. The indicative depths range between 0.7m and 2.5m. Subject to the depth of the water and design, the solar arrays will need to be raised above the flood level or removed from areas of flooding.

2.4.12 A number of sensitive receptors (blue dots) are located within close proximity, noise modelling will be required to inform the location of onsite infrastructure and/or setting design criteria for onsite plant in order to meet the required noise limits.

2.4.13 All the fields appear to have good access and visibility from the highway, with the exception of P4, P5, P8, P11, P15.

2.4.14 Field P4 is currently accessed on the inside of bend and visibility is constrained, the alternative access further east would need to be reorientated and formalised. Subject to the final layout an alternative option could be to create a temporary crossing from Fields P2 or P5.

2.4.15 Access to Fields P4, P5, P8 and P15 are restricted by a 7.5 tonne weight restriction. Subject to the design layout, internal access routes from an unrestricted road is likely to be required or the use of a construction hub to distribute construction material on smaller loads.

2.4.16 Access to Field P11 is constrained due to the restricted visibility to the south.

2.4.17 The land holding is identified as Grade 3 agricultural land. The predictive BMV Maps shown the site as having low likelihood of BMV (<=20% area BMV).

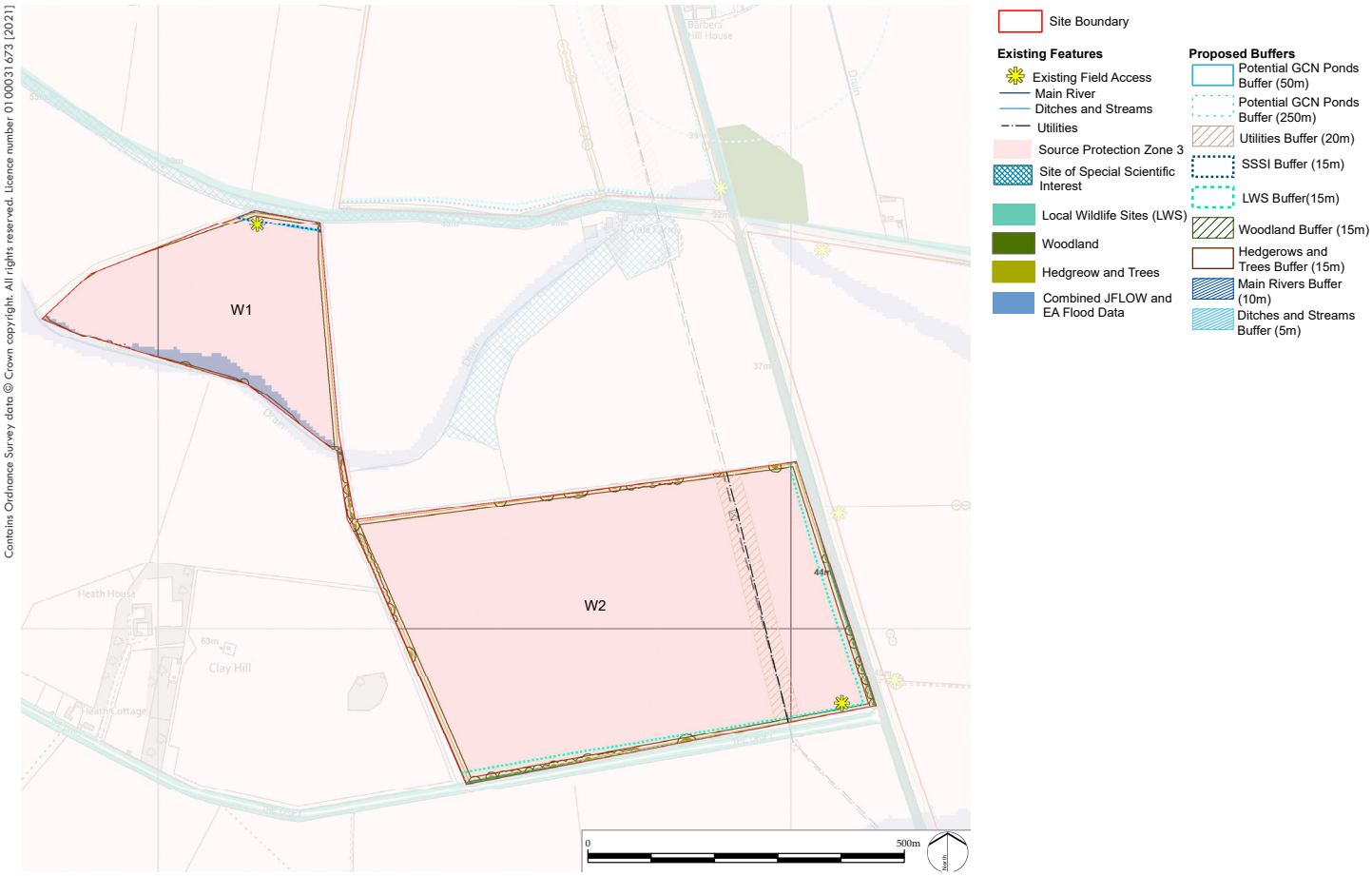
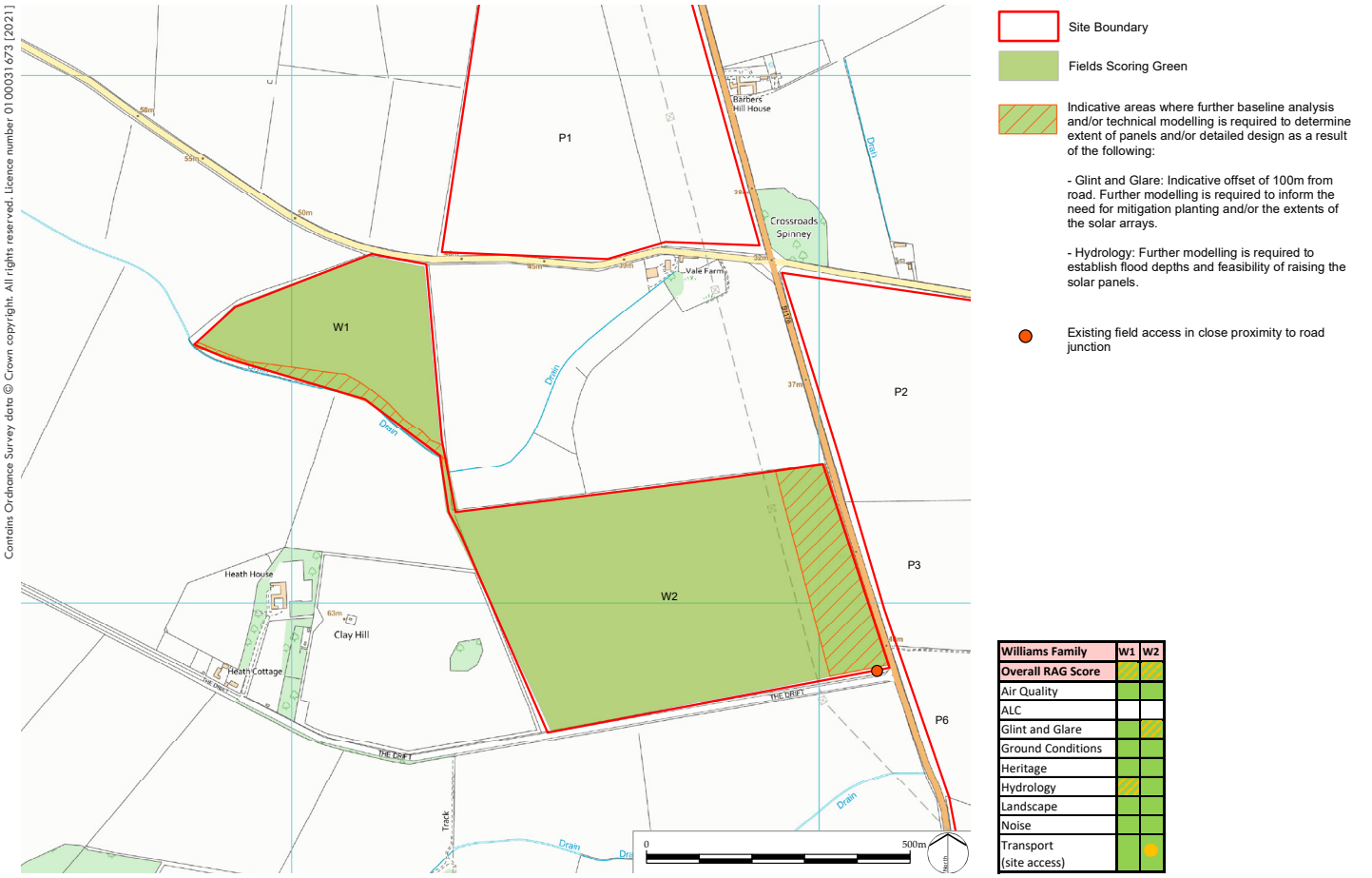


Figure 2.6: Mitigation Buffers: Williams



Williams Family	W1	W2
Overall RAG Score		
Air Quality		
ALC		
Glint and Glare		
Ground Conditions		
Heritage		
Hydrology		
Landscape		
Noise		
Transport (site access)		

Figure 2.7: Red Flag Review: Williams

2.5 Williams Land

2.5.1 The eastern half of Field W2 is potentially constrained by the roadside LWS and the overhead powerline.

2.5.2 A SSSI is located along the northern boundary of Field W1 and a LWS is located along the southern and eastern boundary of W2, associated with the roadside verges. A sensitive design response could provide further protection and enhancement to these designations.

2.5.3 The appropriate buffers have been applied to the ecological features along the boundaries which will be retained so to avoid impacts on species such as dormouse, bats and reptiles. Occasional breaks for cable routes and internal access tracks can be accommodated. We have not undertaken a dormouse or bat survey as it is considered disproportionate. The approach to ecological surveys will be confirmed through the EIA Scoping Request.

2.5.4 Glint and Glare has been identified as potential risk along the road corridor. Early modelling work will need to be undertaken to inform the layout and/or requirement for suitable landscape screening.

2.5.5 Borehole data within the vicinity suggests that there is a shallow rockhead. No mining has been recorded within the area.

2.5.6 Early engagement with the EA is recommended to discuss the placement of construction compounds and inverters as the land parcel has been identified as being within a ground water source protection zone.

2.5.7 Modelling will need to be undertaken to establish the depths of flooding within Field W1. The indicative depths range is 1.2m. Subject to the depth of the water and design, the solar arrays will need to be raise above the flood level or removed from areas of flooding.

2.5.8 Noise is unlikely to be a concern as the receptors are greater than 350m form the site boundary.

2.5.9 Field W1 has good access from the highway, albeit across the SSSI. Access to Field W2 is located in close proximity (approx. 10m) to the B176 junction which is less than optimal. Discussions with the LPA will be required to agree appropriate access arrangements.

2.5.10 The land holding is identified as Grade 3 agricultural land. The predictive BMV Maps shown the site as having low likelihood of BMV (<=20% area BMV).

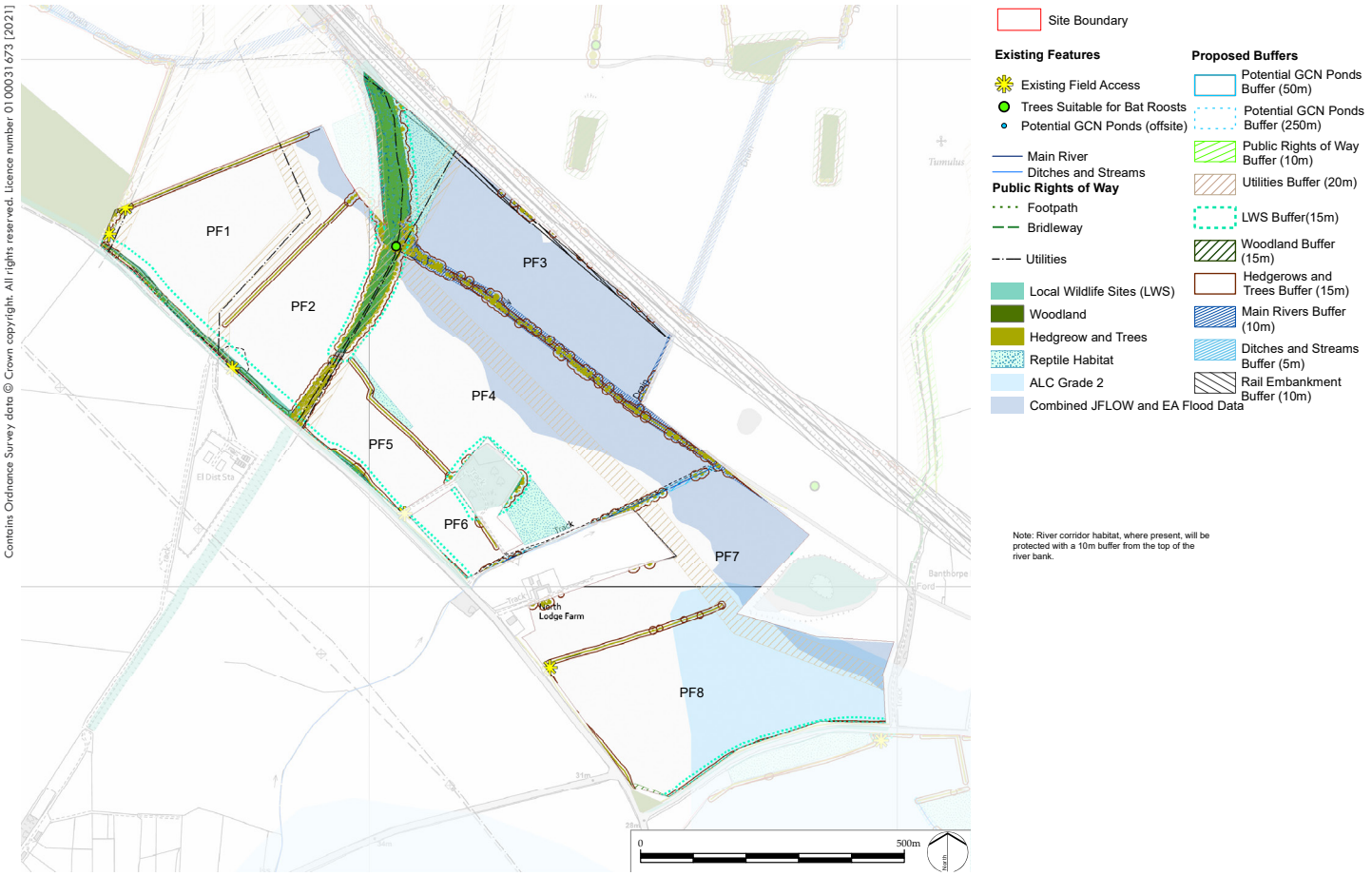
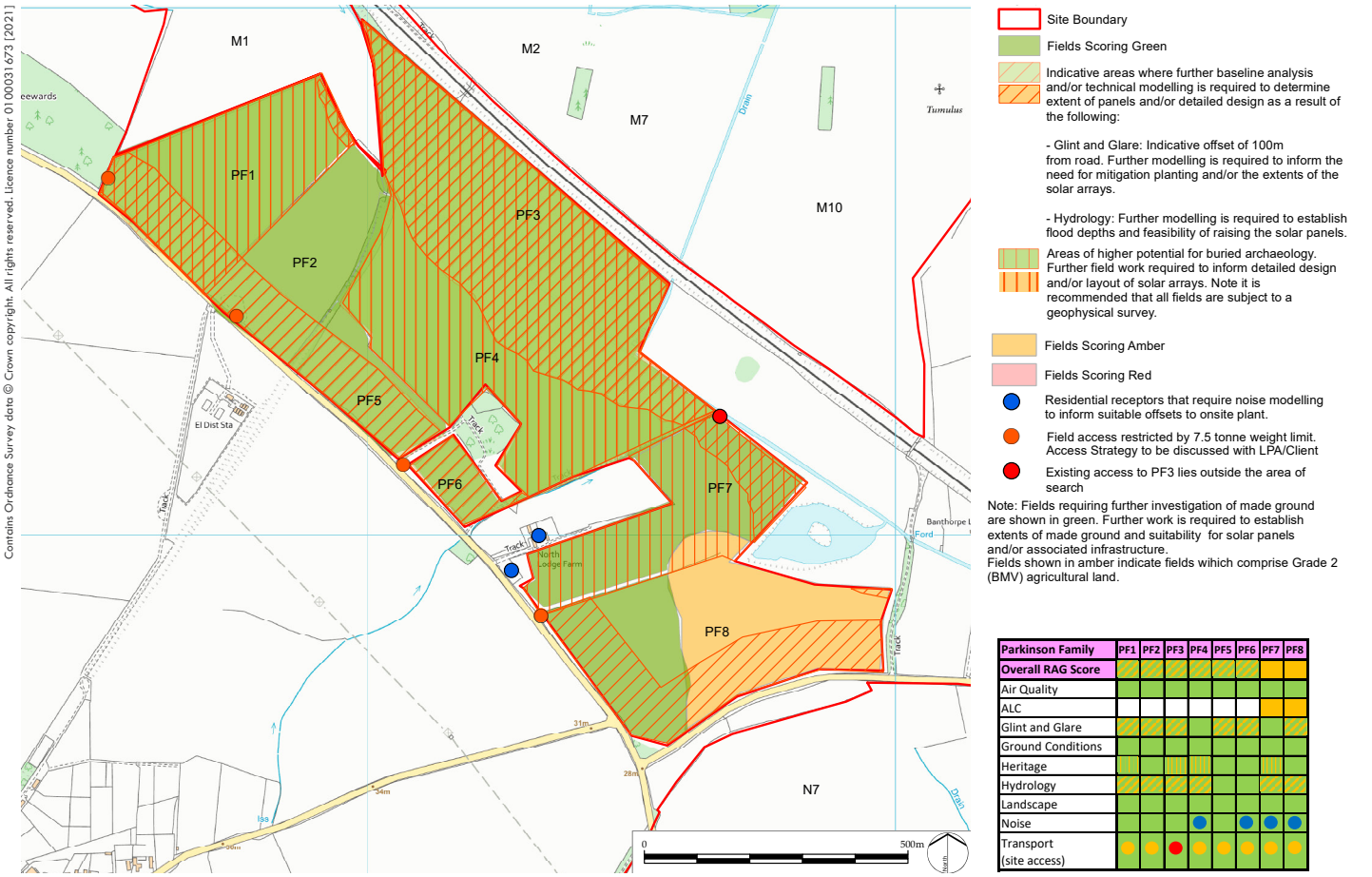


Figure 2.8: Mitigation Buffers: Parkinson



Parkinson Family	PF1	PF2	PF3	PF4	PF5	PF6	PF7	PF8
Overall RAG Score								
Air Quality								
ALC								
Glint and Glare								
Ground Conditions								
Heritage								
Hydrology								
Landscape								
Noise								
Transport (site access)								

Figure 2.9: Red Flag Review: Parkinson

2.6 Parkinson Family Land

2.6.1 The fields within this land parcel are smaller than the other land holdings and are bound by extensive trees and hedges which may reduce available areas for panels due to shadowing. Fields PF1, PF3, PF4 and PF7 are all constrained by utilities and flooding.

2.6.2 The majority of the land holding has been identified as having potential for archaeological features which will need to be investigated through field survey. This will inform the detailed design and layout, although taking the field out of a regime of ploughing could protect any buried archaeological remains.

2.6.3 Local Wildlife Sites are located along the boundaries of the site, associated with the roadside verges. A sensitive design response could provide further protection and enhancement to these designations. Areas of suitable reptile habitat have been identified within Fields PF3 and PF4 which should be retained within the layout.

2.6.4 The appropriate buffers have been applied to the ecological features and have assumed that the existing ditches, hedgerows, trees and woodland will be retained so to avoid impacts on species such as dormouse, bats and reptiles. Occasional breaks for cable routes and internal access tracks can be accommodated. We have not undertaken a dormouse or bat survey of the entire site as it is considered disproportionate. The approach to ecological surveys will be confirmed through the EIA Scoping Request.

2.6.5 Glint and Glare has been identified as potential risk along the road corridors and signals along the railway, especially as it is elevated on an embankment. Early modelling work will need to be undertaken to inform the layout and/or requirement for suitable landscape screening.

2.6.6 Boreholes data within the vicinity suggests that there is a shallow rockhead. No mining has been recorded within the area. The potential for made ground associated with quarrying has been identified within the southern extents of Field PF2 along with made ground associated with the railway corridor.

2.6.7 Modelling will need to be undertaken to establish the depths of river flooding within Fields PF1, PF2, PF3, PF4, PF7 and PF8. The indicative depths ranges between 0.1m and 1.5m. Subject to the depth of the water and design, the solar arrays will need to be raise above the flood level or removed from areas of flooding.

2.6.8 Sensitive receptors (blue dot) are located in the central area of the land holding, noise modelling will be required to inform the location of onsite infrastructure and/or setting design criteria for onsite plant in order to meet the required noise limits.

2.6.9 Access to all of the fields is restricted by a 7.5 tonne weight restriction. Field PF3 doesn't appear to be accessible from the other fields within the land parcel, without creating a new crossing over the river. An existing access point appears to be available via PF7 outside the redline.

2.6.10 The majority of the land holding is identified as Grade 3 agricultural land, with a small area of Grade 2 in the southern extents of the land holding. The predictive BMV show the majority of the site as having low likelihood of BMV (<=20% area bmv) and the southern extents as High likelihood of BMV (>60% area BMV).

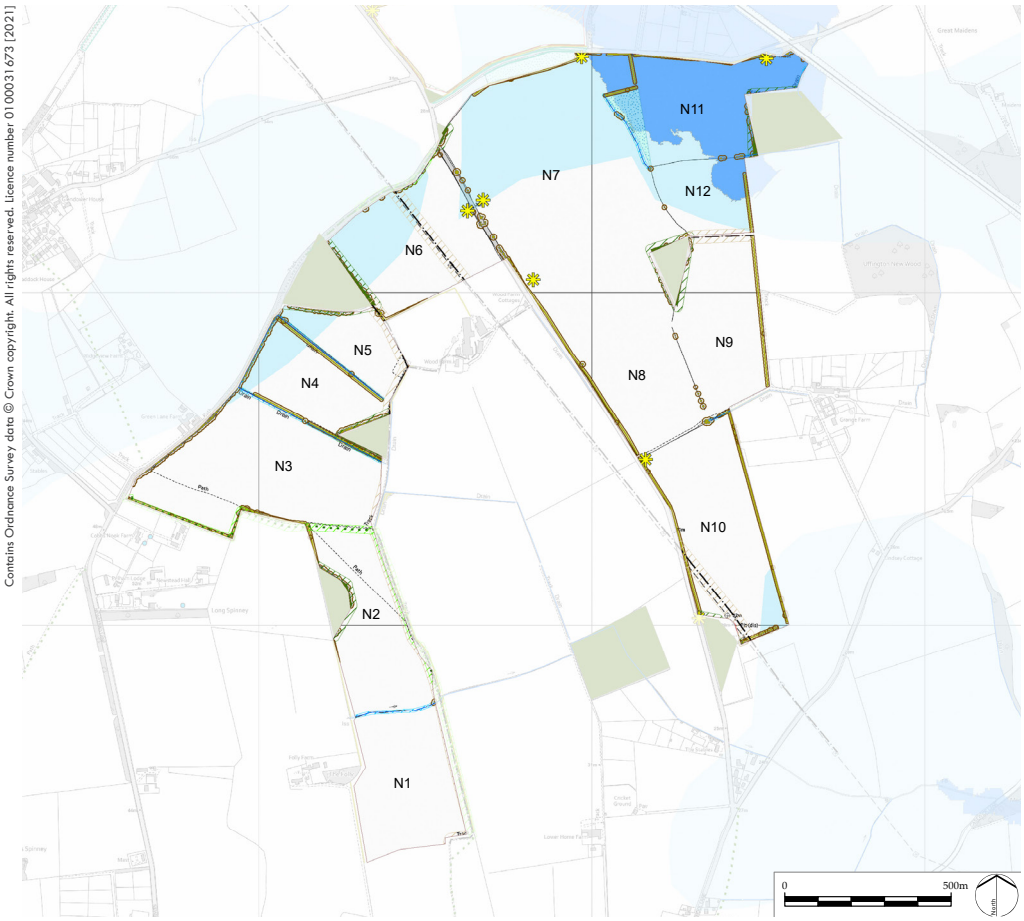
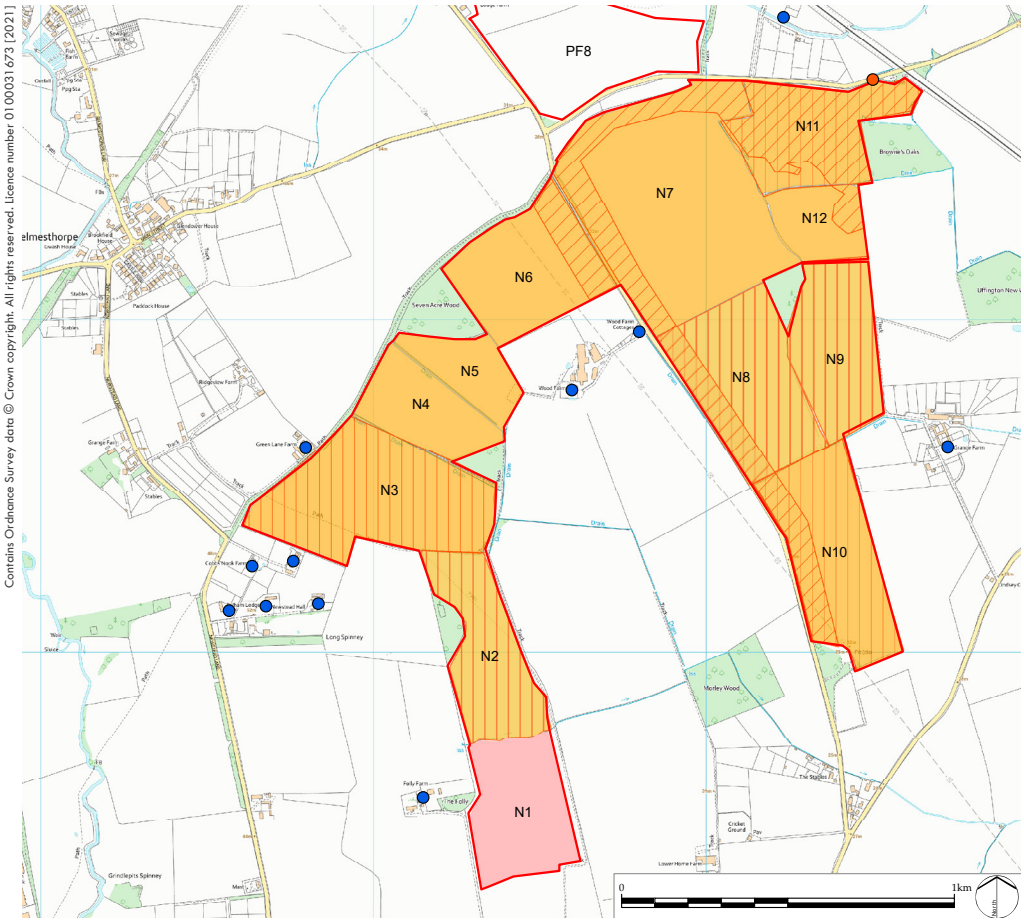


Figure 2.10: Mitigation Buffers: Naylor



Naylor Family	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
Overall RAG Score												
Air Quality												
ALC												
Glint and Glare												
Ground Conditions												
Heritage												
Hydrology												
Landscape												
Noise												
Transport (site access)												

Figure 2.11 Red Flag Review: Naylor

2.7 Naylor Land

2.7.1 The south-western extents of the land holding have been identified as being of high risk because of the potential views along the northern avenue of Burghley House. Field N1 has been marked as Red but further detailed assessment will be required to establish the sensitivity of Field N2. Other areas of the land holding has been identified as having potential for archaeological features which will need to be investigated through field survey. This will inform the detailed design and layout, although taking the field out of a regime of ploughing could protect the buried archaeological remains.

2.7.2 A footpath follows the boundary of Fields N3 and N2 and offer potential views of Burghley House from Field N2. The footpath alignment differs from the path shown the OS mapping so the alignment will need to be checked with the LPA.

2.7.3 The appropriate buffers have been applied to the ecological features and have assumed that the existing ditches, hedgerows, trees and woodland will be retained so to avoid impacts on species such as dormouse, bats and reptiles. Occasional breaks for cable routes and internal access tracks can be accommodated. We have not undertaken a dormouse or bat survey of the entire site as it is considered disproportionate. The approach to ecological surveys will be confirmed through the EIA Scoping Request.

2.7.4 No onsite ponds have recorded the presence of Great Crested Newts and there are two offsite ponds within 250m of Field N3. All core habitat (within 50 m of the pond) is not going to be impacted and the majority of the suitable habitat on site is unimpacted (e.g. hedgerows, woodlands and rough grassland margins) and that the very low suitability habitat (arable fields) will be enhanced in the long term for this species, the favourable conservation status of GCN will therefore be improved. Work is ongoing to survey the offsite ponds.

2.7.5 Glint and Glare has been identified as potential risk along the road corridor. Early modelling work will need to be undertaken to inform the layout and/or requirement for suitable landscape screening.

2.7.6 Borehole data within the vicinity suggest that there is a shallow rockhead. No mining has been recorded within the area.

2.7.7 Modelling will need to be undertaken to establish the depths of flooding within Fields N11 and N12 which are located within Flood Zone 2. Subject to the depth of the water and design, the solar arrays will need to be raised above the flood level.

2.7.8 A number of sensitive receptors (blue dots) are located within close proximity, especially Field N3. Noise modelling will be required to inform the location of onsite infrastructure and/or setting design criteria for onsite plant in order to meet the required noise limits.

2.7.9 All the fields appear to have good access and visibility from the highway.

2.7.10 The majority of the land holding is identified as Grade 3 agricultural land, however there is an area of Grade 2 in the north eastern extent of the land holding (Fields N7, N11 and N12). The predictive BMV Maps shown the land holding as having medium likelihood of BMV (20 – 60 % area bmv) and High likelihood of BMV(>60% area BMV) (Fields N6, N7 N11 and N12).

3.0 Overview

3.0 Overview

3.1 Recommendations

3.1.1 This review has analysed each of the fields within the indicative red line boundary and provided a RAG rating in relation to environment topics.

3.1.2 For the avoidance of doubt, the analysis to date has focused on the risk of locating solar panels within each field. Some of the fields that are considered not suitable for solar arrays in the context of a DCO could still provide important and necessary land for environmental mitigation and enhancement purposes, for example, the anticipated future requirement for NSIP projects to provide 10% biodiversity net gain.

3.1.3 Each of our recommendations is organised by land ownership grouping.

3.2 Mair Land

3.2.1 The environmental analysis gave this land an overall rating of Green/Amber hatch, primarily due to environmental matters that would require more detailed investigation, principally hydrology, glint and glare, heritage and noise (for land parcels in close proximity to residential receptors).

3.2.2 There are two fields in the Mair Land, M1 and M3 which have an Amber rating for environment. This is primarily due to their proximity to greater groupings of residential receptors and, in the case of M3, also potential effects on Essendine Castle Scheduled Monument. M1 in particular would significantly increase the sense of enclosure of Essendine village. The environmental matters identified have the potential to be mitigated through detailed design.

3.3 Parkinson Land

3.3.1 The environmental analysis gave this land an overall rating of Green/Amber hatch primarily due to environmental matters that would require more detailed investigation, principally hydrology, glint and glare, heritage, noise (for land parcels in close proximity to residential receptors) and potential access constraints.

3.3.2 This land is part of the area used for commercial usage and is not being proposed for solar panels. There are some small areas of flood risk identified by the more detailed hydrological mapping, but it is considered that these could be addressed by detailed design, through raising the panels or potentially avoiding panels in these areas.

3.3.3 As with the Mair land, the environmental matters identified have the potential to be mitigated through detailed design and being addressed through the DCO planning process.

3.4 Williams Land

3.4.1 The environmental analysis gave this land a rating of Green. This land performs well environmentally.

3.5 Parkinson Family Land

3.5.1 The environmental analysis gave this

land an overall rating of Green/Amber hatch primarily due to environmental matters that would require more detailed investigation, principally hydrology, glint and glare, heritage, noise (for land parcels in close proximity to residential receptors) and potential access constraints. There is also a small part of field PF8 which is Grade 2 agricultural land and should be classed as Amber.

3.5.2 The environmental matters identified have the potential to be mitigated through detailed design and being addressed through the DCO planning process.

3.6 Naylor Land

3.6.1 The environmental analysis gave this land an overall rating of Amber due to the medium to high probability of BMV and Grade 2 ALC combined with other environmental matters that would require more detailed investigation, principally hydrology, glint and glare, heritage and noise (for land parcels in close proximity to residential receptors).

3.6.2 The exception is field N1, which has an environmental RAG rating of Red due to potential longer distance views from Burghley House.

3.6.3 The environmental matters identified have the potential to be mitigated through detailed design and being addressed through the DCO planning process.

View looking north west across Field P13

LDĀDESIGN

London
209 -215 Blackfriars Road
London SE1 8NL
United Kingdom
+44 (0) 20 7467 1470

Bristol
Studio 4B
36 King Street
Bristol BS1 4DZ
United Kingdom
+44 (0) 117 203 3628

Cambridge
The Courtyard
17A Sturton Street
Cambridge CB1 2SN
United Kingdom
+44 (0) 1223 949054

Exeter
Kings Wharf, The Quay
Exeter EX2 4AN
United Kingdom
+44 (0) 1392 260 430

Glasgow
Sovereign House
158 West Regent Street
Glasgow G2 4RL
United Kingdom
+44 (0) 1412 229 780

Manchester
Hilton Square
3 Tariff Street
Manchester M1 2FF
United Kingdom
+44 (0) 161 359 5684

Oxford
Worton Rectory Park
Oxford OX29 4SX
United Kingdom
+44 (0) 1865 887050

Peterborough
17 Minster Precincts
Peterborough PE1 1XX
United Kingdom
+44 (0) 1733 310 471

www.lda-design.co.uk

LDA Design Consulting Ltd
Registered No: 09312403
17 Minster Precincts, Peterborough PE1 1XX

Appendix G Q1.3.2 Table of potentially available connection points approximately within 80km of Proposed Development

Appendix G – Table of potentially available connection points approximately within 80km of Proposed Development (Q1.3.2)

Name	Postcode	Voltage	Approximate Distance (km) from the Proposed Development	Connection Timeframe for new connections (May 2023)	Current number of Pre-applications ongoing	Current Number of Live (unsigned) Offers	Number of signed offers (not connected)	Number of connected projects	Earliest connection date for a signed offer for Solar >=240MW
Ryhall	PE9 4QG	400kV	0	2030 - 2032	0	3	1	0	01/01/2028
Spalding North	PE11 2BB	400kV	22	2030 - 2032	0	0	1	2	NA
Bicker Fen	PE20 3BF	400kV	28	2033 - 2035	1	3	6	0	01/10/2027
Walpole	PE14 7JE	132kV & 400kV	41	2030 - 2032	1	5	4	3	30/11/2031
Stoke Bardolph	NG14 5HL	400kV	48	2033 - 2035	0	2	1	0	31/10/2030
Staythorpe	NG23 5RQ	400kV	48	2033 - 2035	0	1	2	0	31/08/2024
Grendon	NN7 1JD	132kV & 400kV	50	2030 - 2032	0	1	2	0	01/07/2029
Enderby	LE19 4AD	400kV	50	2030 - 2032	0	5	2	0	30/10/2028
Eaton Socon	PE19 3BT	400kV	51	2030 - 2032	2	2	2	1	31/10/2028
Ratcliffe-on-Soar	NG11 0EE	132kV & 400kV	54	2030 - 2032	0	6	3	2	NA
Patford Bridge	NN6 7PP	400kV	57	2030 - 2032	0	3	0	0	NA
High Marnham	NG23 6SE	275kV & 400kV	58	2033 - 2035	0	4	4	1	31/10/2027
Burwell	CB5 OBP	400kV	66	2030 - 2032	1	3	4	2	31/10/2027
Cottam	DN22 0TF	400kV	69	2033 - 2035	0	2	4	1	01/10/2027
Coventry	CV2 1NL	275kV	70	2030 - 2032	0	1	1	0	NA
Willington & Willington East	DE65 6DE	132kV & 275kV & 400kV	73	2030 - 2032	0	4	7	0	NA
West Burton	DN22 9BL	132kV & 400kV	75	2033 - 2035	0	2	3	1	30/11/2028

Appendix H Q1.3.3 National Grid Electricity Distribution connection points table

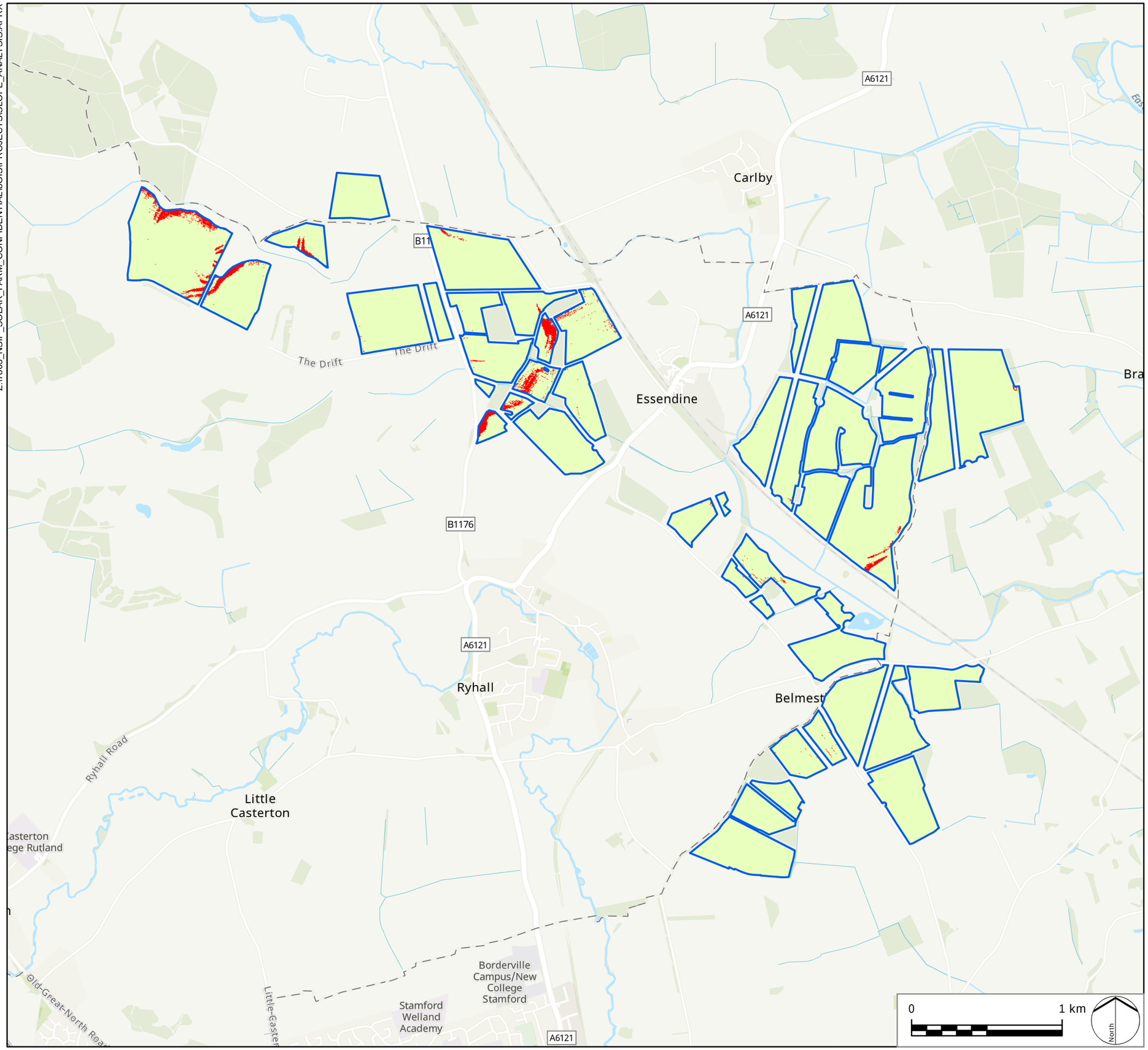
Appendix H - National Grid Electricity Distribution of all bulk connection points in East Midlands within 80km of Proposed Development (Q1.3.3)

Substation Name	Location	Voltage	Approximate Distance to the Proposed Development (km)	Aggregated Generation Headroom RAG	Generation Connected (MVA)	Generation Accepted Not Connected (MVA)	Generation Offered Not Accepted (MVA)	Headroom less offers made (MVA)
Corby No2	Long 52.492, Lat -0.669	33kV	23	Green	14	57	0	84
Leicester East	Long 52.63, Lat -1.101	33kV	41	Green	16	2	0	135
Leicester North	Long 52.647, Lat -1.143	33kV	44	Green	13	40	0	63
Leicester	Long 52.623, Lat -1.142	33kV	44	Green	5	0	0	151
Nottingham	Long 52.932, Lat -1.162	33kV	52	Green	92	80	4	153
Northampton East	Long 52.243, Lat -0.837	33kV	53	Green	41	10	0	65
Lincoln No 1	Long 53.228, Lat -0.519	33kV	57	Red	94	80	0	99
Stanton	Long 52.948, Lat -1.312	33kV	59	Green	20	1	0	57
Derby South	Long 52.887, Lat -1.462	33kV	68	Green	44	2	0	149
Derby	Long 52.926, Lat -1.476	132kV	71	Green	3	1	0	74
Derby	Long 52.926, Lat -1.477	33kV	71	Green	13	0	1	103
Whitley	Long 52.394, Lat -1.483	33kV	74	Green	28	2	0	87
Coventry Central	Long 52.42, Lat -1.508	33kV	74	Green	3	0	0	132
Bletchley	Long 52.012, Lat -0.744	33kV	75	Green	64	8	1	127
Coventry South	Long 52.406, Lat -1.539	33kV	77	Green	11	1	0	105

Note - National Grid Electricity Distribution provide a RAG (Red, Amber, Green) status for each substation in relation to Aggregated Generation Headroom.

Appendix I Q1.3.5 Application Site Slope Analysis

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\8GIS\PROJECTS\SLOPE_ANALYSIS.APRX



LEGEND

Solar PV Site

Percent Rise

< 12

> 12

Note: The inclination of slope is calculated as percent rise, also referred to as the percent slope.

This drawing is based upon a computer generated slope analysis produced using the slope routine in ArcGISPro.
The slope analysis takes into account topography only, with the heights obtained from a LiDAR digital terrain model. The model does not take into account any above ground features. It is based on LiDAR terrain data with a 1m^2 resolution.

LDĀDESIGN

PROJECT TITLE

MALLARD PASS SOLAR FARM

DRAWING TITLE

Slope Analysis 2

The Infrastructure Planning (Examination Procedure) Rules 2010

ISSUED BY	Oxford	T: 01865 887050	
Date	2022	DRAWN	SG
SCALE @A3	1:25,000	CHECKED	RP
STATUS	Draft	APPROVED	RP

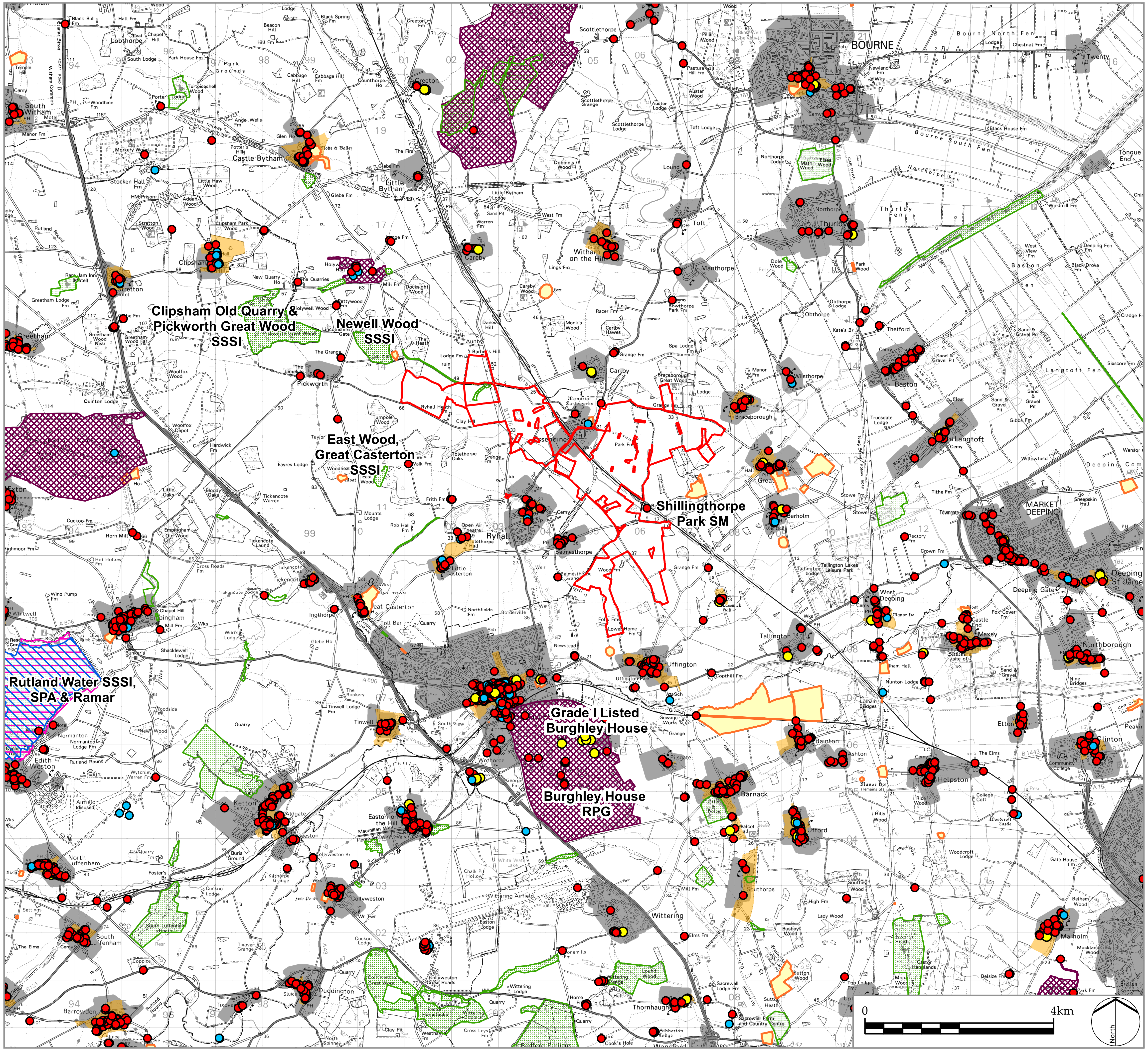
DWG. NO. 7863_SK328

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

Appendix J Q1.3.7 Order Limits and Environmental Considerations

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\8GIS\PROJECTS\7863_SITE_CONSTRIANTS_FOR_SITE_SELECTION_V2.MXD



Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

LEGEND

Order Limits

Listed Buildings

Grade

- I
- II
- II*

Ramsar site

Special Protection Area (SPA)

Sites of Special Scientific Interest

Registered Park and Garden (RPG)

Scheduled Monuments (SM)

Conservation Areas

Settlements

REV.	DESCRIPTION	APP.	DATE
P0	DCO Deadline 2 Submission	RP	14/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Order Limits and Environmental Considerations

ISSUED BY	Oxford	T: 01865 887050	
DATE	Jun 2023	DRAWN	AG
SCALE @A3	1:80,000	CHECKED	PD
STATUS	Final	APPROVED	RP

DWG. NO. 7863_SK_900 REV: P0

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

Appendix K Q4.0.6 Q1 2023 Canadian Solar Inc Financial Results

INVESTOR RELATIONS

NEWS RELEASES

CANADIAN SOLAR REPORTS FIRST QUARTER 2023 RESULTS

GUELPH, ON, May 18, 2023 /PRNewswire/ -- Canadian Solar Inc. ("Canadian Solar" or the "Company") (NASDAQ: CSIQ) today announced financial results for the first quarter ended March 31, 2023.

Highlights

- 66% increase in solar module shipments year-over-year ("yoy") to 6.1 GW, in line with guidance of 5.9 GW to 6.2 GW.
- 36% increase in revenue yoy to $1.7 billion, in line with guidance of $1.6 billion to $1.8 billion.
- 18.7% gross margin, in line with guidance of 18% to 20%.
- Net income attributable to Canadian Solar of $84 million or $1.19 per diluted share.
- 25 GWp of solar development pipeline and 47 GWh of battery storage development pipeline, as of March 31, 2023 (Recurrent Energy, formerly Global Energy).
- Carve-out IPO of CSI Solar subsidiary on track to be completed in the second quarter of 2023.

Dr. Shawn Qu, Chairman and CEO, commented, "We started off the year strong with 36% yoy revenue growth and 750% increase in diluted earnings per share. We continue to leverage our premium brand to capture increased solar and battery storage opportunities, while laying the groundwork for future success with strategic capacity expansion. We remain focused on profitable growth and continue to optimize our cost structure through vertical integration. With the imminent IPO of our CSI Solar subsidiary, we will have a new platform to raise investment capital and further strengthen our leading position in solar and battery storage manufacturing."

Yan Zhuang, President of Canadian Solar's CSI Solar subsidiary, said, "We delivered a record operating profit in the first quarter, despite normal seasonal softness with lower input and manufacturing processing costs, and lower logistics costs. Looking ahead, as we continue to grow our volumes and increase the level of vertical integration, we expect profitability to remain healthy as our cost structure continues to improve and we reap the benefits of greater scale. On the battery energy storage side, we continue to grow our contracted turnkey pipeline which stood at approximately $1.3 billion as of March 31, 2023, and have continued to sign new contracts across the world reflecting overall market growth and positive customer response to our innovative products and solutions."

Ismael Guerrero, Corporate VP and President of Canadian Solar's Recurrent Energy subsidiary, said, "As expected, we monetized a smaller number of projects in the first quarter, namely, around 5 MWp in Japan, reflecting typical fluctuations in the timing of

project sales. Importantly, we formally unified our Global Energy platform under our Recurrent Energy brand, which now encompasses our global development and services businesses rather than just our North American business as before. Recurrent Energy is now one of the world's largest platforms with a global development pipeline of 25 GWp of solar and 47 GWh of battery energy storage projects, of which 14 GWp and 12 GWh respectively have interconnections granted. With a large majority of our pipeline being developed from greenfield, and increasingly holding and owning more of the projects we develop, we expect to capture even more value created throughout the project development cycle."

Dr. Huifeng Chang, Senior VP and CFO, added, "In the first quarter, we achieved $1.7 billion in revenue, a 18.7% gross margin, and net income of $1.19 per diluted share. We delivered positive operating cash flow, while we continue to build on solar modules and battery storage inventories to position our topline growth for the balance of 2023. We fortified our balance sheet in the quarter and remain well-positioned to support our planned strategic capacity expansion, drive growth and create additional value. Both the N-type TOPCon capacity and greater manufacturing vertical integration will drive further cost reductions and greater operating leverage with higher volumes."

First Quarter 2023 Results

Total module shipments recognized as revenues in the first quarter of 2023 were 6.1 GW, up 66% yoy. Of the total, 90 MW were shipped to the Company's own utility-scale solar power projects.

Net revenues in the first quarter of 2023 were up 36% yoy and down 14% quarter-over-quarter ("qoq") to $1.7 billion. The sequential decrease reflects the expected decline in module average selling price ("ASP"), lower solar module shipment volume due to seasonality, and lower project sales. The yoy increase was mainly driven by a significant increase in solar module shipments, partially offset by lower module ASPs and lower revenues from utility-scale battery storage solutions and project sales due to the timing of projects.

Gross profit in the first quarter of 2023 was $318 million, up 76% yoy and down 9% qoq. Gross margin in the first quarter of 2023 was 18.7%, compared to 17.7% in the fourth quarter of 2022, within the guidance range of 18% to 20%. The gross margin improvement was mainly driven by lower manufacturing costs, partially offset by lower module ASPs.

Total operating expenses in the first quarter of 2023 were $172 million compared to $213 million in the fourth quarter of 2022 and $165 million in the first quarter of 2022. The sequential decrease was mainly driven by further declines in logistics costs, while the yoy increase was mainly driven by higher total logistics costs due to the significant increase in solar module shipments, partially offset by lower average logistics costs per unit.

Depreciation and amortization charges in the first quarter of 2023 were $68 million, compared to $50 million in the fourth quarter of 2022 and $66 million in the first quarter of 2022. The sequential increase was primarily driven by the Company's previously outlined manufacturing capacity expansion as it works to meet anticipated higher demand levels.

Net interest expense in the first quarter of 2023 was $12 million, compared to $11 million in both the fourth and first quarters of 2022.

Net foreign exchange and derivative loss in the first quarter of 2023 was $13 million, compared to a net loss of $15 million in the fourth quarter of 2022 and a net gain of $3 million in the first quarter of 2022. The net foreign exchange loss and derivative was mainly due to a weaker U.S. dollar.

Net income attributable to Canadian Solar in the first quarter of 2023 was $84 million, or $1.19 per diluted share ("diluted EPS"), compared to net income of $78 million, or $1.11 per diluted share, in the fourth quarter of 2022, and net income of $9 million, or $0.14 per diluted share, in the first quarter of 2022.

Net cash flow provided by operating activities in the first quarter of 2023 was $47 million, compared to $397 million in the fourth quarter of 2022. The qoq decrease in operating cash flow primarily resulted from higher inventory in preparation for expected revenue growth.

Total debt was $3.0 billion as of March 31, 2023, compared to $2.6 billion as of December 31, 2022, and included $831 million and $684 million of debt related to Recurrent Energy as of March 31, 2023 and December 31, 2022, respectively. Non-recourse debt used to finance solar power systems and project assets increased to $410 million as of March 31, 2023 from $365 million as of December 31, 2022.

Total project assets as of March 31, 2023 were $864 million, compared to $824 million as of December 31, 2022. Project assets are projects that are developed and built for sale, as part of Recurrent Energy's business model.

The net value of solar power systems as of March 31, 2023 was $472 million, compared to $365 million as of December 31, 2022. Solar power systems are projects that are developed and built to be held on the Company's balance sheet.

Corporate Structure

The Company has two business segments: Recurrent Energy, formerly Global Energy, and CSI Solar. The two businesses operate as follows:

- **Recurrent Energy (formerly Global Energy)** is one of the world's largest clean energy project development platforms with 14 years' experience, having delivered nearly 9 GWp of solar power projects and 3 GWh of battery storage projects. It is vertically integrated and has strong expertise from greenfield origination, development, financing, execution, operations and maintenance, and asset management.

- **CSI Solar** consists of solar module and battery storage manufacturing, and delivery of total system solutions, including inverters, solar system kits and EPC (engineering, procurement and construction) services. CSI Solar's battery storage business includes both its utility-scale turnkey battery system solutions, as well as a small but growing residential battery storage business. These storage systems solutions are complemented with long-term service agreements, including future battery capacity augmentation services.

Recurrent Energy Segment (formerly Global Energy)

Recurrent Energy is one of the world's largest and most geographically diversified utility-scale solar and energy storage project development platforms, with a 14-year track record of originating, developing, financing, and building nearly 9 GWp of solar power plants and 3 GWh of battery storage power plants across six continents. As of March 31, 2023, the Company had a leading position with a total global solar development pipeline of approximately 25 GWp and an energy storage development pipeline of over 47 GWh.

While Recurrent Energy's business model was historically predominantly develop-to-sell, as previously communicated, the Company is in the process of adjusting its strategy to create greater asset value and retain greater ownership of projects in select markets to increase the revenues generated through recurring income, such as power sales, operations and maintenance, and asset management income.

The business model will consist of three key drivers:

- **Operating portfolio** to drive stable, diversified cash flows in growth markets with stable currencies.
- **Project sales** (or asset rotations) in the rest of the world, driving cash-efficient, funded growth model as value from project sales will help fund growth in operating assets.
- **Power services** through long-term operations and maintenance ("O&M") contracts, currently with 6 GW of contracted projects.

Recurrent Energy is continuing to evaluate adjustments in its growth strategy to hold valuable solar assets for the longer term.

Project Development Pipeline – Solar

As of March 31, 2023, Recurrent Energy's total solar project development pipeline was 24.6 GWp, including 1.7 GWp under construction, 5.2 GWp of backlog, and 17.7 GWp of projects in advanced and early-stage pipelines, defined as follows:

- **Backlog projects** are late-stage projects that have passed their risk cliff date and are expected to start construction in the next 1-4 years. A project's risk cliff date is the date on which the project passes the last high-risk development stage and varies depending on the country where it is located. This is usually after the projects have received all the required environmental and regulatory approvals, and entered into interconnection agreements, feed-in tariff ("FIT") arrangements and power purchase agreements

("PPAs"). Significant majority of projects in backlog are contracted (i.e., have secured a PPA or FIT), and the remaining are reasonably assured of securing PPAs.
- **Advanced pipeline projects** are mid-stage projects that have secured or have more than 90% certainty of securing an interconnection agreement.
- **Early-stage pipeline projects** are early-stage projects controlled by Recurrent Energy that are in the process of securing interconnection.

The following table presents **Recurrent Energy's total solar project development** pipeline.

Solar Project Development Pipeline (as of March 31, 2023) – MWp*					
Region	In Construction	Backlog	Advanced Pipeline	Early-Stage Pipeline	Total
North America	-	422	1,977	4,656	**7,055**
Latin America	1,400**	2,397**	887	407	**5,091**
Europe, the Middle East and Africa ("EMEA")	89	1,236	3,194	3,267	**7,786**
Japan	4	141	12	46	**203**
China	250	971**	-	1,325	**2,546**
Asia Pacific excluding Japan and China	-	3	1,001	887	**1,891**
Total	**1,743**	**5,170**	**7,071**	**10,588**	**24,572**

**All numbers are gross MWp.*

***Including 672 MWp in construction and 332 MWp in backlog that are owned by or already sold to third parties.*

Project Development Pipeline – Battery Storage

As of March 31, 2023, Recurrent Energy's total battery storage project development pipeline was 47.4 GWh, including 0.3 GWh under construction, 1.7 GWh of backlog, and 45.4 GWh of projects in advanced and early-stage pipelines.

The table below sets forth **Recurrent Energy's total storage project development** pipeline.

Energy Storage Project Development Pipeline (as of March 31, 2023) – MWh					
Region	In Construction	Backlog	Advanced Pipeline	Early-Stage Pipeline	Total
North America	-	-	3,898	15,242	**19,140**
Latin America	-	1,100	2,040	970	**4,110**
EMEA	-	110	4,038	10,081	**14,229**
Japan	-	-	-	19	**19**
China	300	-	-	7,500	**7,800**
Asia Pacific excluding Japan and China	20	458	200	1,440	**2,118**
Total	**320**	**1,668**	**10,176**	**35,252**	**47,416**

Projects in Operation – Solar and Energy Storage Power Plants

As of March 31, 2023, Recurrent Energy's solar power plants in operation totaled 609 MWp, with a combined estimated net resale value of approximately $700 million to Recurrent Energy. The estimated net resale value is based on selling prices that Recurrent Energy is currently negotiating or comparable asset sales.

Solar Power Plants in Operation – MWp*

Latin America	Japan	China	Asia Pacific ex. Japan and China	Total
335	176	86	12	**609**

**All numbers are net MWp owned by Recurrent Energy; total gross MWp of projects is 1,063 MWp, including volume that is already sold to third parties.*

As of March 31, 2023, Recurrent Energy's energy storage power plants in operation totaled 280 MWh, representing the 20% interest Recurrent Energy retains in the 1,400 MWh Crimson standalone battery energy storage project in California.

Operating Results

The following table presents select unaudited results of operations data of the Recurrent Energy segment for the periods indicated.

Recurrent Energy Segment Financial Results

(In Thousands of U.S. Dollars, Except Percentages)

	Three Months Ended		
	March 31, 2023	December 31, 2022	March 31, 2022
Net revenues	20,052	73,650	92,966
Cost of revenues	12,843	57,686	75,130
Gross profit	7,209	15,964	17,836
Operating expenses	22,414	17,315	18,847
Loss from operations*	(15,205)	(1,351)	(1,011)
Gross margin	*36.0 %*	*21.7 %*	*19.2 %*
Operating margin	*-75.8 %*	*-1.8 %*	*-1.1 %*

**Loss from operations reflects management's allocation and estimate as some services are shared by the Company's two business segments.*

CSI Solar Segment

Solar Modules

CSI Solar shipped 6.1 GW of solar modules to more than 70 countries in the first quarter of 2023. For the first quarter of 2023, the top five markets ranked by shipments were China, Brazil, the U.S., Spain, and Germany.

CSI Solar's 2024 solar capacity expansion targets are set forth below.

Solar Manufacturing Capacity, GW*				
	March 2023 Actual	June 2023 Plan	December 2023 Plan	March 2024 Plan
Ingot	20.4	20.4	20.4	50.4
Wafer	21.0	21.0	35.0	50.0
Cell	21.0	26.0	50.0	60.0
Module	36.2	36.7	50.0	75.0

**Nameplate annualized capacities at said point in time. Capacity expansion plans are subject to change without notice based on market conditions and capital allocation plans.*

Battery Storage Solutions

Within CSI Solar, the battery storage solutions team, namely CSI Energy Storage, provides customers with competitive turnkey, integrated, utility-scale battery storage solutions, including bankable, end-to-end, utility-scale, turnkey battery storage system solutions across various applications. System performance is complemented with long-term service agreements, which include future battery capacity augmentation services and bring in long-term, stable income.

As of March 31, 2023, CSI Energy Storage had a total project turnkey pipeline of 22.8 GWh, which includes both contracted and in construction projects, as well as projects at different stages of the negotiation process. CSI Energy Storage was also managing 2.3 GWh of projects under long-term service agreements, which are operational battery storage projects delivered by CSI Energy Storage that are under multi-year long-term service agreements and generate recurring earnings.

The total contracted turnkey pipeline was approximately $1.3 billion, which are contractual obligations with customers and provide significant earnings visibility over a multi-year period.

The table below sets forth CSI Energy Storage's battery storage manufacturing capacity expansion targets.

Battery Storage Manufacturing Capacity, GWh*	March 2023 Actual	December 2023 Plan
SolBank	2.5	10.0

**Nameplate annualized capacities at said point in time. Capacity expansion plans are subject to change without notice based on market conditions and capital allocation plans.*

Operating Results

The following table presents select unaudited results of operations data of the CSI Solar segment for the periods indicated.

CSI Solar Segment Financial Results* (In Thousands of U.S. Dollars, Except Percentages)

	Three Months Ended		
	March 31, 2023	December 31, 2022	March 31, 2022
Net revenues	1,709,730	1,976,045	1,209,994
Cost of revenues	1,394,121	1,631,417	1,034,165
Gross profit	315,609	344,628	175,829
Operating expenses	146,151	192,099	143,931
Income from operations	169,458	152,529	31,898
Gross margin	*18.5 %*	*17.4 %*	*14.5 %*
Operating margin	*9.9 %*	*7.7 %*	*2.6 %*

**Include effects of both sales to third-party customers and to the Company's Recurrent Energy segment. Please refer to the attached financial tables for intercompany transaction elimination information. Income from operations reflects management's allocation and estimate as some services are shared by the Company's two business segments.*

The table below provides the geographic distribution of the net revenues of CSI Solar:

CSI Solar Net Revenues Geographic Distribution* (In Millions of U.S. Dollars, Except Percentages)						
	Q1 2023	% of Net Revenues	Q4 2022	% of Net Revenues	Q1 2022	% of Net Revenues
Asia	555	33	846	45	473	41
Americas	632	38	635	33	453	39
Europe and others	494	29	417	22	231	20
Total	**1,681**	**100**	**1,898**	**100**	**1,157**	**100**

**Excludes sales from CSI Solar to Recurrent Energy.*

Business Outlook

The Company's business outlook is based on management's current views and estimates given factors such as existing market conditions, order book, production capacity, input material prices, foreign exchange fluctuations, anticipated timing of project sales, and the global economic environment. This outlook is subject to uncertainty with respect to, among other things, customer demand, project construction and sale schedules, product sales prices and costs, supply chain constraints, and geopolitical conflicts. Management's views and estimates are subject to change without notice.

For the second quarter of 2023, the Company expects total revenue to be in the range of $2.4 billion to $2.6 billion. Gross margin is expected to be between 19% and 21%. Total module shipments recognized as revenues by CSI Solar are expected to be in the range of 8.1 GW to 8.4 GW, including approximately 60 MW to the Company's own projects.

For the full year of 2023, the Company reiterates its prior outlook for CSI Solar's total module shipments to be in the range of 30 GW to 35 GW. CSI Solar's battery storage shipments are expected to be in the range of 1.8 GWh to 2.0 GWh, representing this year's

transition from white label to own manufactured product. The Company's total revenue is now expected to be in the range of $9.0 billion to $9.5 billion from the prior range of $8.5 billion to $9.5 billion.

Dr. Shawn Qu, Chairman and CEO, commented, "We expect significant revenue and profit growth in the second quarter driven by both higher volume in solar module shipments and project sales. In the CSI Solar segment, volume growth is picking up while costs continue to come down, albeit partially offset by gradual ASP declines. On the Recurrent Energy side, we expect the closing of a major project sale during the quarter to have a significantly positive impact on profit. Overall, we will continue to leverage our market leadership position and expect significant growth in 2023 and beyond across both our solar and battery storage businesses."

Recent Developments

Recurrent Energy (formerly Global Energy)

On May 15, 2023, Canadian Solar announced its wholly-owned subsidiary Recurrent Energy signed an aggregated virtual power purchase agreement with EMD Electronics, Biogen Inc., Wayfair LLC, Autodesk, Inc. and a large healthcare company for 100% of the production capacity of the Liberty Solar Project. Recurrent Energy is currently developing the 100 MWac solar project in Liberty County, Texas, around 50 miles from Houston. The project is expected to be operational in 2024.

On April 10, 2023, Canadian Solar announced the rebranding of its wholly-owned Global Energy subsidiary as Recurrent Energy. Recurrent Energy, previously the Company's North American utility-scale solar and energy storage project developer, will now encompass all its global development and services businesses.

CSI Solar

On May 17, 2023, Canadian Solar announced its majority-owned subsidiary CSI Solar's CSI Energy Storage will deliver 363 MWh of battery energy products to an Aypa Power Project in Texas. The project is expected to reach commercial operation by Q2 2024.

On April 11, 2023, Canadian Solar announced its majority-owned subsidiary CSI Solar capacity expansion plans. Namely, CSI Solar intends to have 20.4 GW of ingot, 35 GW of wafer, 50 GW of cell and 50 GW of module capacities by the end of 2023 and is expected to have 50.4 GW of ingot, 50 GW of wafer, 60 GW of cell and 75 GW of module capacities by the end of Q1 2024.

Conference Call Information

The Company will hold a conference call on Thursday, May 18, 2023, at 8:00 a.m. U.S. Eastern Daylight Time (8:00 p.m., Thursday, May 18, 2023, in Hong Kong) to discuss its first quarter 2023 results and business outlook. The dial-in phone number for the live audio call is +1-877-704-4453 (toll-free from the U.S.), 800-965-561 (toll-free from Hong Kong), 400-120-2840 (local dial-in from Mainland China) or +1-201-389-0920 from international

locations. The conference ID is 13738337. A live webcast of the conference call will also be available on the investor relations section of Canadian Solar's website at www.canadiansolar.com.

A replay of the call will be available 2 hours after the conclusion of the call until 11:00 p.m. U.S. Eastern Daylight Time on Thursday, June 1, 2023 (11:00 a.m., June 2, 2023, in Hong Kong) and can be accessed by +1-844-512-2921 (toll-free from the U.S.), or +1-412-317-6671 from international locations. The replay pin number is 13738337. A webcast replay will also be available on the investor relations section of Canadian Solar's website at www.canadiansolar.com.

About Canadian Solar Inc.

Canadian Solar was founded in 2001 in Canada and is one of the world's largest solar technology and renewable energy companies. It is a leading manufacturer of solar photovoltaic modules, provider of solar energy and battery storage solutions, and developer of utility-scale solar power and battery storage projects with a geographically diversified pipeline in various stages of development. Over the past 22 years, Canadian Solar has successfully delivered around 94 GW of premium-quality, solar photovoltaic modules to customers across the world. Likewise, since entering the project development business in 2010, Canadian Solar has developed, built and connected over 8.8 GWp in over 20 countries across the world. Currently, the Company has approximately 609 MWp of projects in operation, 6.9 GWp of projects under construction or in backlog (late-stage), and an additional 17.7 GWp of projects in advanced and early-stage pipeline. Canadian Solar is one of the most bankable companies in the solar and renewable energy industry, having been publicly listed on the NASDAQ since 2006. For additional information about the Company, follow Canadian Solar on LinkedIn or visit www.canadiansolar.com.

Safe Harbor/Forward-Looking Statements

Certain statements in this press release, including those regarding the Company's expected future shipment volumes, revenues, gross margins and project sales are forward-looking statements that involve a number of risks and uncertainties that could cause actual results to differ materially. These statements are made under the "Safe Harbor" provisions of the U.S. Private Securities Litigation Reform Act of 1995. In some cases, you can identify forward-looking statements by such terms as "believes," "expects," "anticipates," "intends," "estimates," the negative of these terms, or other comparable terminology. Factors that could cause actual results to differ include general business, regulatory and economic conditions and the state of the solar and battery storage market and industry; geopolitical tensions and conflicts, including impasses, sanctions and export controls; volatility, uncertainty, delays and disruptions related to the COVID-19 pandemic; supply chain disruptions; governmental support for the deployment of solar power; future available supplies of high-purity silicon; demand for end-use products by consumers and inventory levels of such products in the supply chain; changes in demand from significant customers; changes in demand from major markets such as Japan, the U.S., China, Brazil and Europe; changes in effective tax rates; changes in customer order patterns; changes in product mix;

changes in corporate responsibility, especially environmental, social and governance ("ESG") requirements; capacity utilization; level of competition; pricing pressure and declines in or failure to timely adjust average selling prices; delays in new product introduction; delays in utility-scale project approval process; delays in utility-scale project construction; delays in the completion of project sales; continued success in technological innovations and delivery of products with the features that customers demand; shortage in supply of materials or capacity requirements; availability of financing; exchange and inflation rate fluctuations; uncertainties related to the CSI Solar carve-out listing; litigation and other risks as described in the Company's filings with the Securities and Exchange Commission, including its annual report on Form 20-F filed on April 18, 2023. Although the Company believes that the expectations reflected in the forward-looking statements are reasonable, it cannot guarantee future results, level of activity, performance, or achievements. Investors should not place undue reliance on these forward-looking statements. All information provided in this press release is as of today's date, unless otherwise stated, and Canadian Solar undertakes no duty to update such information, except as required under applicable law.

Investor Relations Contacts:

Isabel Zhang	David Pasquale
Investor Relations	Global IR Partners
Canadian Solar Inc.	Tel: +1-914-337-8801
investor@canadiansolar.com	csiq@globalirpartners.com

FINANCIAL TABLES FOLLOW

The following tables provide unaudited select financial data for the Company's CSI Solar and Recurrent Energy businesses.

Select Financial Data – CSI Solar and Recurrent Energy

Three Months Ended March 31, 2023

(In Thousands of U.S. Dollars, Except Percentages)

	CSI Solar	Recurrent Energy	Elimination and unallocated items [1]	Total
Net revenues	1,709,730	20,052	(28,501)	1,701,281
Cost of revenues	1,394,121	12,843	(23,684)	1,383,280
Gross profit	315,609	7,209	(4,817)	318,001
Gross margin	18.5 %	36.0 %	—	18.7 %
Income (loss) from operations [2]	169,458	(15,205)	(8,649)	145,604

Select Financial Data – CSI Solar and Recurrent Energy

Three Months Ended March 31, 2022

(In Thousands of U.S. Dollars, Except Percentages)

	CSI Solar	Recurrent Energy	Elimination and unallocated items [1]	Total
Net revenues	1,209,994	92,966	(52,611)	1,250,349
Cost of revenues	1,034,165	75,130	(39,837)	1,069,458
Gross profit	175,829	17,836	(12,774)	180,891
Gross margin	14.5 %	19.2 %	—	14.5 %
Income (loss) from operations [2]	31,898	(1,011)	(15,372)	15,515

(1) Includes inter-segment elimination, and unallocated corporate costs not considered part of management's evaluation of business segment operating performance.

(2) Income (loss) from operations reflects management's allocation and estimate as some services are shared by the Company's two business segments.

Select Financial Data - CSI Solar and Recurrent Energy

	Three Months Ended March 31, 2023	Three Months Ended December 31, 2022	Three Months Ended March 31, 2022
	(In Thousands of U.S. Dollars)		
CSI Solar Revenues:			
Solar modules	1,454,876	1,642,144	963,045
Solar system kits	133,587	157,845	90,456
Utility-scale battery storage	9,815	48,992	82,500
Residential battery storage	4,995	686	—
EPC	49,023	20,933	5,323
Others	28,933	27,346	16,059
Subtotal	1,681,229	1,897,946	1,157,383
Recurrent Energy Revenues:			
Solar and battery storage projects	4,621	58,504	78,392
O&M and asset management services	8,687	8,087	7,948
Others (includes electricity sales)	6,744	7,059	6,626
Subtotal	20,052	73,650	92,966
Total net revenues	1,701,281	1,971,596	1,250,349

Canadian Solar Inc.

Unaudited Condensed Consolidated Statements of Operations

(In Thousands of U.S. Dollars, Except Share and Per Share Data)

	Three Months Ended		
	March 31, 2023	**December 31, 2022**	**March 31, 2022**
Net revenues	$ 1,701,281	$ 1,971,596	$ 1,250,349
Cost of revenues	1,383,280	1,622,967	1,069,458
Gross profit	**318,001**	**348,629**	**180,891**
Operating expenses:			
Selling and distribution expenses	88,371	126,313	108,845
General and administrative expenses	78,648	89,207	62,810
Research and development expenses	17,307	20,607	13,280
Other operating income, net	(11,929)	(23,260)	(19,559)
Total operating expenses	**172,397**	**212,867**	**165,376**
Income from operations	**145,604**	**135,762**	**15,515**
Other income (expenses):			
Interest expense	(20,448)	(20,195)	(15,302)
Interest income	7,956	9,287	4,212
Gain (loss) on change in fair value of derivatives, net	7,601	(27,071)	(24,738)
Foreign exchange gain (loss), net	(20,860)	11,610	27,862
Investment income (loss), net	8,380	2,628	(5,524)
Total other expense	**(17,371)**	**(23,741)**	**(13,490)**
Income before income taxes and equity in earnings of affiliates	**128,233**	**112,021**	**2,025**

Income tax benefit (expense)	(28,715)	(21,850)	5,183
Equity in earnings of affiliates	7,311	8,653	1,726
Net income	**106,829**	**98,824**	**8,934**
Less: Net income (loss) attributable to non-controlling interests	**23,117**	**20,990**	**(273)**
Net income attributable to Canadian Solar Inc.	**$ 83,712**	**$ 77,834**	**$ 9,207**
Earnings per share - basic	$ 1.30	$ 1.21	$ 0.14
Shares used in computation - basic	64,517,935	64,505,398	64,028,919
Earnings per share - diluted	$ 1.19	$ 1.11	$ 0.14
Shares used in computation - diluted	71,424,749	71,307,345	64,720,107

Canadian Solar Inc.

Unaudited Condensed Consolidated Statement of Comprehensive Income

(In Thousands of U.S. Dollars)

	Three Months Ended		
	March 31, 2023	**December 31, 2022**	**March 31, 2022**
Net Income	**$ 106,829**	**$ 98,824**	**$ 8,934**
Other comprehensive income (loss):			
Foreign currency translation adjustment	23,250	73,310	7,511
Gain on changes in fair value of available-for-sale debt securities, net of tax	339	306	—
Gain (loss) on interest rate swap, net of tax	(105)	34	190
Share of gain (loss) on changes in fair value of derivatives of affiliate, net of tax	(610)	1,499	—

Comprehensive income	**129,703**	**173,973**	**16,635**
Less: comprehensive income attributable to non-controlling interests	25,162	30,631	1,127
Comprehensive income attributable to Canadian Solar Inc.	**$ 104,541**	**$ 143,342**	**$ 15,508**

Canadian Solar Inc.

Unaudited Condensed Consolidated Balance Sheets

(In Thousands of U.S. Dollars)

	March 31, 2023	December 31, 2022
ASSETS		
Current assets:		
Cash and cash equivalents	$ 848,035	$ 981,434
Restricted cash	1,207,573	978,116
Accounts receivable trade, net	991,168	970,950
Accounts receivable, unbilled	67,886	57,770
Amounts due from related parties	51,190	48,614
Inventories	1,671,544	1,524,095
Value added tax recoverable	192,810	158,773
Advances to suppliers, net	345,633	253,484
Derivative assets	7,761	17,516
Project assets	396,035	385,964
Prepaid expenses and other current assets	267,833	267,941
Total current assets	**6,047,468**	**5,644,657**
Restricted cash	19,925	9,953
Property, plant and equipment, net	1,986,335	1,826,643
Solar power systems, net	471,971	364,816
Deferred tax assets, net	226,765	229,226
Advances to suppliers, net	73,531	65,352
Investments in affiliates	136,449	115,784
Intangible assets, net	14,797	17,530
Project assets	467,567	438,529
Right-of-use assets	153,716	103,600

Amounts due from related parties	35,106	33,489
Other non-current assets	195,693	187,549
TOTAL ASSETS	**$ 9,829,323**	**$ 9,037,128**

Canadian Solar Inc.

Unaudited Condensed Consolidated Balance Sheets (Continued)

(In Thousands of U.S. Dollars)

	March 31, 2023	December 31, 2022
Current liabilities:		
Short-term borrowings	$ 1,761,960	$ 1,443,816
Accounts payable	797,909	805,300
Short-term notes payable	1,620,475	1,493,399
Amounts due to related parties	16,736	89
Other payables	864,097	853,040
Advances from customers	335,207	334,943
Derivative liabilities	11,920	25,359
Operating lease liabilities	9,779	9,810
Other current liabilities	397,122	293,012
Total current liabilities	**5,815,205**	**5,258,768**
Long-term borrowings	862,759	813,406
Convertible notes	226,335	225,977
Liability for uncertain tax positions	5,730	5,730
Deferred tax liabilities	67,930	66,630
Loss contingency accruals	6,887	5,000
Operating lease liabilities	72,852	25,714
Other non-current liabilities	337,560	329,209
TOTAL LIABILITIES	**7,395,258**	**6,730,434**
Equity:		
Common shares	835,543	835,543
Additional paid-in capital	2,785	1,127
Retained earnings	1,359,232	1,275,520
Accumulated other comprehensive loss	(149,722)	(170,551)
Total Canadian Solar Inc. shareholders' equity	**2,047,838**	**1,941,639**
Non-controlling interests	386,227	365,055

TOTAL EQUITY	2,434,065	2,306,694
TOTAL LIABILITIES AND EQUITY	$ 9,829,323	$ 9,037,128

View original content:https://www.prnewswire.com/news-releases/canadian-solar-reports-first-quarter-2023-results-301828321.html

SOURCE Canadian Solar Inc.

Appendix L Q6.0.1 Written Scheme of Investigation (WSI) for Pre-Application Trial Trenching

Cotswold Archaeology

Mallard Pass Solar Farm DCO
Rutland & Lincolnshire

Written Scheme of Investigation for an Archaeological Evaluation

for:
LDA Design Consulting Ltd

CA Project: MK0789

Site code; ESMP22

Rutland Accession Number; OAKRM: 2022.49

Lincolnshire Accession Number; LCNCC: 2022.131

November 2022

Mallard Pass Solar Farm DCO
Rutland & Lincolnshire

Written Scheme of Investigation for an Archaeological Evaluation

CA Project: MK0789

Document Control Grid						
Revision	Date	Author	Checked by	Status	Reasons for revision	Approved by
1	30.08.22	Anna Wolf	Adrian Scruby	Issue 1	–	Adrian Scruby
2	14.10.22	Anna Wolf	Adrian Scruby	Issue 2	Lincs Historic Places Team comments	Adrian Scruby
3	24.10.22	Anna Wolf	Adrian Scruby	Issue 3	Lincs Historic Places Team comments	Adrian Scruby
4	07.11.22	Anna Wolf	Adrian Scruby	Issue 4	Lincs Historic Places Team comments	Adrian Scruby

Cirencester	**Milton Keynes**	**Andover**	**Suffolk**
Building 11 Kemble Enterprise Park Cirencester Gloucestershire GL7 6BQ **t.** 01285 771 022	Unit 8, The IO Centre Fingle Drive, Stonebridge Milton Keynes Buckinghamshire MK13 0AT **t.** 01908 564 660	Stanley House Walworth Road Andover Hampshire SP10 5LH **t.** 01264 347 630	Unit 5, Plot 11 Maitland Road Lion Barn Industrial Estate Needham Market Suffolk IP6 8NZ **t.** 01449 900 120
e. enquiries@cotswoldarchaeology.co.uk			

CONTENTS

1. INTRODUCTION

1.1. This document is a Written Scheme of Investigation (WSI) by Cotswold Archaeology (CA) for an archaeological evaluation of land within the surrounding environs of Essendine, Rutland, and extending across the border into the South Kesteven administrative area of Lincolnshire (see 1.4 below). This WSI has been prepared at the request of LDA Design Consulting Ltd and the works, which follow on from an Archaeological Desk-based Assessment (dba) and geophysical survey, are intended to be undertaken post-harvest in Autumn 2022 with a view to further assessing the site for areas of significant or complex archaeological remains.

1.2. An application for a Development Consent Order is to be submitted for the construction of a solar farm within the Site, consisting of solar panel arrays, access routes, compounds, and the installation of underground cable routes. A Scoping Opinion was produced on 18 March 2022 by the Planning Inspectorate (on behalf of the Secretary of State). This states that a desk-based assessment and geophysical survey of the Site should be undertaken as a minimum, and the need for selective trial trenching should be established with the relevant Local Planning Authority archaeological advisors.

1.3. This WSI has been guided in its composition by the *Standard and guidance for archaeological field evaluation* (CIfA 2014; updated October 2020), *Management of Research Projects in the Historic Environment (MoRPHE) PPN 3: Archaeological Excavation* (Historic England 2015) and *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England 2015). This WSI will be submitted to the relevant local planning authorities for review; while the trenching methodology will be agreed by the relevant Local Authority archaeological advisors the attached trenching plans, dated 13th of September 2022, have not been agreed.

The Site

1.4. The proposed development site is approximately 350ha in extent, comprising a number of separate land parcels presently in use as arable fields to the north of Ryhall, to the east and west of Essendine in Rutland, and to the west of Braceborough and Greatford, Lincolnshire (hereafter referred to as 'the Site'; centred at NGR: 505490 312483). The Site occupies a generally flat landscape with gently rolling hills and slight undulations. The elevations within the Site lies at 26m aOD toward the

village of Essendine, rising to between 32 and 33m aOD within the eastern and south-eastern areas of the Site. Within the western area of the Site the landscape rises to approximately 58m aOD.

1.5. The bedrock geology of the Site is comprised of three 3 differing types (BGS 2022). Predominantly within the eastern part of the Site, but also extending towards the centre in areas, are the Kellaways Formation and Oxford Clay Formation – mudstone, siltstone and sandstone, sedimentary bedrock formed approximately 156 – 165 million years ago. Within the centre and western parts of the Site are the Great Oolite Group – sandstone, limestone and argillaceous rocks, and Inferior Oolite Group – limestone, sandstone, siltstone and mudstone. These sedimentary bedrocks were formed approximately 165 to 176 million years ago in the Jurassic Period (BGS 2022).

1.6. Superficial deposits are present, predominately within the eastern half of the Site and forming discrete areas (BGS 2022). Alluvium composed of clay, sand and gravels, and sand and gravel River Terrace Deposits, both formed up to 3 million years ago in the Quaternary Period, meander through the village of Essendine out toward Belmesthorpe to the south-east. Further discrete patches of Head deposit, composed of clay, silt, sand and gravels, also formed in the Quaternary period, are present within the centre of the Site. Within the eastern part of the Site recorded superficial deposits comprise patches of Mid Pleistocene Glaciofluvial Deposits composed of sand and gravels, and Mid Pleistocene Till, consisting of diamicton (terrigenous sediment with particles ranging from clay to boulders) formed up to 2 million years ago in the Quaternary Period within a local environment dominated by ice age conditions.

1.7. Borehole samples are recorded within the Site (BGS 2022) and depths of soils and geology are summarised below. Within the south-eastern area of the Site, boreholes undertaken in 1959 recorded 0.3m of soil overlaying river gravels and Oolite Series. To the east of Essendine, boreholes undertaken in 1980 recorded 0.2m of topsoil overlying brown clays with much gravel 0.6m thick, which in turn overlaid firm sandy clays with gravels. To the immediate west of Essendine, boreholes undertaken in 1959 recorded 0.3m of topsoil overlying Upper Estuarine Clays. Boreholes undertaken in 1958 within the furthest western area of the Site recorded 0.15m of soil overlying the Lincolnshire Limestone.

1.8. An archaeological excavation undertaken in the centre of the Site recorded topsoil measuring 0.3m in thickness overlaying a subsoil 0.1m to 0.2m thick, which in turn overlaid the natural geology (Dodd 2015).

1.9. Geophysical survey (Magnitude Surveys 2022; see below) has identified a network of paleochannels and large natural anomalies across the Site. These potential palaeochannels may have drained toward fenland located to the east of the Site.

2. ARCHAEOLOGICAL BACKGROUND

2.1. A detailed archaeological background of the Site and surrounding areas, including detailed map regressions and information regarding known archaeological sites and findspots in the wider area, will be presented in a Heritage Desk-Based Assessment currently being prepared (HDBA; CA 2022). Additionally, a programme of geophysical survey has been carried out covering the majority of the proposed development area (Magnitude 2022). The following text represents a summary of these sources.

Palaeolithic

2.2. Early prehistoric finds have been identified within recorded palaeochannels towards the centre of the of the Site. Further natural variations were detected across the Site during the geophysical survey (Magnitude Surveys 2022). The survey recorded particularly strong anomalies (variations in the structure of the subsoil indicative of potential human activity) which were interpreted as natural palaeochannels in the north-west. In addition, a single findspot within the eastern area of the Site comprised a Lower Palaeolithic handaxe.

Mesolithic

2.3. The Mesolithic/Neolithic period is represented by flint scatters to the north-east of The Freewards within the centre of the Site, located between 2 palaeochannels on the valley floor of the West Glen River. The size of the assemblage suggests there was significant Mesolithic/Early Neolithic settlement (Dodd 2015). Further evidence of the Mesolithic and Neolithic periods is located c. 670m to the south of the Site. This activity comprised of concentrations of worked flint and fired clay interpreted as Mesolithic hearths.

Neolithic

2.4. Potential Neolithic worked flint was recovered within the centre of the Site, a polished flint axe within the centre of the Site (recorded by the PAS), and to the south, and a

Scheduled Neolithic causewayed monument is located c. 180m to the south of the Site. The monument is located in a valley-side location and tilted to overlook the low-lying ground in the valley toward the west (Oswald et al 2001).

Bronze Age

2.5. The Site is located within a landscape of known prehistoric funerary activity, with multiple recorded possible Bronze Age barrows, represented as ring-ditches, in the south-east in Field 53, and the centre of the Site in Field 35, and two others recorded to the south of the Site. Two other potential Bronze Age barrow cropmarks are located c. 800m to the east, and c. 180m to the north-east of the Site. Some of these possible barrows have been identified during the recent geophysical survey within the Site, and some as cropmarks with the Site c. 200m to the east of Essendine Castle. while others had already been known from cropmarks noted on aerial photographs outside of the Site boundary. This evidence suggests that the landscape within the centre of the Site formed an important focus for prehistoric funerary activity. Surrounding the possible Bronze Age round barrows (Field 82) to the south and south-west are multiple cropmarks forming enclosures that might be of prehistoric in date possibly associated with these potential barrows. Further Bronze Age and prehistoric activity within the Site comprises findspots of pottery and possible worked flint across the Site. Further Bronze Age activity is recorded immediately adjacent to the Site along the route of proposed highway works and comprises a triple ditch cropmark.

Iron Age

2.6. The remains of an unenclosed settlement consisting of three possible structures, pits/postholes and three possible ovens, along with 500 pottery sherds was identified within the centre of the Site, dating to the Late Bronze Age/Early Iron Age (Davies and Parker 2014). The remains of another possible settlement are recorded within the centre of the Site, along with multiple linear and curvilinear ditches surrounding settlement site identified on the geophysical survey. The recorded settlement comprised of pits, post holes, ditches and a possible waterhole dating from the 5th to 2nd centuries BC (Dodd 2015). It might be possible that the two settlement sites form part of a larger singular settlement within this part of the landscape. It must be noted that the Iron Age settlement is located close to the historic route of the West Glen River, located to the immediate north of the settlement's location, therefore the river maybe an indicator as to why the settlement is situated where it is. The undulating

flood plain of the former river course is recorded on the LiDAR imagery of the Site, therefore the location of the river may have been a factor in the settlement's location.

2.7. Further Iron Age activity within the wider area comprises of a large double-ditched enclosure c. 260m to the south-west of the Site. A watching brief of the installation of a gas pipe recorded features and pottery dating to the Middle Iron Age (Liddle 1983). Late Iron Age settlement remains are located c. 100m from the Site in Great Casterton, comprised of ditches and burials.

2.8. Further features, potentially associated with prehistoric or Roman settlement activity, were identified by the geophysical survey. These anomalies were composed of rectilinear enclosures, with linear and curvilinear ditches and possible internal features. The morphology (shape) of these anomalies suggest that they may be the remains of settlements and a wider network of agricultural land divisions.

2.9. Within the north-western part of the Site, the geophysical survey identified possible ring ditches and an enclosure (again indicative of the remains of roundhouses and property / field boundaries), features previously identified on air photos. At various other locations across the Site, similar linear and curvilinear anomalies were detected.

2.10. Further remains are recorded within the Site and study area which are broadly prehistoric in date. These include: an enclosure and boundary ditch located within the southern area of the Site, an enclosure c. 150m to the east of the Site, a settlement c. 1km to the east, and a ring ditch c. 500m to the north.

2.11. Across the Site the geophysical survey identified multiple areas of possible later prehistoric or Roman period settlement activity (Magnitude Surveys 2022) which were also identified as cropmarks. The survey identified possible remains of a complex of enclosures and agricultural features. Roman period pottery has been recorded to the south of this area and suggests a Romano-British origin for these anomalies (Magnitude Surveys 2022). Further anomalies interpreted as potential enclosures with settlement activity and ring ditches within them were recorded to the south-east of the main activity.

Romano-British

2.12. Known recorded Roman period remains within the Site comprise findspots of material including pottery sherds, individual coins and industrial waste. Further findspots of a metal brooch and coin within the wider area are recorded by the PAS around the village of Ryhall c. 1.2km to the south of the Site. The recorded location of the PAS findspots are not accurate but give an indication to Roman activity within the landscape.

2.13. A stone sarcophagus was recovered within the eastern area of the Site. The sarcophagus contained a male skeleton with 2 glass vessels and a dish dated to the 4th century (Hurley 1991). The recent geophysical survey of the Site recorded multiple enclosures with internal features close to the findspot of the stone sarcophagus, and therefore could be associated with this possible settlement activity.

2.14. Cropmarks of potential Roman in date are located within the Site c. 80m to the east of Essendine Castle. Further recorded Roman settlement activity was recorded c. 1km to the south-west of the Site. This activity comprised of multiple linear ditches interpreted as drainage ditches and flood defences near to the River Gwash, along with ceramic building material indicating the presence of a Roman building nearby (Archaeological Project Services 2007).

2.15. Extensive Roman period settlement and activity is recorded to the south-west of the Site, within and around the village of Great Casterton. The settlement began as the fort in the 1st century, located on the north-eastern edge of the current village *c*.4km to the south-west of the Site, and expanded to become a major settlement spanning around Ermine Street. It is deduced that this settlement flourished, and it is known that the rampart bank was built on the remains of earlier settlement buildings. During the end of the 2nd century and the beginning of the 3rd century the town wall was built, which from evidence from excavations was 2.1m wide at its base with a 6.5m wide ditch in front of the wall (Great Casterton Parish Council 2022). A villa or farmhouse was built in the 4th century AD c. 400m outside the eastern defences of the town to the north-east. The town and villa were occupied well into the 5th century AD.

Early medieval

2.16. One findspot is recorded within the centre of the Site, comprising an Anglo-Saxon pot found during the construction of the Stamford & Essendine Railway in 1868, however

the location of the findspot is an approximation based on a contemporary account (Meaney 1964). An early medieval watermill is located c. 870m to the south-west of the Site, but immediately to the south of the A6121 in Ryall.

2.17. The remains of an Anglo-Saxon cemetery were encountered during emergency excavation carried out in 1966 due to a road widening scheme on the north-eastern edge of Great Casterton, *c*.4km to the south-west of the Site. A total of 35 Anglo-Saxon cremations and 15 inhumations were recorded during these works. The burials contained grave goods included an ivory purse ring, 17 bone gaming pieces, a blue-green glass bead, bone combs, copper alloy tweezers, iron tweezers, a miniature iron razor, iron tang fragment, greenish-blue glass vessel, bone beads, an ivory ring, blue glass rod, and an H-shaped iron plate (Leicestershire Archaeological and Historical Society 2015).

2.18. The Site is situated within a landscape with multiple settlements recorded in the 1086 Domesday Book, which will usually infer they have early medieval origins. The settlement of Essendine located immediately next to the Site boundary was recorded as having 22 households with 16 villagers, 2 smallholders and 1 slave. The settlement included ploughlands, meadow, woodland and a mill under the lordship of the Bishop of Lincoln (Powell-Smith ND). The origin of the name of Essendine derives from the Old English 'Esa's valley' (University of Nottingham ND).

Medieval

2.19. The Site was likely to have been rural in character with dispersed woodland throughout the medieval period, being the agricultural hinterland for the surrounding villages within Rutland and Lincolnshire.

2.20. Within the eastern part of the Site is the approximate location of Essendine deer park (Fig. 4: 24), associated with Essendine Castle. The park has is origins in the 13th century, but later the park of Essendine was granted to Cecily, Duchess of Warwick, in 1447. It then contained 200 acres of wood, 200 acres of land and 20 acres of meadow (Page 1935). Modern Post-War farming methods have however completely altered the landscape to form very large open flat fields.

2.21. Located outside of the Site is the historic settlement core of Essendine. Within this historic core, located c. 60 to the west of the Site is the Scheduled Monument of Essendine Castle, constructed during the late 12th or early 13th century, and the

Grade II* Listed Church of St Mary, immediately to the south of the castle, built in the 12th century. The church is said to have been not the parish church but the chapel of castle, in whose bailey the church is sited. Located to the immediate north and south of Essendine Castle are the remains of fishponds which were likely fed by the West Glen River which flows north to south along the boundary of the castle and fishponds. To the immediate east of Essendine Castle is the location of a watermill, which was also mentioned in the Domesday Book, and referred to in the 14th and 15th centuries (Page 1935).

2.22. To the immediate west of the Essendine Castle are the cropmarks and earthworks of the medieval village forming a number of pits. There is at least one building site and a possible windmill mound.

2.23. To the north-west of the Site at a c. 300m distance is the Scheduled Monument of Castle Dyke (NHLE: 1019097) and Castle Dike Wood. Castle Dyke is the remains of moated manor site with a platform surrounded by a ditch and possibly dates to the 12th century and associated with the deserted medieval village of Aunby nearby.

2.24. Extensive ridge and furrow remains are recorded within the Site and the eastern part of the study area, illustrating that previous agricultural remains are present as above ground earthworks around the Site. The ridge and furrow remains within the Site were identified as part of the recent geophysical survey undertaken in 2022, along with striations related to agricultural activity (Magnitude Surveys 2022).

Post-medieval and modern

2.25. The Site and surrounding area appear to have retained an essentially rural character throughout the post-medieval and modern periods.

2.26. Remains dating to the post-medieval period are located within the Site. These remains comprise of agricultural features such as ridge and furrow, ditches and field boundaries identified on the accompanying geophysical survey undertaken for the present application (Magnitude Surveys 2022). In addition, within the eastern end of the Site post-medieval settlement remains are present, north of Banthorpe Wood. These remains include possible buildings, ponds and drains identified on the National Mapping Programme, but aerial photography from c. 2000 shows that these features no longer survive as earthworks (CA 2022).

2.27. Three railway lines were constructed within the mid-19th century and cross the middle of the Site. The Great North Railway running north-west to south-east was constructed in 1856. Two spurs of the railway line come off of the Great North Railway Line and head north and south. The northern route is the former Essendine & Bourne Branch opened in in 1860 and went out of use in 1965. The route of the line is preserved within the Site as a hedge line and earthwork to the east of Essendine. The former route of the southern line was Stamford & Essendine Railway that opened in 1856 and was closed in the 1960s also. The railway line is preserved within the Site as a treeline and earthwork also.

Geophysical survey (Magnitude 2022)

2.28. The geophysical survey results indicate the presence of probable and possible archaeological features, interpreted as relating most likely to late prehistoric and Roman settlement, agriculture and burial practices. Further anomalies relating to the historical and modern agricultural use of the landscape are also evident across the survey area in the form of ridge and furrow cultivation regimes, modern ploughing trends, mapped former field boundaries and field drains.

2.29. The natural geological anomalies identified across the Site indicate the presence of palaeochannels or historic streams or riverbeds, particularly within the north-west of the Site. Illustrating that the landscape contained numerous rivers and streams than at present. These river channels are predominantly located within the north-west of the Site, within the centre and toward the north and south.

2.30. Archaeological remains identified within the Site by the geophysical survey are located in denser concentrations within the southern, eastern and central areas of the Site. Across the Site the anomalies identified as archaeological remains correspond with the pattern of cropmarks within the landscape, in particular those which have been identified as possible prehistoric funerary sites, Iron Age settlement and other prehistoric enclosures. Those anomalies within the centre of the Site and where the anomalies are at their densest, also correspond with the density of cropmarks within that area interpreted as representing settlement activity. Within the south-eastern area of the Site, the geophysical survey identified multiple concentrations of possible settlement activity in the form of enclosures, ring ditches which could be roundhouses, and field divisions. Further ring ditches that may indicate previously unrecorded funerary activity are located within an eastern area of the Site. Other

possible prehistoric and/ or Roman enclosures, ring ditches and discrete features were also identified, primarily within the central, southern and eastern areas of the Site. Concentrations of possible enclosures and settlement are located near to Grange Farm within the north-eastern area of the Site, within the area of a previously identified Roman stone sarcophagus.

2.31. Further linear features interpreted as agricultural features, and extensive ridge and furrow were recorded across the Site as part of the geophysical survey. These features are anticipated to primarily date from the medieval period onwards.

3. AIMS AND OBJECTIVES

3.1. The specific objective of the evaluation is to investigate potential archaeological features identified by the desk-based assessment, the geophysical survey (Magnitude 2022) and LiDAR data. work is intended to be undertaken post-harvest in Autumn 2022 with a view to confirming the presence/ absence of significant or complex archaeological remains.

3.2. If significant archaeological remains are identified, the evaluation report will make reference to the *East Midlands Historic Environment Research Framework* (2020) so that the remains can, if possible, be placed within their local and regional contexts.

4. METHODOLOGY

4.1. The evaluation will comprise the excavation of 209no. trenches, each measuring 50m long by 2m wide, in the locations shown in Figure 2. The trenches have been located to test anomalies identified through geophysical survey and LIDAR data.

4.2. Trenches will be set out on OS National Grid co-ordinates using Leica GPS. They will be scanned for live services by trained CA staff using CAT and genny equipment, in accordance with the *CA Safe System of Work for avoiding underground services*. The positions of the trenches may be adjusted on site to account for services or other constraints, with the approval of the Archaeological Advisor.

4.3. Overburden will be stripped from the trenches by a mechanical excavator fitted with a toothless grading bucket. All machining will be conducted under archaeological supervision and will cease when the first significant archaeological horizon or natural substrate is revealed (whichever is encountered first). The depth of the natural

substrate will be established in all trenches, including by means of machine excavated sondages; trenches will be stepped out where necessary to maintain a safe working depth; and, all trenches will be weathered out and will be checked thoroughly for any emerging features which require further investigation. Topsoil and subsoil will be stored separately adjacent to each trench.

4.4. Following machining, any archaeological features present will be investigated, planned and recorded in accordance with *CA Technical Manual 1: Fieldwork Recording Manual*. Each context will be recorded by written and measured description. Records will be entered directly into the CA Digital Recording System (DRS) and/or onto pro-forma site recording sheets. Hand-drawn sections of excavated archaeological features will be prepared (scale 1:10 or 1:20, as appropriate). Features/deposits will be recorded in plan using Leica GPS or Total Station (as appropriate), in accordance with *CA Technical Manual 4: Survey Manual*. Photographs (digital colour) will be taken as appropriate using a digital SLR.

4.5. Sample excavation of archaeological deposits will be sufficient to achieve the aims and objectives identified in Section 3 (above). All trenches and features will be excavated/ investigated to natural and all exposed archaeological features will be investigated and recorded by hand, unless otherwise agreed with the Archaeological Advisor. Investigation slots through all linear features will be at least 1m in length. Discrete features will be half-sectioned or excavated in quadrants where they are large. Trenches will be stepped or tested by sondage to facilitate investigation of the full deposit sequence/ deep excavation; hand auger will be used where excavation of deep features continues below a level that is not practicable or safe at this stage of investigation (e.g. wells). Where structural features, hearths, kilns, ovens or areas of complex remains are encountered then any excavation will not compromise the integrity of the archaeological record and will be carried out in such a way as to allow for the subsequent protection of remains, either for conservation or to allow more detailed investigations to be conducted at a later date.

4.6. Upon completion of the evaluation, all trenches will be backfilled by a mechanical excavator. Trenches in the South Kesteven administrative area will not be backfilled without sign-off from the Historic Places Team, Lincolnshire County Council.

Artefacts

4.7. Artefacts will be recovered and retained for processing and analysis in accordance with *CA Technical Manual 3: Treatment of Finds Immediately after Excavation*. Artefacts will be collected and bagged by context. Artefacts from topsoil, subsoil and unstratified contexts will normally be noted but not retained unless they are of intrinsic interest. All artefacts from stratified excavated contexts will be collected, except for large assemblages of post-medieval or modern material. In agreement with the archaeological advisor, such material may be noted and not retained or, if appropriate, a representative sample may be collected and retained.

Environmental remains

4.8. The selection, collection and processing of environmental samples will follow the guidelines outlined in *Environmental Archaeology: A guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011) and *CA Technical Manual 2: The Taking and Processing of Environmental and Other Samples from Archaeological Sites*.

4.9. Due care will be taken to identify deposits which may have environmental potential and, where appropriate, a programme of environmental sampling will be initiated. The sampling strategy will be adapted for the specific circumstances of the Site, in close consultation with the CA Environmental Officer, the Archaeological Advisor and, where required, the Historic England regional Science Advisor (Matthew Nicholas), but will follow the general selection parameters set out in the following paragraphs.

4.10. Secure, phased deposits, especially those related to settlement activity and/or structures, will be considered for sampling for the recovery of charred plant remains, charcoal and mineralised remains. Any cremation-related deposits (where excavated; see *Human remains*, below) will be sampled appropriately for the recovery of cremated human bone and charred remains. If any evidence of *in situ* metal working is found, suitable samples will be taken for the recovery of slag and hammerscale.

4.11. Where sealed waterlogged deposits are encountered, samples will be considered for the recovery of waterlogged remains (including insects, molluscs and pollen) and any charred remains. The taking of sequences of samples for the recovery of molluscs and/or waterlogged remains will be considered through any suitable deposits, such as deep enclosure ditches, barrow ditches, palaeochannels, or buried soils. Monolith

samples may also be taken from suitable deposits as appropriate to allow soil and sediment description/interpretation, as well as sub-sampling for pollen and other micro/macrofossils such as diatoms, foraminifera and ostracods.

4.12. The need for more specialist samples (such as OSL, archaeomagnetic dating and dendrochronology) will be evaluated on site. If required, any such samples will be taken in consultation with the relevant specialists and/ or the Historic England Science Advisor.

4.13. Sample processing will be carried out in conjunction with the relevant specialists. Flotation or wet sieve samples will be processed to 0.25mm. More specialist samples, such as those for pollen, will be prepared by the relevant specialists.

Treasure

4.14. Upon discovery of treasure, CA will notify the Client and relevant Archaeological Advisor/ PAS officer immediately. CA will comply fully with the provisions of the Treasure Act 1996 and the Code of Practice referred to therein. Findings will be reported to the Coroner within 14 days.

Human remains

4.15. Upon discovery of human remains, CA will notify the Client and the relevant Archaeological Advisor immediately. Any human remains (skeletal or cremated) will be treated with due decency and respect at all times.

4.16. Small slots will be hand-excavated across any suspected burial features (inhumations or cremated bone deposits) in order to confirm the presence and condition of any human bone. Once confirmed as human, the buried remains will not normally be disturbed through any further investigation at the evaluation stage, and will be left *in situ* where possible.

4.17. Where further disturbance is unavoidable, or where full exhumation of the remains is deemed necessary, exhumation will be conducted following the provisions of the Coroner's Unit in the Ministry of Justice. All excavation of human remains and associated post-excavation processes will be in accordance with the standards set out in *Updated Guidelines to the Standards for Recording Human Remains* (CIfA 2017), *The Role of the Human Osteologist in an Archaeological Fieldwork Project*

(Historic England 2018) and *Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England* (APABE 2017).

5. PROGRAMME

5.1. It is anticipated that the project fieldwork will require approximately 6 weeks to complete, including backfilling. It is anticipated that analysis of the results and subsequent reporting will take up to a further six to eight weeks.

6. PROJECT STAFF

6.1. This project will be under the management of Adrian Scruby, Principal Fieldwork Manager, CA (the Project Manager). The Project Manager will direct the overall conduct of the evaluation during the period of fieldwork. Day-to-day responsibility will, however, rest with the Project Leader, who will be on-site throughout the project.

6.2. The field team will consist of a maximum of up to 12no. staff (one Project Officer, 1 Project Supervisor and up to 10no. Archaeologists).

6.3. Specialists who may be invited to advise and report on specific aspects of the project as necessary are:

- **Ceramics:** Ed McSloy BA (Hons) MCIfA (CA), Alejandra Gutierrez BA (Hons) PHd MCIfA (CA), Peter Banks LLB LLM PCIfA (CA), Ian Rowlandson (freelance)
- **Metalwork:** Ed McSloy MCIfA (CA)
- **Flint:** Jacky Sommerville PCIfA (CA), Pippa Bradley BA MPhil Dip Post-Ex MCIfA (CA), Jack Martin-Jones (CA)
- **Animal bone:** Andy Clarke BA ACIfA (Hons) MA (CA) and Matilda Holmes PhD BSc MSc ACIfA (freelance)
- **Human bone:** Sharon Clough MCIfA (CA)
- **Environmental remains:** Sarah Wyles MCIfA (CA); Emma Aitken (CA)
- **Conservation:** Pieta Greeves BSc MSc ACR (Drakon Heritage and Conservation)
- **Geoarchaeology:** Dr Keith Wilkinson (ARCA)

6.4. Depending on the nature of the deposits and artefacts encountered, it may be necessary to consult other specialists not listed here. A full list of specialists currently used by CA is given as Appendix A.

7. POST-EXCAVATION, REPORTING AND ARCHIVING

Reporting

7.1. An illustrated typescript report will be compiled on the evaluation results. This report will include:

- an abstract preceding the main body of the report, containing the essential elements of the results;
- a summary of the project's background;
- a description and illustration of the site location;
- a methodology of the works undertaken;
- integration of, or cross-reference to, appropriate cartographic and documentary evidence and the results of other research undertaken, where relevant to the interpretation of the evaluation results;
- a description of the evaluation results;
- an interpretation of the evaluation results, including a consideration of the results within their wider local/regional context;
- a site location plan at an appropriate scale on an Ordnance Survey (or equivalent) base-map;
- a plan showing the locations of the trenches in relation to the site boundaries;
- plans of each trench, or part of trench, in which archaeological features were recorded. These plans will be at an appropriate scale to allow the nature of the features to be shown and understood. Plans will show the orientation of trenches in relation to north. Section drawing locations will also be shown on these plans. Archaeologically sterile areas will not normally be illustrated;
- appropriate section drawings of trenches and archaeological features. These drawings will include OD heights and will be at scales appropriate to the stratigraphic detail being represented. Drawings will show orientation in relation to north/south/east/west;
- photographs showing significant archaeological features and deposits that are referred to in the text. All photographs will contain appropriate scales, the size of which will be noted in the photograph captions;

- summary tables of the recorded contexts and recovered artefacts;
- a summary of the contents of the project archive and details of its location;
- specialist assessment or analysis reports (where undertaken). Specialist artefact and palaeoenvironmental assessments will take into account the wider local/regional contexts and will include:
    - specialist aims and objectives;
    - processing methodologies (where relevant);
    - any known biases in recovery, or problems of contamination/residuality;
    - quantities of material; types of material present; distribution of material;
    - for environmental material, a statement on abundance, diversity and preservation;
    - a summary and discussion of the results, to include significance in a local and regional context.

7.2. The draft evaluation report will be distributed to the Client and Archaeological Advisor for review prior to finalisation. All copies of the report (draft and final) will be issued in pdf format.

Academic and public dissemination

7.3. It is anticipated that a short note on the evaluation results will be produced for inclusion within an appropriate local archaeological journal(s).

7.4. Subject to any contractual constraints, a summary of information from the project will be entered onto the OASIS online database of archaeological projects in Britain. This will include a digital (pdf) copy of the final report, which will also appear on the Archaeology Data Service (ADS) website once the OASIS record has been verified.

7.5. A digital (pdf) copy of the final report will also be made available for public viewing via CA's *Archaeological Reports Online* web page at:

http://reports.cotswoldarchaeology.co.uk

Archive deposition

7.6. All artefacts and environmental samples will be processed, assessed, conserved and packaged in accordance with CA technical manuals and the relevant recipient museum guidelines. CA has made arrangements with Rutland County Museum and

Lincolnshire County Council Heritage Service for the deposition of the site archive and, subject to agreement with the legal landowner(s), the artefact collection. Confirmation has been obtained from Rutland County Museum & The Collection Museum (Lincolnshire County Council) that the site archive will be split geographically and deposited with the relevant museum under the following accession numbers:

Rutland Accession Number; OAKRM: 2022.49

Lincolnshire Accession Number; LCNCC: 2022.131

7.7. An ordered, indexed, and internally consistent site archive will be prepared in accordance with the *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA 2014; updated October 2020), *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation* (Archaeological Archives Forum 2007) and *Standard and Guide to Best Practice for Archaeological Archiving in Europe: EAC Guidelines 1* (Europae Archaeologia Consilium 2019), as well as the relevant recipient museum guidelines.

7.8. Depending on the nature and scope of any subsequent archaeological works required at the site, the project archive may be combined with that for any subsequent works and deposited as a single archive. Confirmation of this will be included in any forthcoming WSI.

Selection strategy

7.9. As noted above, artefacts from topsoil, subsoil and unstratified contexts will normally be noted but not retained unless they are of intrinsic interest. All artefacts from stratified excavated contexts will be collected, except for large assemblages of post-medieval or modern material. Such material may be noted and not retained or, if appropriate, a representative sample may be collected and retained.

7.10. The site-selected material archive returned to the CA offices will be reviewed following analysis. Stakeholders will make selection decisions based on CA Finds Manager/Officer reports and selection recommendations. The selection will take place during archive compilation. After discussion with the relevant museum curator and the CA Finds Managers/Officers, it is possible that no material postdating AD 1800 will be retained for inclusion in the preserved archive.

Digital archive

7.11. A digital archive will be deposited with the Archaeology Data Service (ADS). This archive will be compiled in accordance with the *ADS Guidelines for Depositors*.

Data management

7.12. All born-digital and digitally-transferred project data created during fieldwork and post-excavation (other than duplicated files) will be stored by CA. Upon project completion and deposition, the data will be transferred to a secure external server. Data will be selected for inclusion in the final digital archive, as detailed below. It is proposed that data selection will occur following completion of post-excavation work.

7.13. Selected digital files will be transferred to the ADS, in line with the relevant guidance and standards. In adherence to CA's *Guidelines for essential archive tasks and the preparation of archives* (2017), it is proposed that the selected files will include final versions only. Digital photographs will be selected for inclusion in the archive in line with CA's *Guidelines for essential archive tasks and the preparation of archives* (2017) and *Digital Image Capture and File Storage: Guidelines for Best Practice* (Historic England 2015). Data produced by external specialists or sub-contractors will be granted under license to CA to allow inclusion in the digital archive as required.

8. HEALTH, SAFETY AND ENVIRONMENT

8.1. CA will conduct all works in accordance with the Health and Safety at Work Act 1974 and all subsequent health and safety legislation, as well as the CA Health and Safety and Environmental policies and the CA Safety, Health and Environmental Management System (SHE). Any client/developer/Principal Contractor policies and/or procedures will also be followed. A site-specific Construction Phase Plan (form SHE 017) will be formulated prior to commencement of fieldwork.

9. INSURANCES

9.1. CA holds Public Liability Insurance to a limit of £15,000,000 and Professional Indemnity Insurance to a limit of £10,000,000.

10. MONITORING

10.1. Notification of the start of site works will be made to the relevant archaeological advisors so that there will be opportunities to visit the evaluation and check on the quality and progress of the work. Trenches in the South Kesteven administrative area

will not be backfilled without sign-off from the Historic Places Team, Lincolnshire County Council.

11. QUALITY ASSURANCE

11.1. CA is a Registered Organisation (RO) with the Chartered Institute for Archaeologists (RO Ref. No. 8). As a RO, CA endorses the Code of Conduct (CIfA 2019) and the *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment* (CIfA 2014; updated October 2020). All CA Project Managers hold Member status within the CIfA.

11.2. CA operates an internal quality assurance system as follows: projects are overseen by a Project Manager, who is responsible for the quality of the project. The Project Manager reports to the Chief Executive, who bears ultimate responsibility for the conduct of all CA operations. Matters of policy and corporate strategy are determined by the Board of Directors and, in cases of dispute, recourse may be made to the Chairman of the Board.

12. PUBLIC ENGAGEMENT, PARTICIPATION AND BENEFIT

12.1. It is not anticipated that this evaluation will afford opportunities for public engagement or participation during the course of the fieldwork. However, the evaluation results will be made publicly available on the ADS and CA websites, as set out in Section 7.

13. STAFF TRAINING AND CPD

13.1. CA has a fully documented mandatory performance management system for all staff. This system reviews personal performance, identifies areas for improvement, sets targets and ensures the provision of appropriate training within CA's adopted training policy. In addition, CA has developed an award-winning career development programme for its staff. This ensures a consistent and high-quality approach to the development of appropriate skills.

13.2. As part of CA's requirement for continuing professional development, all members of staff are required to maintain a personal development plan and an associated log; these are reviewed within the performance management system.

14. REFERENCES

ADS (Archaeology Data Service) 2021 *Guidelines for Depositors*

APABE (Advisory Panel on the Archaeology of Burials in England) 2017 *Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England*

BGS (British Geological Survey) 2022 *Geology Viewer* https://geologyviewer.bgs.ac.uk/?_ga=2.85880985.1050205140.1659354252-1913367769.1659354252 Accessed 26 August 2022

CA (Cotswold Archaeology) 2022 *Mallard Pass Solar Farm, Essendine, Rutland: Heritage Desk-Based Assessment* CA ref. MK0487_1 (in prep)

CIfA (Chartered Institute for Archaeologists) 2017 *Updated Guidelines to the Standards for Recording Human Remains*

CIfA (Chartered Institute for Archaeologists) 2019 *Code of Conduct*

CIfA (Chartered Institute for Archaeologists) 2020a *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*

CIfA (Chartered Institute for Archaeologists) 2020b *Standards and guidance for field evaluation*

CIfA (Chartered Institute for Archaeologists) 2020c *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*

Dodd, M. 2015 *Final Report on an Archaeological Strip, Plan and Record Excavation at Ryhall Substation, Cable Trench Route, Rutland*. Trent & Peak Archaeology: Nottingham

Great Casterton Parish Council 2022 *History of the Village from Roman Times* https://www.greatcastertonpc.org.uk/history.html (accessed 09/05/2022)

East Midlands Historic Environment Research Framework 2022 https://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main

HE (Historic England) 2015a *Management of Research Projects in the Historic Environment (MoRPHE) PPN 3: Archaeological Excavation*

HE (Historic England) 2015b *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*

HE (Historic England) 2015c *Digital Image Capture and File Storage: Guidelines for Best Practice*

HE (Historic England), 2018. *Role of the Human Osteologist in an Archaeological Fieldwork Project*

Leicestershire Archaeological and Historical Society 2015 'The Roman and Anglo-Saxon Cemetery at Great Casterton: The 1966 Excavation' In, *Transactions of the Leicestershire Archaeological and Historical Society*, *Volume 89*. pp73-106, pp108-109

Liddle, P. 1983 'Archaeology in Leicestershire and Rutland 1983' In, *Transactions of the Leicestershire Archaeological and History Society. Volume 58*. Leicestershire Archaeological and History Society

Magnitude (Magnitude Surveys) 2022 *Geophysical Survey Report. Mallard Pass Solar Farm DCO, Essendine, Rutland* Magnitude Surveys ref. MSTF1136A

Meaney, A. 1964 *Gazetteer of Early Anglo-Saxon Burial Sites*

MHCLG (Ministry of Housing, Communities & Local Government) 2021 *National Planning Policy Framework*

Page, W. 1935 'Parishes: Essendine' In*, A History of the County of Rutland: Volume 2, pp. 250-254. British History* [redacted] (accessed 22/04/2022)

APPENDIX A: COTSWOLD ARCHAEOLOGY SPECIALISTS

Ceramics

Neolithic/Bronze Age	Ed McSloy BA MCIFA (CA) Alistair Barclay BSc PhD FSA MCIfA (CA) Grace Jones BA MA Phd MCIfA (CA) Jacky Sommerville BSc MA PCIfA (CA) Emily Edwards (freelance) Dr Elaine Morris BA PhD FSA MCIFA (University of Southampton) Anna Doherty MA (Archaeology South-East) Sarah Percival MA MCIFA (freelance) Steve Benfield BA (CA)
Iron Age/Roman	Ed McSloy BA MCIFA (CA) Alistair Barclay BSc PhD FSA MCIfA (CA) Grace Jones BA MA Phd MCIfA (CA) Ian Rowlandson (Freelance) Peter Banks LLB LLM PCIfA (CA) Jacky Sommerville BSc MA PCIfA (CA) Kayt Marter Brown BA MSc MCIFA (freelance) Steve Benfield BA (CA)
(Samian)	Gwladys Montell MA PhD (freelance) Steve Benfield BA (CA)
(Amphorae stamps)	Dr David Williams PhD FSA (freelance)
Anglo-Saxon	Alejandra Gutierrez BA (Hons) PHd MCIfA Alistair Barclay BSc PhD FSA MCIfA (CA) Grace Jones BA MA Phd MCIfA (CA) Jacky Sommerville BSc MA PCIfA (CA) Paul Blinkhorn BTech (freelance) Dr Jane Timby BA PhD FSA MCIFA (freelance) Sue Anderson, M Phil, MCIFA, FSA (freelance)
Medieval/post-medieval	Alejandra Gutierrez BA (Hons) PHd MCIfA Ed McSloy BA MCIFA (CA) Alistair Barclay BSc PhD FSA MCIfA (CA) Grace Jones BA MA Phd MCIfA (CA) Jacky Sommerville BSc MA PCIfA (CA) Kayt Marter Brown BA MSc MCIFA (freelance) Stephanie Ratkai BA (freelance) Paul Blinkhorn BTech (freelance) John Allan BA MPhil FSA (freelance) Richenda Goffin BA MCIFA (CA) Sue Anderson M Phil, MCIFA, FSA (freelance)
South-West	Henrietta Quinnell BA FSA MCIFA (University of Exeter)
Clay tobacco pipe	Reg Jackson MLitt MCIFA (freelance) Marek Lewcun (freelance) Kieron Heard (freelance) Richenda Goffin BA MCIFA (CA)
Ceramic building material	Ed McSloy MCIFA (CA) Peter Banks LLB LLM PCIfA (CA) Richenda Goffin (Roman painted wall plaster) CBM, BA MCIFA (CA) Steve Benfield BA (CA) Dr Peter Warry PhD (freelance) Sue Anderson M Phil, MCIFA, FSA (freelance)

Other finds

Small finds	Ed McSloy BA MCIFA (CA) Richenda Goffin, (non-metalwork) BA MCIFA (CA) Steve Benfield CA Dr I Riddler (freelance) Dr Alison Sheridan, National Museum of Scotland
Metal artefacts	Ed McSloy BA MCIFA (CA) Grace Jones BA MA Phd MCIfA (CA) Dr Jörn Schuster MA DPhil FSA MCIFA (freelance) Dr Hilary Cool BA PhD FSA (freelance) Dr I Riddler (freelance)
Lithics	Ed McSloy BA MCIFA (CA) Jacky Sommerville BSc MA PCIFA (CA) Pippa Bradley BA MPhil Dip Post-Ex MCIfA (CA) Michael Green (CA) Jack Martin-Jones (CA) Sarah Bates BA (freelance)
(Palaeolithic)	Dr Francis Wenban-Smith BA MA PhD (University of Southampton)
Worked stone	Dr Ruth Shaffrey BA PhD MCIFA (freelance) Dr Kevin Hayward FSA BSc MSc PhD PCIFA (freelance)
Inscriptions	Dr Roger Tomlin MA DPhil, FSA (Oxford)
Glass	Ed McSloy MCIFA (CA) Dr Hilary Cool BA PhD FSA (freelance) Dr David Dungworth BA PhD (freelance; English Heritage) Dr Sarah Paynter (Historic England) Dr Rachel Tyson (freelance) Dr Hugh Wilmott (University of Sheffield)
Coins	Ed McSloy BA MCIFA (CA) Dr Ruth Beveridge (CA) Dr Peter Guest BA PhD FSA (Cardiff University) Dr Richard Reece BSc PhD FSA (freelance) Jude Plouviez (freelance) Dr Andrew Brown (British Museum) Dr Richard Kelleher (Fitzwilliam Museum) Dr Philip de Jersey (Ashmolean Museum)
Leather	Quita Mould MA FSA (freelance)
Textiles	Penelope Walton Rogers FSA Dip Acc. (freelance) Dr Sue Harrington (freelance)
Iron slag/metal technology	Dr Tim Young MA PhD (Cardiff University) Dr David Starley BSc PhD Lynne Keys (freelance)
Worked wood	Michael Bamforth BSc MCIFA (freelance)

Biological remains

Animal bone	Dr Matilda Holmes BSc MSc ACIFA (freelance) Julie Curl (freelance) Lorrain Higbee (Wessex Archaeology)
Human bone	Sharon Clough BA MSc MCIFA (CA) Sue Anderson M Phil, MCIFA, FSA (freelance)

Environmental sampling	Sarah Wyles BA MCIFA (CA) Sarah Cobain BSc MSc ACIFA (CA) Dr Keith Wilkinson BSc PhD MCIFA (ARCA) Emma Aitken BSc MSc ACIfA (CA) Anna West BSc (CA) Val Fryer (freelance)
Pollen	Dr Michael Grant BSc MSc PhD (University of Southampton) Dr Rob Batchelor BSc MSc PhD MCIFA (QUEST, University of Reading)
Diatoms	Dr Tom Hill BSc PhD CPLHE (Natural History Museum) Dr Nigel Cameron BSc MSc PhD (University College London)
Charred plant remains	Sarah Wyles BA MCIFA (CA) Sarah Cobain BSc MSc ACIFA (CA) Emma Aitken BSc MSc ACIfA (CA)
Wood/charcoal	Sarah Cobain BSc MSc ACIFA(CA) Dana Challinor MA (freelance) Dr Esther Cameron (freelance)
Insects	Enid Allison BSc D.Phil (Canterbury Archaeological Trust) Dr David Smith MA PhD (University of Birmingham)
Mollusca	Sarah Wyles BA MCIFA (CA) Emma Aitken BSc MSc ACIfA (CA) Dr Keith Wilkinson BSc PhD MCIFA (ARCA) Dr Mike Allen (Allen Environmental Archaeology)
Ostracods and Foraminifera	Dr John Whittaker BSc PhD (freelance)
Geoarchaeology	Dr Keith Wilkinson BSc PhD MCIFA (ARCA)
Soil micromorphology	Dr Richard Macphail BSc MSc PhD (University College London) Dr Mike Allen (Allen Environmental Archaeology)
Scientific dating	
Dendrochronology	Robert Howard BA (NTRDL Nottingham)
Radiocarbon dating	Alistair Barclay BSc PhD FSA MCIfA (CA) SUERC (East Kilbride, Scotland) Beta Analytic (Florida, USA)
Bayesian chronological modelling	Dr Derek Hamilton (SUERC) Professor John Hines (Cardiff University)
Archaeomagnetic dating	Dr Cathy Batt BSc PhD (University of Bradford)
TL/OSL Dating	Dr Phil Toms BSc PhD (University of Gloucestershire)
Conservation	Karen Barker BSc (freelance) Pieta Greaves BSc MSc ACR (Drakon Heritage and Conservation) Julia Park-Newman (Conservation Services, freelance)

APPENDIX B: SOUTH KESTEVEN TRENCH RATIONALE

This page is intentionally blank

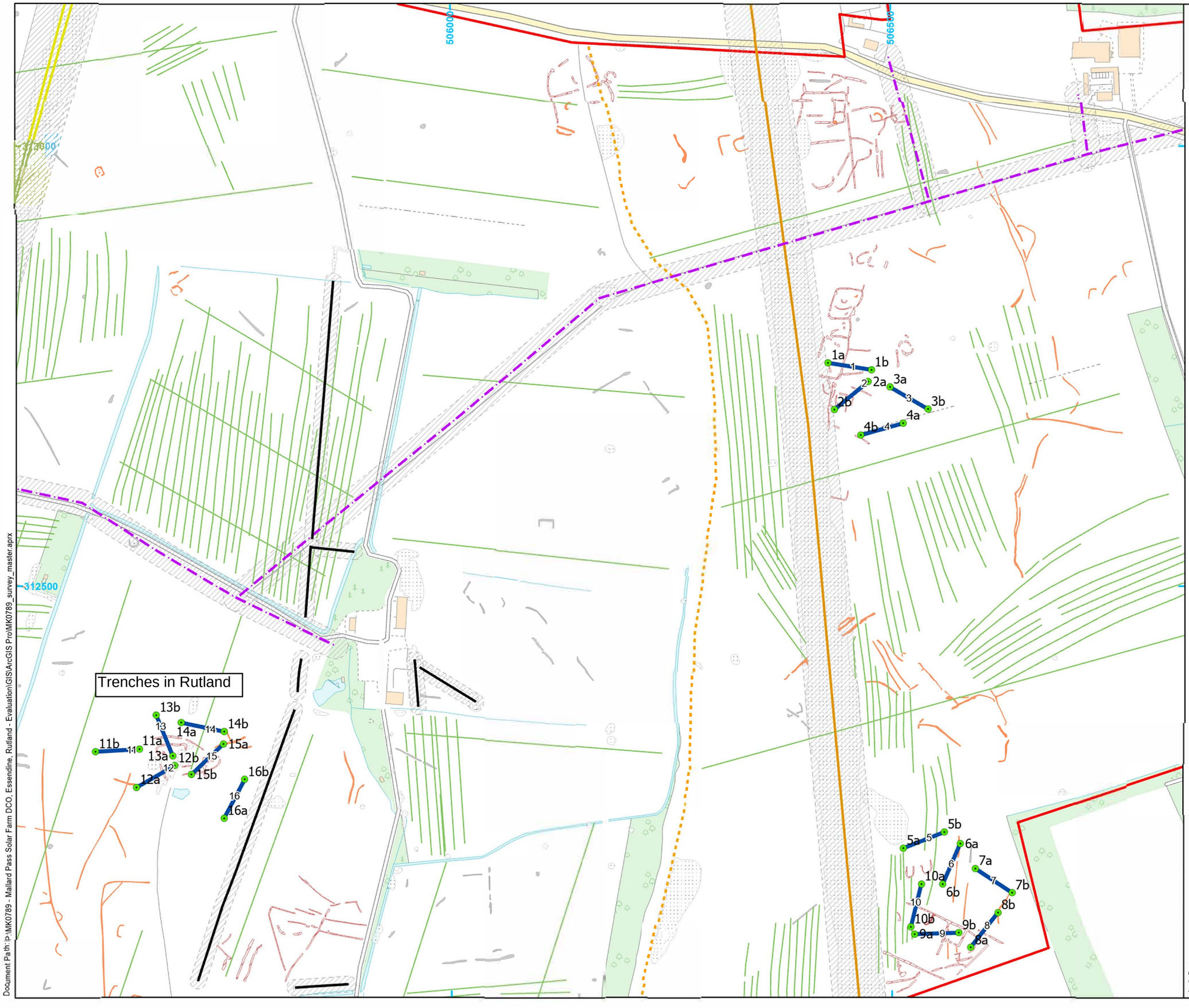
Mallard Pass Solar Farm – South Kesteven trench rationale (with reference to attached trench plan)

Trench No.	Landowner	Rationale
1	Mair	Targeting geophysical anomaly of probable archaeological origin – enclosure?
2	Mair	Targeting geophysical anomalies of probable archaeological origin – enclosure/ associated features?
3	Mair	Testing apparently blank area adjacent to anomalies of probable archaeological origin
4	Mair	Testing apparently blank area adjacent to anomalies of probable archaeological origin
5	Mair	Testing linear anomalies – probable ridge and furrow
6	Mair	Testing linear anomalies – possible archaeological origin/ probable ridge and furrow
7	Mair	Testing apparently blank area adjacent to anomalies of probable archaeological origin
8	Mair	Targeting geophysical anomalies of probable archaeological origin – enclosure/ associated features?
9	Mair	Targeting geophysical anomalies of probable archaeological origin – enclosure/ associated features?
10	Mair	Targeting geophysical anomalies of probable archaeological origin – enclosure/ associated features?
63	Parkinson	Testing linear anomalies – probable ridge and furrow
64	Parkinson	Testing linear anomalies of possible archaeological origin/ probable ridge and furrow. Likely field system/ field boundary
65	Parkinson	Targeting gap in line of geophysical anomaly of probable archaeological origin to test for continuation of feature – enclosure?
66	Parkinson	Testing linear anomalies of possible archaeological origin - likely field system/ field boundary
67	Parkinson	Targeting geophysical anomaly of probable archaeological – enclosure?
139	Naylor	Testing linear anomaly of uncertain origin - likely ridge and furrow?
140	Naylor	Testing curvilinear anomaly of uncertain origin
141	Naylor	Targeting geophysical anomalies of probable archaeological and uncertain origin – enclosure/ associated features?
142	Naylor	Targeting geophysical anomalies of probable archaeological – ring ditch and associated features?
143	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin
144	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/ ridge and furrow

145	Naylor	Targeting geophysical anomalies of probable archaeological – ring ditch?
146	Naylor	Targeting anomalies indicative of ploughed-out ridge and furrow
147	Naylor	Testing apparently blank area adjacent to anomalies of uncertain origin/ ridge and furrow
148	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/ ridge and furrow
149	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/ ridge and furrow
150	Naylor	Testing apparently blank area adjacent to anomalies of uncertain origin/ ridge and furrow
151	Naylor	Testing anomalies of uncertain origin
152	Naylor	Testing apparently blank area
153	Naylor	Testing apparently blank area
154	Naylor	Testing apparently blank area
155	Naylor	Testing apparently blank area
156	Naylor	Testing apparently blank area
157	Naylor	Testing apparently blank area
158	Naylor	Targeting geophysical anomaly of probable archaeological origin – enclosure?
159	Naylor	Targeting geophysical anomaly of probable archaeological origin – enclosure?
160	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/
161	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/
162	Naylor	Targeting geophysical anomaly of probable archaeological origin – field system/ field boundary ditch?
163	Naylor	Targeting anomalies indicative of ploughed-out ridge and furrow
164	Naylor	Targeting geophysical anomalies of probable archaeological origin – trackway/ field system
165	Naylor	Targeting geophysical anomalies of probable archaeological origin
166	Naylor	Targeting geophysical anomalies of probable archaeological origin
167	Naylor	Targeting geophysical anomaly of probable archaeological origin
168	Naylor	Targeting geophysical anomalies of probable archaeological origin
169	Naylor	Targeting geophysical anomalies of probable archaeological origin
170	Naylor	Testing linear anomalies of possible archaeological origin/ probable ridge and furrow.
171	Naylor	Targeting geophysical anomalies of probable archaeological origin
172	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin

173	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin
174	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin
175	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin
176	Naylor	Testing anomalies of possible archaeological origin – small ring ditch/ roundhouse?
177	Naylor	Testing linear and curvilinear anomalies of possible archaeological origin
178	Naylor	Testing largely blank area adjacent to anomalies of probable archaeological origin and ploughed-out ridge and furrow.
179	Naylor	Testing anomalies of probable and possible archaeological origin
180	Naylor	Testing anomalies of probable archaeological origin
181	Naylor	Testing anomalies of probable archaeological origin (enclosure?) and ploughed-out ridge and furrow
182	Naylor	Testing anomalies of probable archaeological origin (enclosure?) and ploughed-out ridge and furrow
183	Naylor	Testing anomalies of probable archaeological origin (enclosure and associated features?)
184	Naylor	Testing anomalies of probable archaeological origin (enclosure?)
185	Naylor	Testing anomalies of probable archaeological origin (enclosure?)
186	Naylor	Testing apparently blank area within enclosure complex
187	Naylor	Testing anomalies of probable archaeological origin (enclosure?)
188	Naylor	Testing linear anomaly of probable archaeological origin and ploughed-out ridge and furrow
189	Naylor	Testing anomalies indicative of ploughed-out ridge and furrow
190	Naylor	Testing linear and curvilinear anomalies of possible archaeological origin
191	Naylor	Testing apparently blank area adjacent to anomalies of probable archaeological origin/
192	Naylor	Testing anomalies of probable archaeological origin (enclosure?)
193	Naylor	Testing linear anomaly of probable archaeological origin
194	Naylor	Testing largely blank that includes scattered anomalies indicative of ploughed-out ridge and furrow/ possible field boundaries.
195	Naylor	Testing largely blank that includes scattered anomalies indicative of ploughed-out ridge and furrow/ possible field boundaries.
196	Naylor	Testing linear anomaly of probable archaeological origin
197	Naylor	Testing anomalies of probable archaeological origin

		(ring ditch?)
198	Naylor	Testing largely blank that includes scattered anomalies indicative of ploughed-out ridge and furrow/ possible field boundaries.
199	Naylor	Testing largely blank that includes scattered anomalies indicative of ploughed-out ridge and furrow/ possible field boundaries.
200	Naylor	Testing linear anomaly of probable archaeological origin
201	Naylor	Testing linear anomaly of probable archaeological origin
202	Naylor	Testing linear anomalies of possible archaeological origin (trackway)
203	Naylor	Testing linear anomaly of possible archaeological origin (enclosure ditch?)
204	Naylor	Testing linear anomalies of probable archaeological origin – field systems/ enclsoures
205	Naylor	Testing apparently blank area/ predicted line of anomalies of probable archaeological origin (enclosure?)
206	Naylor	Testing linear anomaly of probable archaeological origin
207	Naylor	Testing apparently blank area
208	Naylor	Testing apparently blank area
209	Naylor	Testing anomalies of probable archaeological origin – enclosure and internal features



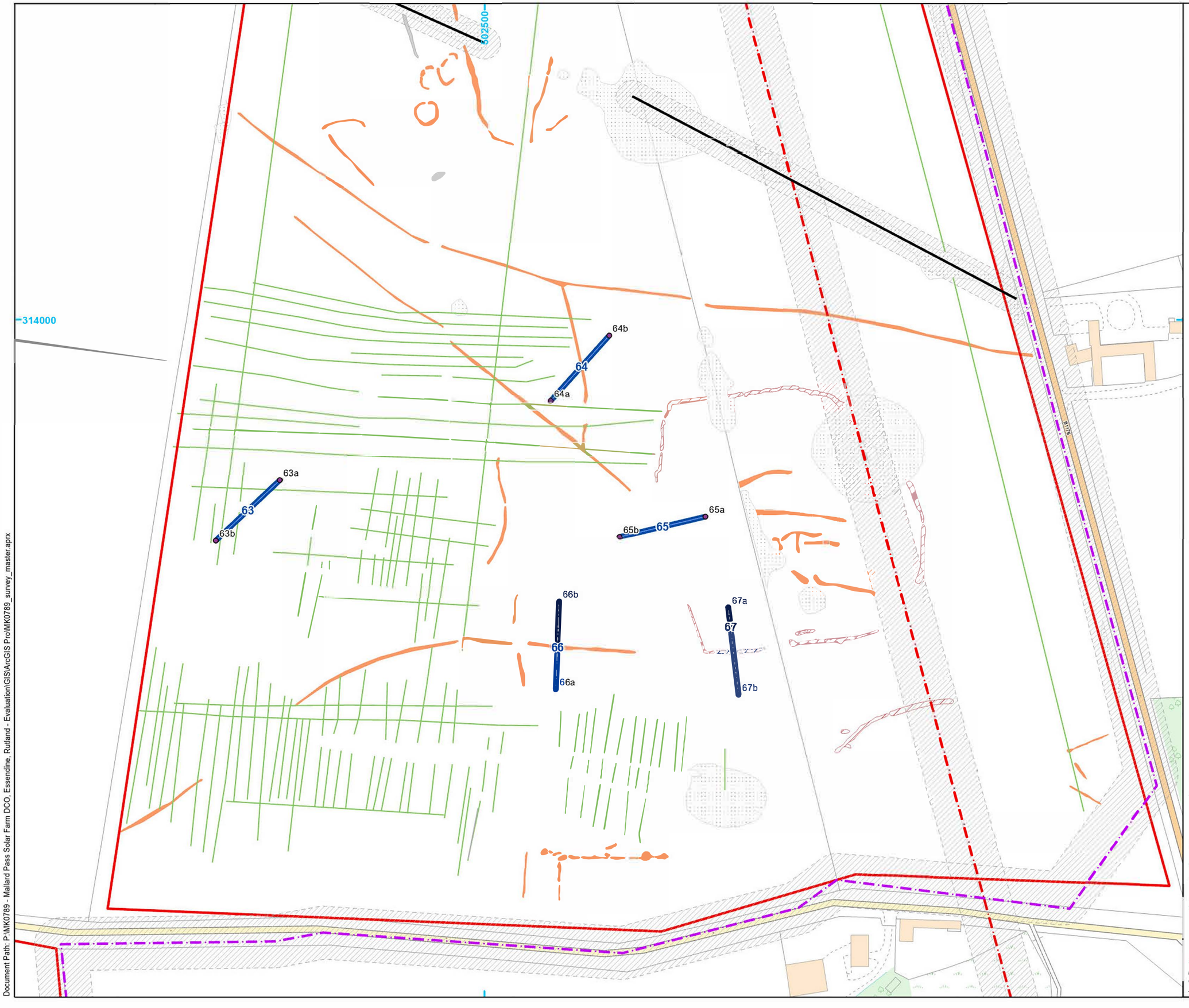
Cotswold Archaeology
Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE
Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE
Landowner - Mair (trenches 1 to 10)

DRAWN BY	MP	PROJECT NO	MK0789	FIGURE NO.
CHECKED BY	AS	DATE	16/09/2022	B1
APPROVED BY	AS	SCALE@A3	1:4,000	130

Document Path: P:\MK0789 - Mallard Pass Solar Farm DCO, Essendine, Rutland - Evaluation\GIS\ArcGIS Pro\MK0789_survey_master.aprx



N

Legend

- Site Boundary
- Proposed evaluation trench

Utilities

- Electricity OH (National Grid)
- Electricity OH (Western Power)
- Unknown
- Public Right of Way
- Safety buffer

Geophysical survey results

- r_and_f
- uncertain
- ferrous
- poss_arch
- prob_arch
- uncertain

0 100m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

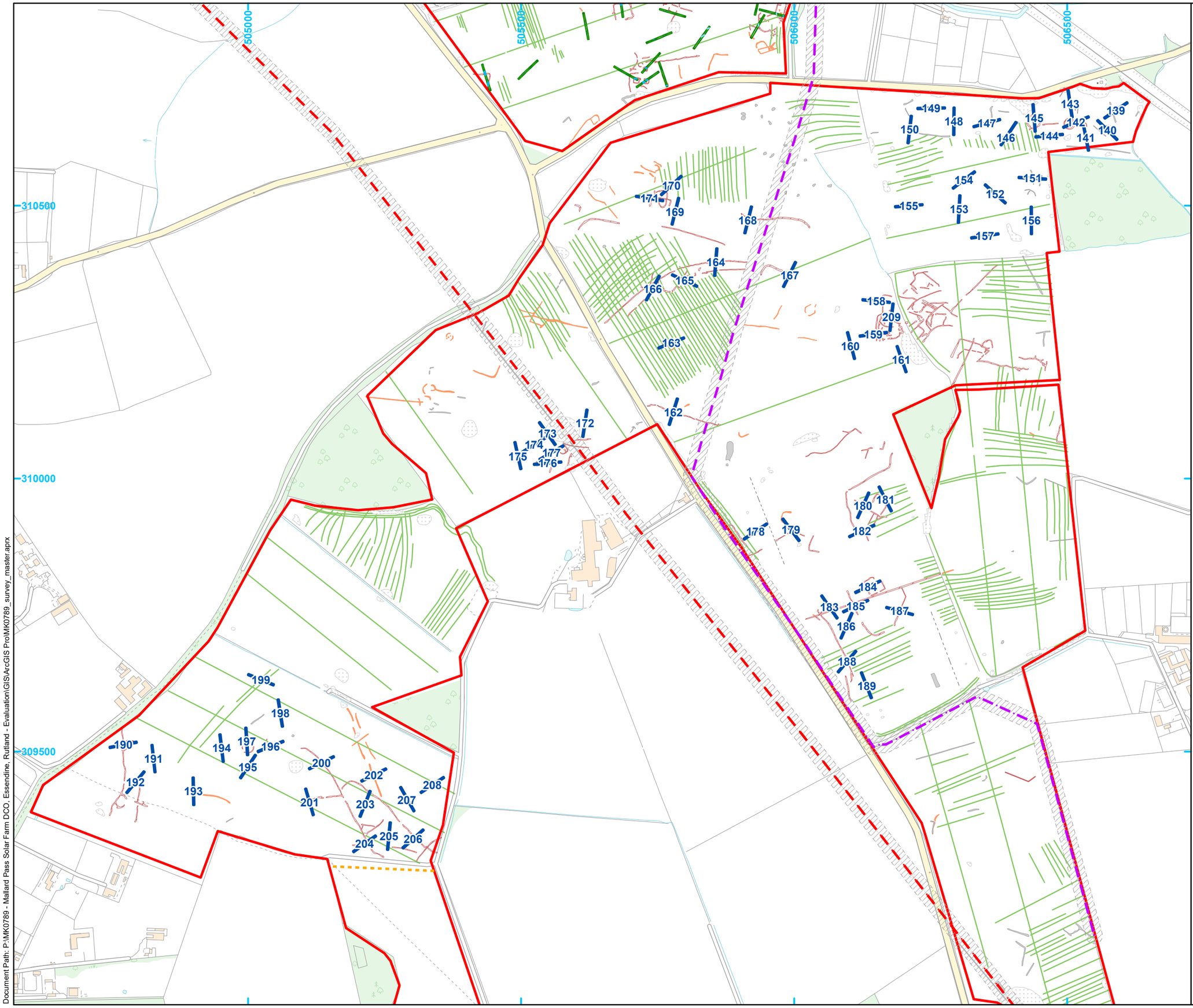
Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Landowner - Parkinson (trenches 63 - 67

DRAWN BY	MP	PROJECT NO	MK0789	FIGURE NO.
CHECKED BY	AS	DATE	04/10/2022	
APPROVED BY	AS	SCALE@A3	1:2,000	B2

Document Path: P:\MK0789 - Mallard Pass Solar Farm DCO, Essendine, Rutland - Evaluation\GIS\ArcGIS Pro\MK0789_survey_master.aprx



Document Path: P:\MK0789 - Mallard Pass Solar Farm DCO, Essendine, Rutland - Evaluation\GIS\ArcGIS Pro\MK0789_survey_master.aprx

N

Legend

- Site Boundary
- Proposed evaluation trench
- LOE Top

Utilities

- Electricity OH (National Grid)
- Electricity OH (Western Power)
- Public Right of Way
- Safety buffer

Geophysical survey results

- ferrous
- prob_arch
- r_and_f
- uncertain
- ferrous
- poss_arch
- prob_arch
- uncertain

0 350m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Landowner - Naylor (trenches 139 - 209)

DRAWN BY	ADB	*PROJECT NO*	MK0789	*FIGURE NO.*
CHECKED BY	AS	*DATE*	08/11/2022	B3
APPROVED BY	AS	*SCALE@A3*	1:6,500	

N

Site boundary

Proposed trench location

0 1,350m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

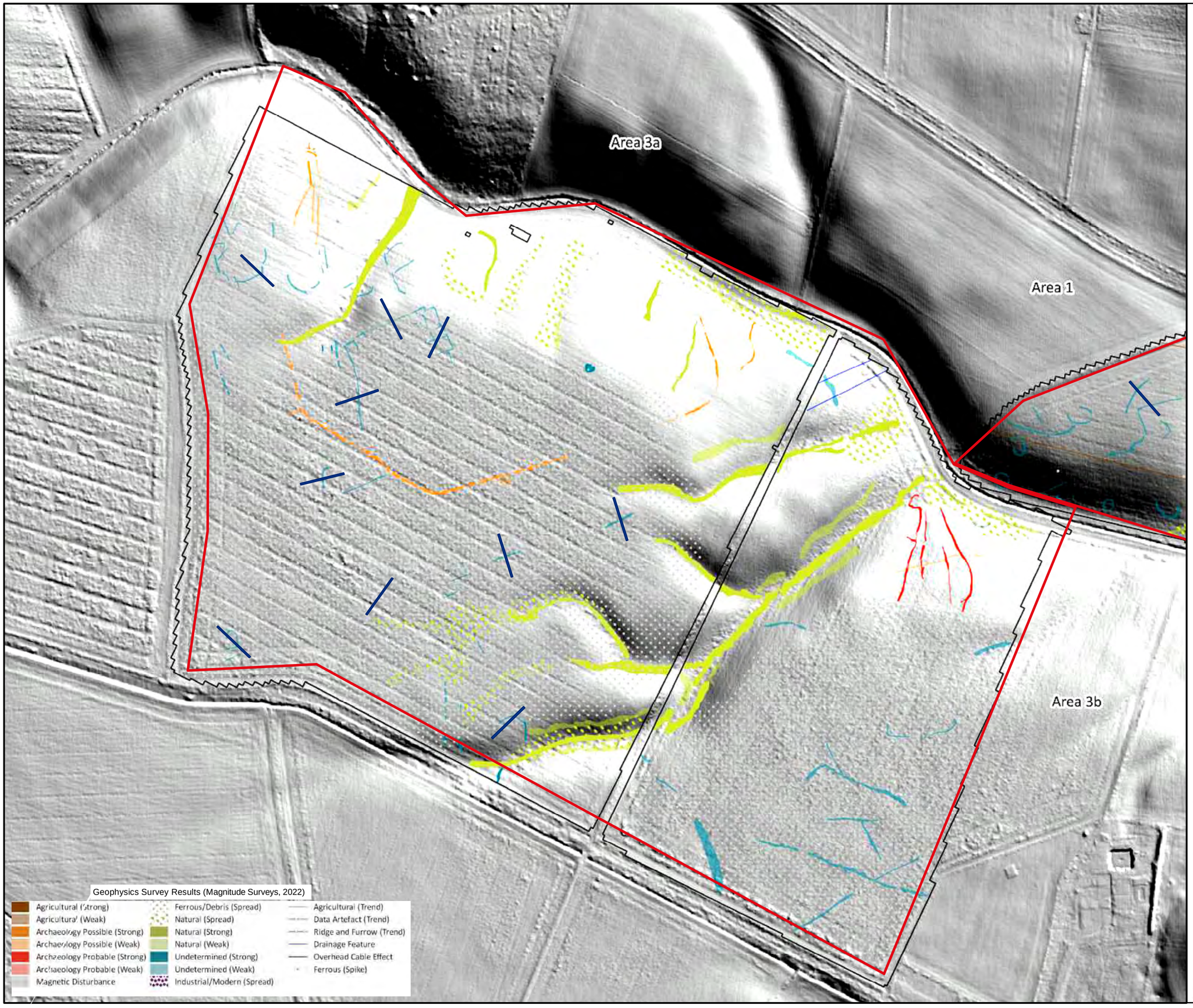
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*
CHECKED BY	**RS**	*DATE*	**26/08/2022**	**2a**
APPROVED BY	**RS**	*SCALE@A3*	**1:25,000**	



N

Site boundary

Proposed trench location

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

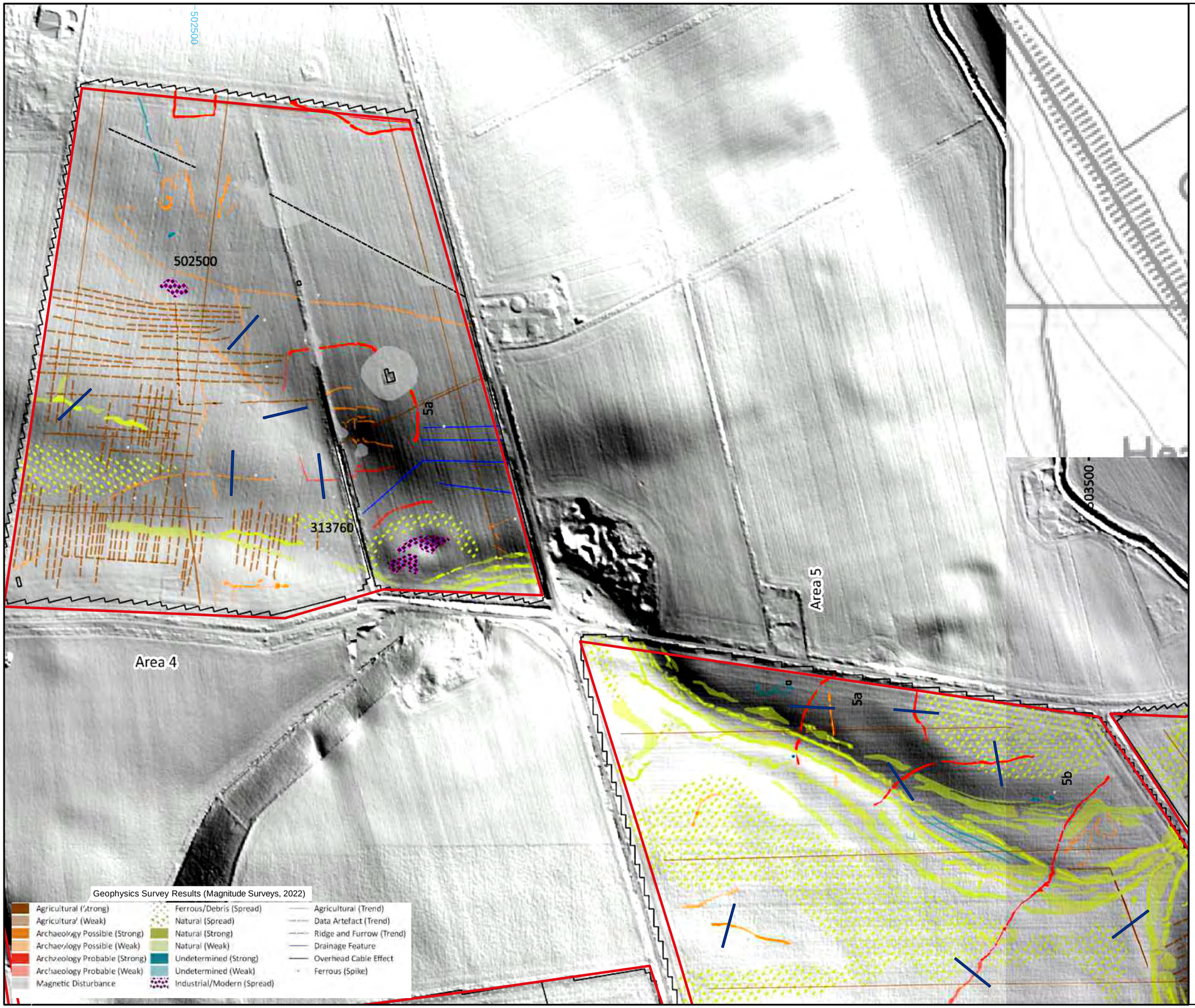
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*
CHECKED BY	**RS**	*DATE*	**26/08/2022**	**2b**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**	



N

Site boundary

Proposed trench location

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*	
CHECKED BY	**RS**	*DATE*	**26/08/2022**		**2c**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**		

Area 2

313230

Area 9

Area 12

Area 6

502500

503000

312500

Ryhall Farm Cottage

57

170

Site boundary

Proposed trench location

N

0 200m

Geophysics Survey Results (Magnitude Surveys, 2022)

- Agricultural (Strong)
- Agricultural (Weak)
- Archaeology Possible (Strong)
- Archaeology Possible (Weak)
- Archaeology Probable (Strong)
- Archaeology Probable (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Industrial/Modern (Spread)
- Agricultural (Trend)
- Data Artefact (Trend)
- Ridge and Furrow (Trend)
- Drainage Feature
- Overhead Cable Effect
- Ferrous (Spike)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

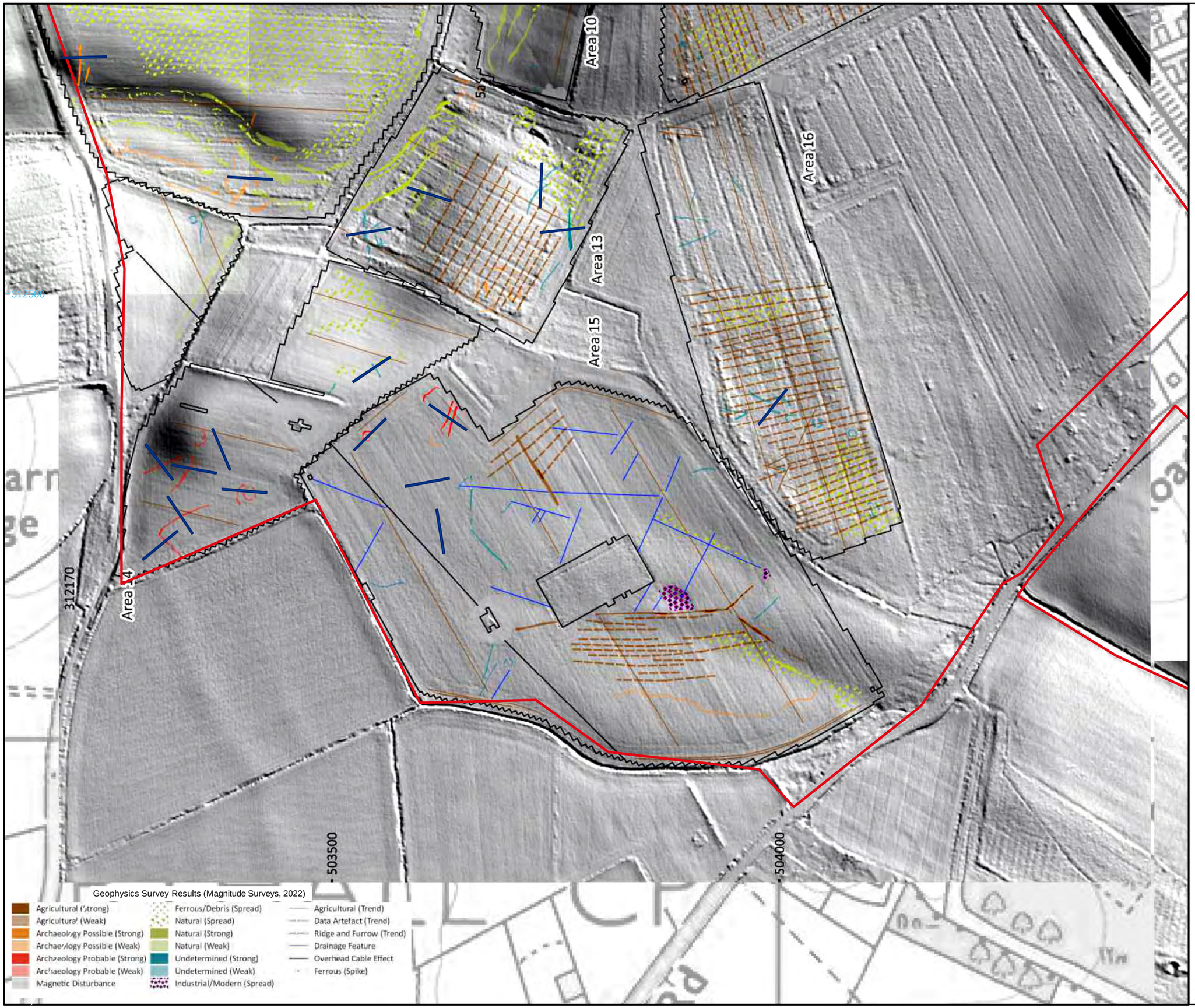
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*	
CHECKED BY	**RS**	*DATE*	**26/08/2022**		**2d**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**		



N

Site boundary

Proposed trench location

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*
CHECKED BY	**RS**	*DATE*	**26/08/2022**	**2e**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**	

N

Site boundary

Proposed trench location

0 200m

Geophysics Survey Results (Magnitude Surveys, 2022)

- Agricultural (Strong)
- Agricultural (Weak)
- Archaeology Possible (Strong)
- Archaeology Possible (Weak)
- Archaeology Probable (Strong)
- Archaeology Probable (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Industrial/Modern (Spread)
- Agricultural (Trend)
- Data Artefact (Trend)
- Ridge and Furrow (Trend)
- Drainage Feature
- Overhead Cable Effect
- Ferrous (Spike)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*	
CHECKED BY	**RS**	*DATE*	**26/08/2022**		**2f**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**		

Area 36

33a

Area 30

Area 34

36b

Area 31

3b

31a

36a

Site boundary

Proposed trench location

N

0

200m

Geophysics Survey Results (Magnitude Surveys, 2022)

- Agricultural (Strong)
- Agricultural (Weak)
- Archaeology Possible (Strong)
- Archaeology Possible (Weak)
- Archaeology Probable (Strong)
- Archaeology Probable (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Industrial/Modern (Spread)
- Agricultural (Trend)
- Data Artefact (Trend)
- Ridge and Furrow (Trend)
- Drainage Feature
- Overhead Cable Effect
- Ferrous (Spike)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

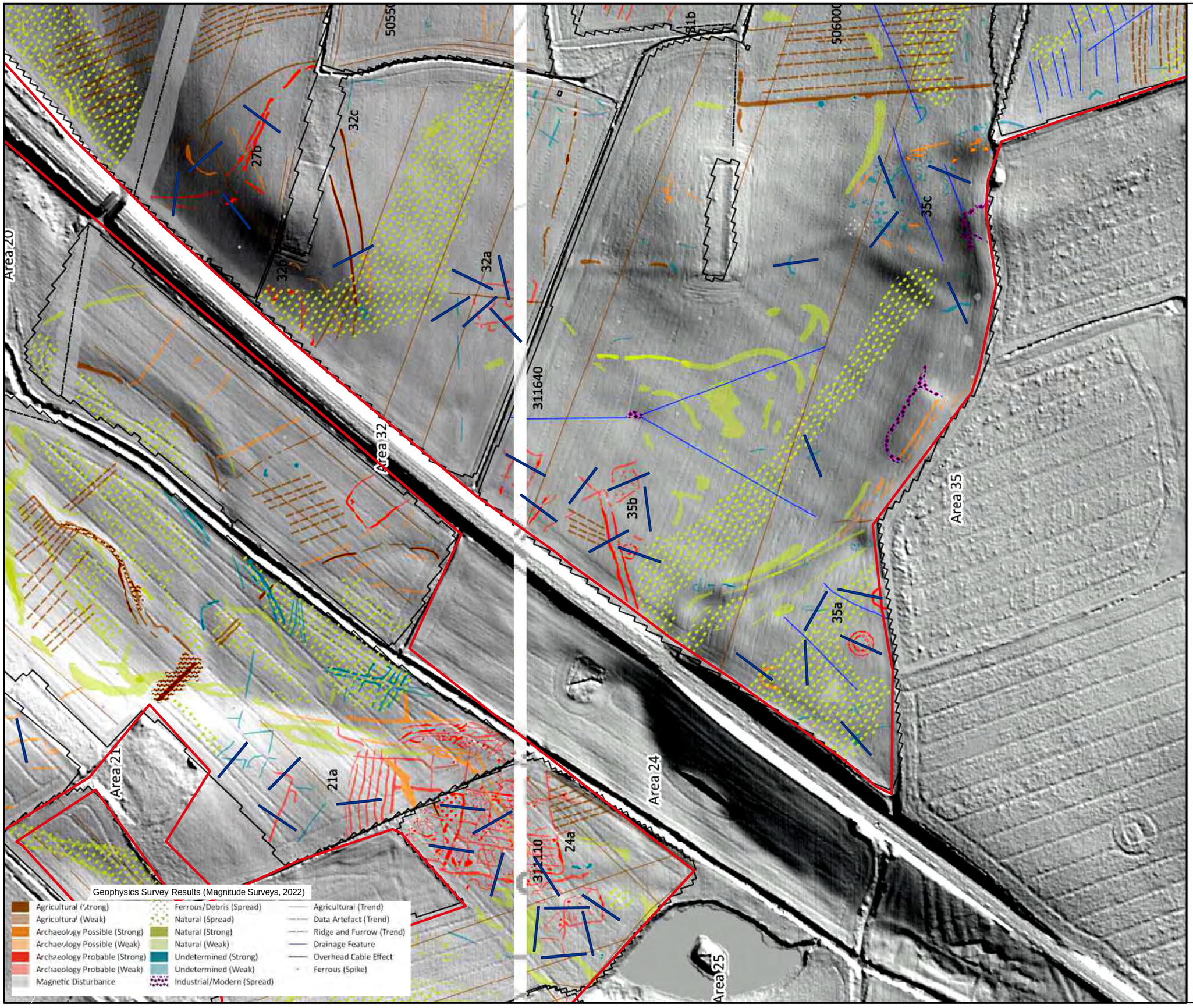
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	MP	PROJECT NO	MK0590	FIGURE NO.
CHECKED BY	RS	DATE	26/08/2022	2g
APPROVED BY	RS	SCALE@A3	1:4,000	



N

Site boundary

Proposed trench location

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

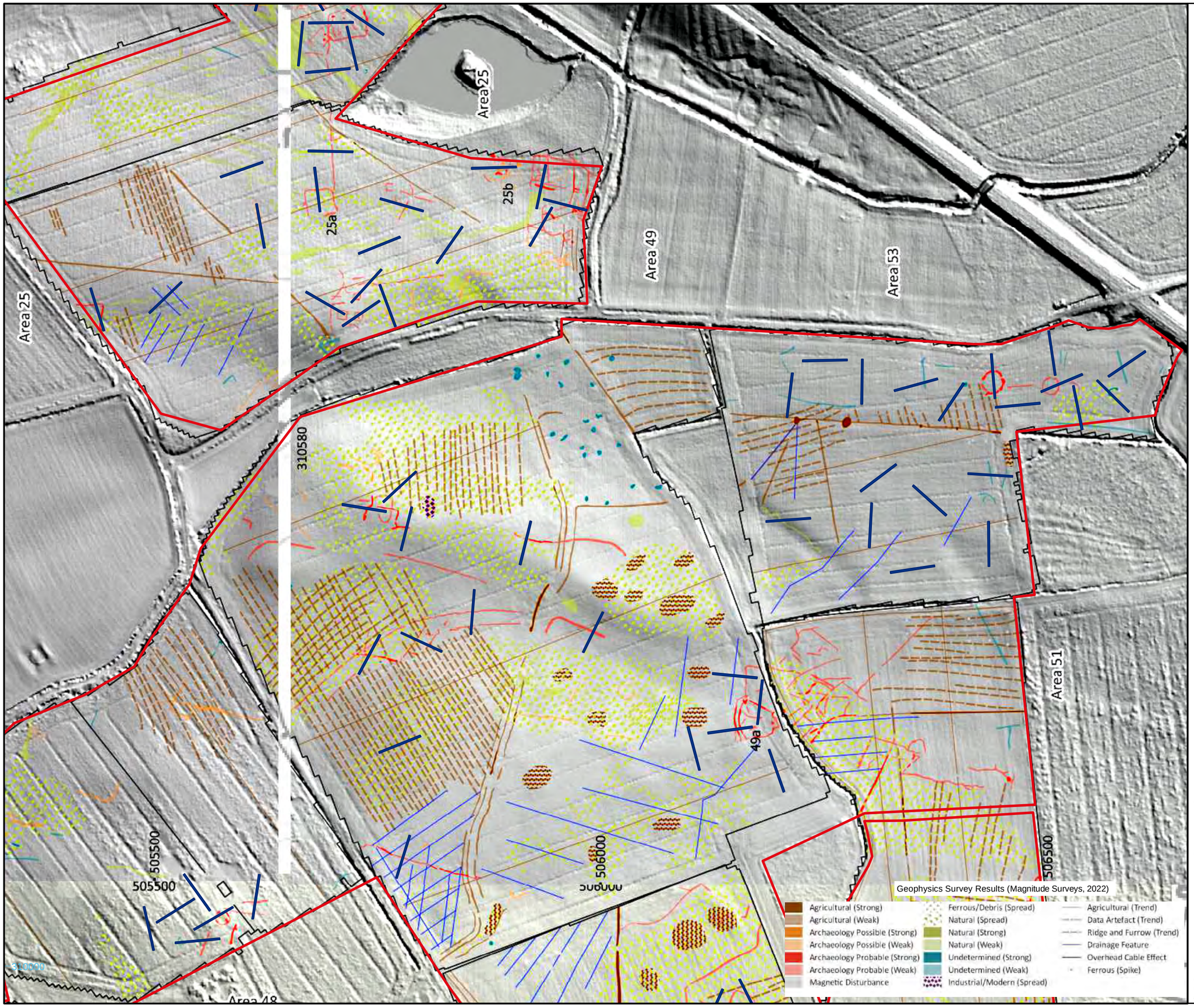
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*
CHECKED BY	**RS**	*DATE*	**26/08/2022**	**2h**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**	



N

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

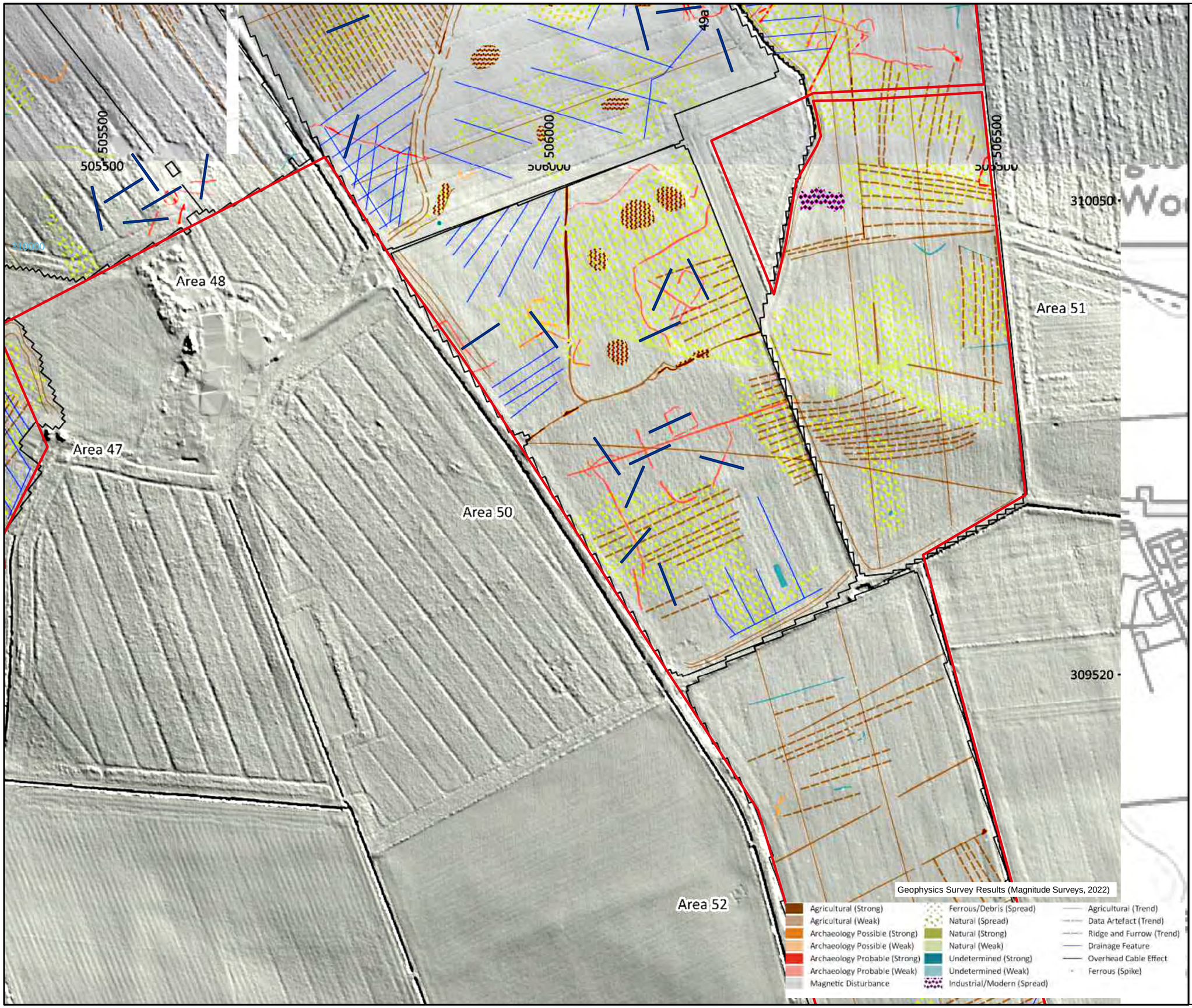
PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*
CHECKED BY	**RS**	*DATE*	**26/08/2022**	**2i**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**	



N

Site boundary

Proposed trench location

0 200m

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*	
CHECKED BY	**RS**	*DATE*	**26/08/2022**		
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**		**2j**

Area 46

Area 48

Area 47

Area 45

309520

308990

Site boundary

Proposed trench location

N

0 200m

Geophysics Survey Results (Magnitude Surveys, 2022)

- Agricultural (Strong)
- Agricultural (Weak)
- Archaeology Possible (Strong)
- Archaeology Possible (Weak)
- Archaeology Probable (Strong)
- Archaeology Probable (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Industrial/Modern (Spread)
- Agricultural (Trend)
- Data Artefact (Trend)
- Ridge and Furrow (Trend)
- Drainage Feature
- Overhead Cable Effect
- Ferrous (Spike)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Milton Keynes 01908 564660
Suffolk 01449 900120

w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Mallard Pass Solar Farm DCO, Essendine, Rutland

FIGURE TITLE

Proposed evaluation trench plan

DRAWN BY	**MP**	*PROJECT NO*	**MK0590**	*FIGURE NO.*	
CHECKED BY	**RS**	*DATE*	**26/08/2022**		**2k**
APPROVED BY	**RS**	*SCALE@A3*	**1:4,000**		

Cotswold Archaeology

Andover Office

Stanley House
Walworth Road
Andover
Hampshire
SP10 5LH

t: 01264 347630

Cirencester Office

Building 11
Cotswold Business Park
Cirencester
Gloucestershire
GL7 6BQ

t: 01285 771022

Milton Keynes Office

Unit 8 - The IO Centre
Fingle Drive, Stonebridge
Milton Keynes
Buckinghamshire
MK13 0AT

t: 01908 564660

Suffolk Office

Unit 5, Plot 11, Maitland Road
Lion Barn Industrial Estate
Needham Market
Suffolk
IP6 8NZ

t: 01449 900120

e: enquiries@cotswoldarchaeology.co.uk

Appendix M Q7.0.6 Guide to Agricultural Good Practice (BRE)

bre

www.bre.co.uk/
nsc

Agricultural Good Practice Guidance for Solar Farms

NFU

EUROPEAN UNION
Investing in Your Future

European Regional
Development Fund 2007-2013

BRE
NATIONAL
SOLAR
CENTRE

Principal Author and Editor Dr Jonathan Scurlock, National Farmers Union

This document should be cited as: BRE (2014) Agricultural Good Practice Guidance for Solar Farms. Ed J Scurlock

BRE National Solar Centre would like to sincerely thank colleagues from the following organisations who have made significant contributions to the development of this guidance:

With thanks to:

Marcus Dixon and Neil Macdonald of British Solar Renewables; Liza Gray of Lightsource; Julie Rankin and Amy Thorley of Lark Energy; Kate Covill of Orta Solar; Ben Cosh of TGC Renewables; Ben Thompson of Foresight Group; Simon Stonehouse of Natural England; Leonie Greene of the Solar Trade Association; and Tom Fullick, Gary Ford and Richard Wordsworth of the NFU.

With thanks to NSC Founding Partners:

Context

This document describes experience and principles of good practice to date for the management of small livestock in solar farms established on agricultural land, derelict/marginal land and previously-developed land.

Proposed for publication as an appendix to existing best practice guidelines by the BRE National Solar Centre[1], it should be read in conjunction with BRE (2014) Biodiversity Guidance for Solar Developments (eds. G.E. Parker and L. Greene).

The guidance presented here has been developed with, and endorsed by, a number of leading UK solar farm developers and organisations concerned with agriculture and land management.

Introduction

Field-scale arrays of ground-mounted PV modules, or "solar farms", are a relatively recent development, seen in Britain only since 2011, although they have been deployed in Germany and other European countries since around 2005. In accordance with the "10 Commitments" of good practice established by the Solar Trade Association[2], the majority of solar farm developers actively encourage multi-purpose land use, through continued agricultural activity or agri-environmental measures that support biodiversity, yielding both economic and ecological benefits.

It is commonly proposed in planning applications for solar farms that the land between and underneath the rows of PV modules should be available for grazing of small livestock. Larger farm animals such as horses and cattle are considered unsuitable since they have the weight and strength to dislodge standard mounting systems, while pigs or goats may cause damage to cabling, but sheep and free-ranging poultry have already been successfully employed to manage grassland in solar farms while demonstrating dual-purpose land use.

Opportunities for cutting hay or silage, or strip cropping of high-value vegetables or non-food crops such as lavender, are thought to be fairly limited and would need careful layout with regard to the proposed size of machinery and its required turning space. However, other productive options such as bee-keeping have already been demonstrated. In some cases, solar farms may actually enhance the agricultural value of land, where marginal or previously-developed land (e.g. an old airfield site) has been brought back into more productive grazing management. It is desirable that the terms of a solar farm agreement should include a grazing plan that ensures the continuation of access to the land by the farmer, ideally in a form that that enables the claiming of Basic Payment Scheme agricultural support (see page 2).

[1] BRE (2013) Planning guidance for the development of large scale ground mounted solar PV systems. www.bre.co.uk/nsc

[2] STA "Solar Farms: 10 Commitments" http://www.solar-trade.org.uk/solarFarms.cfm

Conservation grazing for biodiversity

As suggested in the Biodiversity Guidance described above, low intensity grazing can provide a cost-effective way of managing grassland in solar farms while increasing its conservation value, as long as some structural diversity is maintained. A qualified ecologist could assist with the development of a conservation grazing regime that is suited to the site's characteristics and management objectives, for incorporation into the biodiversity management plan.

Avoiding grazing in either the spring or summer will favour early or late flowering species, respectively, allowing the development of nectar and seeds while benefiting invertebrates, ground nesting birds and small mammals. Hardy livestock breeds are better suited to such autumn and winter grazing, when the forage is less nutritious and the principal aim is to prevent vegetation from overshadowing the leading (lower) edges of the PV modules (typically about 800-900mm high). Other habitat enhancements may be confined to non-grazed field margins (if provision is made for electric or temporary fencing) as well as hedgerows and selected field corners.

Agricultural grazing for maximum production

The developer, landowner and/or agricultural tenant/licensee may choose to graze livestock at higher stocking densities throughout the year over much of the solar farm, especially where the previous land use suggested higher yields or pasture quality. Between 4 and 8 sheep/hectare may be achievable (or 2-3 sheep/ha on newly-established pasture), similar to stocking rates on conventional grassland, i.e. between about March and November in the southwest and May to October in North-East England.

The most common practice is likely to be the use of solar farms as part of a grazing plan for fattening/finishing of young hill-bred 'store' lambs for sale to market. Store lambs are those newly-weaned animals that have not yet put on enough weight for slaughter, often sold by hill farmers in the Autumn for finishing in the lowlands. Some hardier breeds of sheep may be able to produce and rear lambs successfully under the shelter of solar farms, but there is little experience of this yet. Pasture management interventions such as 'topping' (mowing) may be required occasionally or in certain areas, in order to avoid grass getting into unsuitable condition for the sheep (e.g. too long, or starting to set seed).

Smaller solar parks can provide a light/shade environment for free-ranging poultry (this is now recognised by the RSPCA Freedom Foods certification scheme) – experience to date suggests there is little risk of roosting birds fouling the modules. Broiler (meat) chickens, laying hens and geese will all keep the grass down, and flocks may need to be rotated to allow recovery of vegetation. Stocking density of up to 2000 birds per hectare is allowed, so a 5 megawatt solar farm on 12 hectares would provide ranging for 24,000 birds.

Solar farm design and layout

In most solar farms, the PV modules are mounted on metal frames anchored by driven or screw piles, causing minimal ground disturbance and occupying less than 1% of the land area. The rest of the infrastructure typically disturbs less than 5% of the ground, and some 25-40% of the ground surface is over-sailed by the modules or panel. Therefore 95% of a field utilised for solar farm development is still accessible for vegetation growth, and can support agricultural activity as well as wildlife, for a lifespan of typically 25 years.

As described above, the layout of rows of modules and the width of field margins should anticipate future maintenance costs, taking into account the size, reach and turning circle of machinery and equipment that might be used for 'topping' (mowing), collecting forage grass, spot-weeding (e.g. of 'injurious' weeds like ragwort and dock) and re-seeding. Again, in anticipation of reverting the field to its original use after 25 years, many agri-environmental measures may be better located around field margins and/or where specifically recommended by local ecologists. All European farmers are obliged to maintain land in "good agricultural and environmental condition" under the Common Agricultural Policy rules of 'cross compliance', so it is important to demonstrate sound stewardship of the land for the lifetime of a solar farm project, from initial design to eventual remediation.

The depth of buried cables, armouring of rising cables, and securing of loose wires on the backs of modules all need to be taken into consideration where agricultural machinery and livestock will be present. Cables need to be buried according to national regulations and local DNO requirements, deep enough to avoid the risk of being disturbed by farming practice – for example, disc harrowing and re-seeding may till the soil to a depth of typically 100-150 mm, or a maximum of 200 mm. British Standard BS 7671 ("Wiring Regulations") describes the principles of appropriate depth for buried cables, cable conduits and cable trench marking. Note also that stony land may present a risk of stone-throw where inappropriate grass management machinery is used (e.g. unguarded cylinder mowers).

Eligibility for CAP support and greening measures

From 2015, under the Common Agricultural Policy, farmers will be applying for the new Basic Payment Scheme (BPS) of area-based farm support funding. It has been proposed that the presence of sheep grazing could be accepted as proof that the land is available for agriculture, and therefore eligible to receive BPS, but final details are still awaited from Defra at the time of writing. Farmers must have the land "at their disposal" in order to claim BPS, and solar farm agreements should be carefully drafted in order to demonstrate this (BPS cannot be claimed if the land is actually rented out). Ineligible land taken up by mountings and hard standing should be deducted from BPS claims, and in the year of construction larger areas may be temporarily ineligible if they are not available for agriculture.

Defra has not yet provided full details on BPS 'greening' measures, but some types of Ecological Focus Areas may be possibly located within solar farms, probably around the margins, including grazed buffer strips and ungrazed fallow land, both sown with wildflowers. Note that where the agreed biodiversity management plan excludes all forms of grazing, the land will become ineligible for BPS, and this may have further implications for the landowner, such as for inheritance tax.

Long-term management, permanent grassland and SSSI designation

Since solar farms are likely to be in place typically for 25 years, the land could pass on to a succeeding generation of farmers or new owners, and the vegetation and habitat within the fenced area is expected to gradually change with time. According to Natural England, there is little additional risk that the flora and fauna would assume such quality and interest that the solar farm might be designated a SSSI (Site of Special Scientific Interest) compared with a similarly-managed open field. However, there could be a possible conflict with planning conditions to return the land to its original use at the end of the project, e.g. if this is specified as 'cropland' rather than more generically as 'for agricultural purposes'. If the pasture within a solar farm were considered to have become a permanent grassland, it may be subject to regulations requiring an Environmental Impact Assessment to restore the original land use, although restoration clauses in the original planning consent may take precedence here. It is proposed that temporary (arable) grassland should be established on the majority of the land area that lies between the rows of modules. This would be managed in 'improved' condition by periodic harrowing and re-seeding (e.g. every 5 years), typically using a combination disc harrow and seed drill.

Other measures to maintain the productivity of grassland, without the need for mechanised cultivations or total reseeding, could include: maintaining optimum soil fertility and pH to encourage productive grass species; seasonally variable stocking rates to prevent over/under-grazing with the aim of preventing grass from seeding and becoming unpalatable. Non-tillage techniques to optimise grass sward content might include the use of a sward/grass harrow and air-seeder to revive tired pastures. When applying soil conditioners (e.g. lime), fertilisers or other products, consideration should be taken to prevent damage to or soiling of the solar modules.

Good practice in construction and neighbourliness

Consideration should also be given to best practice during construction and installation, and ensuring that the future agricultural management of the land (such as a change from arable cropping to lamb production) fits into the local rural economy. Site access should follow strictly the proposed traffic management plan, and careful attention to flood and mud management in accordance with the Flood Risk Assessment (e.g. controlling run-off by disrupting drainage along wheelings), will also ensure that the landowner remains on good terms with his/her neighbours.

Time of year should be taken into account for agricultural and biodiversity operations such as prior seeding of pasture grasses and wildflowers. Contractors should consider avoiding soil compaction and damage to land drains, e.g. by using low ground pressure tyres or tracked vehicles. Likewise, when excavating cable trenches, storing and replacing topsoil and subsoil separately and in the right order is important to avoid long-term unsightly impacts on soil and vegetation structure. Good practice at this stage will yield longer-term benefits in terms of productivity and optimal grazing conditions.

Evidence base and suggested research needs

A number of preliminary studies on the quantity and quality of forage available in solar farms have suggested that overall production is very little different from open grassland under similar conditions. A more comprehensive and independent evidence base could be established through a programme of directed research, e.g. by consultants (such as ADAS) or interested university groups (e.g. Exeter University departments of geography and biosciences), perhaps in association with seed suppliers and other stakeholders. Productivity of grasses could be compared between partial shade beneath the solar modules and unshaded areas between the rows. Alternatively daily live weight gain could be compared between two groups of fattening lambs (both under the same husbandry regime) on similar blocks of land, with and without solar modules present.

Case Steiger Quadtrac used to deliver inverters and other heavy equipment to site under soft ground conditions (photo courtesy of British Solar Renewables)

Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (photo courtesy of British Solar Renewables)

Agricultural case studies

Benbole Farm, Wadebridge, Cornwall

One of the first solar farms developed in Britain in 2011, this 1.74 megawatt installation on a four-hectare site is well screened by high hedges and grazed by a flock of more than 20 geese. A community scheme implemented by the solar farm developers enabled local residents to benefit from free domestic solar panels and other green energy projects.

Higher Hill, Butleigh, Somerset

Angus Macdonald, a third-generation farmer, installed a five megawatt solar farm on his own land. Located near Glastonbury, the site has been grazed by sheep since its inception in 2011.

Eastacombe Farm, Holsworthy, Devon

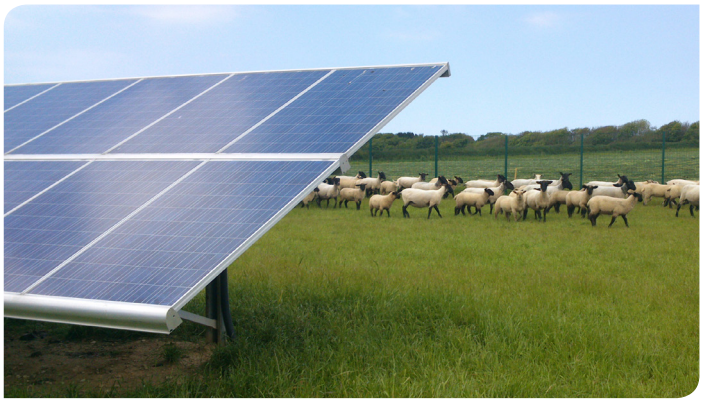
This farm has been in the Petherick family for four generations, but they were struggling to survive with a small dairy herd. In 2011/12, a solar developer helped them convert eight hectares of the lower-grade part of their land into a 3.6 megawatt solar farm with sheep grazing, which has diversified the business, guaranteeing its future for the next generation of farmers.

Newlands Farm, Axminster, Devon

Devon sheep farmer Gilbert Churchill chose to supplement his agricultural enterprise by leasing 13 hectares of grazing land for a 4.2 megawatt solar PV development, which was completed in early 2013. According to Mr Churchill, the additional income stream is "a lifeline" that "will safeguard the farm's survival for the future".

Trevemper Farm, Newquay, Cornwall

In 2011, the Trewithen Estate worked with a solar developer to build a 1.7 megawatt solar farm on 6 hectares of this south-facing block of land, which had good proximity to a grid connection. During the 25-year lease, the resident tenant farmer is still able to graze the land with sheep at his normal stocking density, and is also paid an annual fee to manage the pasture.



Yeowood Solar Farm, North Somerset

Completed in 2012, this 1.3 megawatt installation on 4 hectares of land surrounds a poultry farm of 24,000 laying hens, which are free to roam the land between and underneath the rows of solar modules, as well as other fields. The Ford family, farm owners, also grow the energy crop miscanthus to heat their eco-friendly public swimming pool and office units.

Wyld Meadow Farm, Bridport, Dorset

Farmers Clive and Jo Sage continue to graze their own-brand Poll Dorset sheep on this 4.8 megawatt solar farm, established on 11 hectares in 2012. The solar farm was designed to have very low visual impact locally, with an agreement to ensure livestock grazing throughout the project's lifetime.

Wymeswold Solar Farm, Leicestershire

The author pictured in July 2014 at Britain's largest connected solar farm. At 33 megawatts, this development provides enough energy to power 8,500 homes. Built on a disused airfield in 2013, this extensive installation over 61 hectares (150 acres) received no objections during planning and is grazed by the landowner's sheep – just visible in the background.

BRE National Solar Centre
Foundation Building, Eden Project,
Bodelva, St Blazey
PL24 2SG

T +44 (0)1726 871830
E nsc@bre.co.uk
www.bre.co.uk/nsc
Twitter @natsolarcentre

BRE Trust
The BRE Trust uses profits made by BRE Group to fund new research and education programmes, that will help it meet its goal of 'building a better world together'.

Appendix N Q8.0.4 Photomontage F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1 / Q8.04)

Existing Photograph (Left)

To be viewed at comfortable arm's length

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 1 (for context)

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Existing Photograph (Left)

FIGURE 6.10.F DATE 09/06/2023 Sheet 1 of 12

Z:\9114_MALLARD_PASS_EXAMINATION\8DOCS\VISUAL\9114_EXA_PM_F.INDD

Existing Photograph (Left-Centre)

To be viewed at comfortable arm's length

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 1 (for context)

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Existing Photograph (Left-Centre)

FIGURE 6.10.F DATE 09/06/2023 Sheet 2 of 12

Mallard Pass Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 1 (for context)

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Existing Photograph (Right-Centre)

FIGURE 6.10.F DATE 09/06/2023 Sheet 3 of 12

Existing Photograph (Right)

To be viewed at comfortable arm's length

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 1 (for context)

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Existing Photograph (Right)

FIGURE 6.10.F DATE 09/06/2023

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 1 (Left)

FIGURE 6.10.F DATE 09/06/2023 Sheet 5 of 12

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 1 (Left-Centre)

FIGURE 6.10.F DATE 09/06/2023 Sheet 6 of 12

Mallard Pass Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 1 (Right-Centre)

FIGURE 6.10.F DATE 09/06/2023

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 1 (Right)

FIGURE 6.10.F DATE 09/06/2023 Sheet 8 of 12

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 15 (Left)

FIGURE 6.10.F DATE 09/06/2023 Sheet 9 of 12

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 15 (Left-Centre)

FIGURE 6.10.F DATE 09/06/2023 Sheet 10 of 12

Photomontage Year 15 (Right-Centre)

To be viewed at comfortable arm's length

Mallard Pass
Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 15 (Right-Centre)

FIGURE 6.10.F DATE 09/06/2023 Sheet 11 of 12

Mallard Pass Solar Farm

Infrastructure Planning
(Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

Camera Location (OS Grid Reference):	506067 E 311278 N
Ground Level (mAOD):	30.9m
Direction of View: bearing from North (0°):	270°
Distance to Solar PV Site:	27m

Horizontal Field of View:	53.5° (Planar projection)
Paper Size:	841mm x 297mm (Half A1)
Enlargement Factor:	N/A
Visualisation Type:	Type 3

Photo Date / Time:	26/05/2023 12:00
Camera Model and Sensor Format:	Canon EOS 6D, FFS
Lens Make, Model and Focal Length:	Canon EF50mm f/1.8 STM
Height of Camera Lens above Ground (mAOD):	1.5m

This photomontage is based upon LiDAR digital terrain data with spot heights at 2m (which does not precisely model small scale changes in landform or sharp breaks in slope).
The three dimensional model of the solar farm is based on the proposed layout.

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Viewpoint F - Additional photomontage from within Field No. 35 approximately 50 metres to the north of Viewpoint 6B (ExQ1/Q8.04) - Photomontage Year 15 (Right)

FIGURE 6.10.F DATE 09/06/2023 Sheet 12 of 12

Appendix O Q8.0.17 Meadow Park Industrial Estate Planning Application Documents

Town and Country Planning Act 1990
Town & Country Planning (Development Management Procedure) (England) Order 20

MAJOR FULL PLANNING PERMISSION

Rutland County Council

Applicant Name and Address	Agent Name and Address
Mr George Heys Eastern Properties Anglia Ltd Ruthlyn House 90 Lincoln Road Peterborough PE1 2SP United Kingdom	Mrs Lydia Russell-Demisse Walters Architects 141 London Road Leicester LE2 1EF

Date of Validation	Application Number:
25 March 2021	2021/0379/MAF

PROPOSAL: New warehouse (Class B8 Storage/Distribution).
LOCATION: Land Adjacent To Buildings 25 And 26 Meadow Park Industrial Estate Essendine Rutland

GRANT PLANNING PERMISSION in accordance with the application and plans submitted subject to the following conditions:

1 The development shall be begun before the expiration of three years from the date of this permission.
Reason: To comply with the requirements of Section 91 of the Town and Country Planning Act 1990, as amended by the Planning and Compulsory Purchase Act 2004.

2 The development hereby permitted shall not be carried out except in complete accordance with the details shown on the submitted plans, numbers WA533(04)06, WA533(04)02A and WA533(04)04 .
Reason - For the avoidance of doubt and in the interests of proper planning.

INFORMATIVES:

Proactive Statement – This decision has been reached taking into account paragraph 38 of the National Planning Policy Framework.

Rutland County Council became a Community Infrastructure Levy (CIL) Charging Authority on 1st March 2016. Full details of CIL are available on the Council's website www.rutland.gov.uk. The approved development may be subject to a Community Infrastructure Levy (CIL) liability.

IMPORTANT NOTE: The required CIL forms must be submitted to cil@rutland.gov.uk and acknowledged prior to commencing the development. Failure to do so could result in additional financial penalties. If you have not received an acknowledgement by the time you intend to commence development then it is imperative that you contact cil@rutland.gov.uk.

If the development hereby approved is for a self- build dwelling, residential extension or residential annexe you may be able to apply for relief from CIL. Further details can be found on the Planning Portal: https://www.planningportal.co.uk/info/200126/applications/70/community_infrastructure_levy/2

You are advised that this proposal may require separate consent under the Building Regulations and that no works should be undertaken until all necessary consents have been obtained. Advice on the requirements of the Building Regulations can be obtained from the Building Control Section, Places Directorate, Rutland County Council.

Decision Date: 24 June 2021

Proper Officer of the Council

PLANNING PERMISSION

IMPORTANT NOTES

1. Please quote your application reference number (shown overleaf) in all relevant correspondence.

2. **Appeals to the Secretary of State**

   - If you are aggrieved by the decision to grant permission subject to conditions, then you can appeal to the Secretary of State for Communities and Local Government under Section 78 of the Town and Country Planning Act 1990.

   - If you want to appeal, then you must do so using a form which you can obtain from: Initial Appeals, Planning Inspectorate, Temple Quay House, 2 The Square, Bristol, BS1 6PN. Tel No: 0303 444 5000 Email: https://www.gov.uk/appeal-planning-decision The Planning Inspectorate have an online appeal service which you can use to make your appeal. You can find the service through the Appeals area of the Planning Portal.

   - Appeals must be made within **six months** from the date of this decision notice.

   - The Secretary of State can allow a longer period for giving notice of an appeal, but he will not normally be prepared to use this power unless there are special circumstances which excuse the delay in giving notice of appeal.

The Secretary of State need not consider an appeal if it seems to him that having regard to Sections 70 and 72(i) of the Act, to the provisions of the development order and to any directions given under the order, the Local Planning Authority could not have granted planning permission for the proposed development or could not have granted it without the conditions it imposed.

New Warehouse - Essendine

Walters Architects

Design and Access Statement

Meadow Park Industrial Estate
Essendine
PE9 4LT

141 London Road
Leicester
LE2 1EF

0116 254 1830
waltersarchitects.com
info@waltersarchitects.com

Contents

1 Introduction

1 – Introduction

This Design and Access Statement has been prepared by Walters Architects on behalf of Eastern Properties Anglia Ltd, in support of a planning application at the Meadow Park Industrial Estate, Essendine, PE9 4LT.

The proposed development consists of a new-built warehouse, in the same location as an earlier warehouse, demolished in 2003 / 2004.

The purpose of this statement is to provide readers with an understanding of the analysis that has underpinned the design process leading to the final proposal.

It explains how the design has responded to the site and its context and demonstrates how the development will be accessed by users. In accordance with Planning Practice Guidance the statement is concise, with a level of detail appropriate to the complexity of the application.

This statement is to be read in conjunction with the application drawings:

WA 533 (01) 01	Site Location Plan
WA 533 (04) 01	Block Plan – As existing
WA 533 (04) 02	Block Plan – As proposed
WA 533 (04) 03	Site / Floor Plan – As existing
WA 533 (04) 04	Site / Floor Plan – As proposed
WA 533 (04) 05	Elevations – As existing
WA 533 (04) 06	Elevations & Sections – As proposed

2

Site Location and Context

Aerial view © Google Earth Pro 2020

2.1 – Site Location and Context – The Site

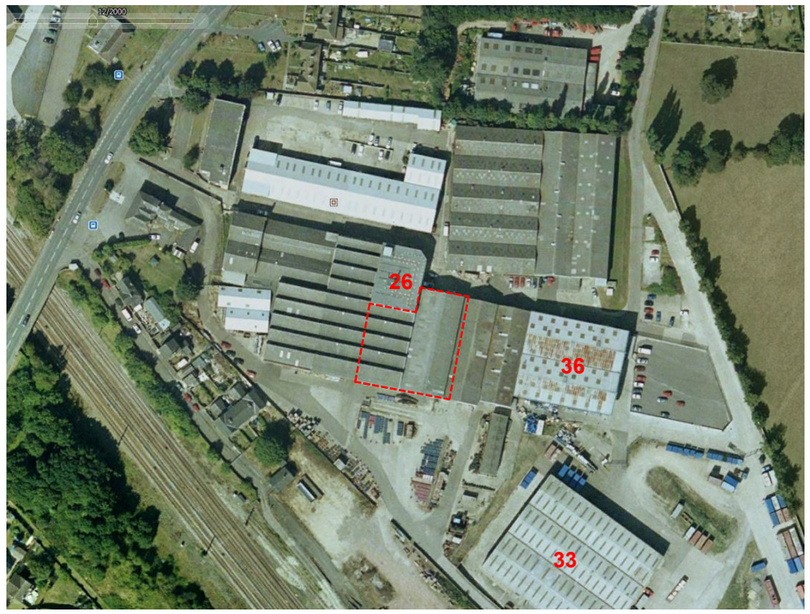
Meadow Park Industrial Estate is located in Essendine, to the northeast of the East Coast main railway line.

It is under the authority of Rutland County Council.

The application is for a new warehouse, in the same location as earlier industrial buildings, demolished in 2003 / 2004.

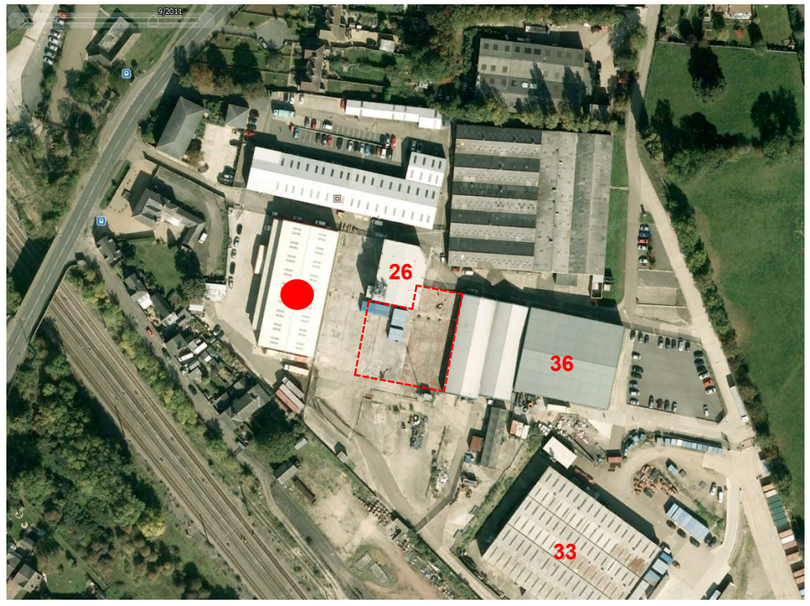
Proposed location of new warehouse

Denotes approximate site boundary – for accurate boundary, refer to Location Plan WA 533 (01) 01

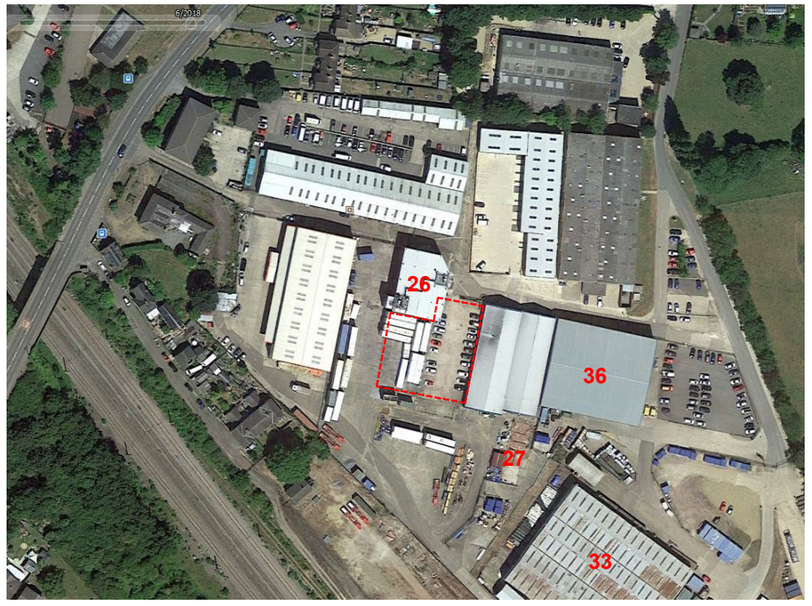


Aerial view © Google Earth Pro - 2000
The aerial view shows the north of the site with the most extensive amount of buildings on site.

Aerial view © Google Earth Pro - 2004
The aerial view shows the extent of the buildings damaged by fire in 2003 and subsequently demolished.



Aerial view © Google Earth Pro - 2011
The red dot denotes the new Steele Removals warehouse to the west of the site.



Aerial view © Google Earth Pro - 2018
The view shows demolished building 27, now the location of Bland's coach maintenance workshop.

2.2 – Site Location and Context – History of the Site

The various aerial views on this page show the evolution of the buildings on the industrial estate.

'26', '33' and '36' refer to the local appellation of the buildings, as shown on the application drawings and are there to help the reader understand the site.

The location of the proposed warehouse is shown in red on each map, putting it in the context of the extent of industrial estate over the years. The warehouse will occupy a footprint occupied earlier by industrial buildings.

This is for illustrative purpose only, and is not an accurate footprint to scale. For accurate dimensions, refer to the drawings submitted as part of the planning application.

2.3 – Site Location and Context – Views

The dots below indicate whare the photographs were taken from.

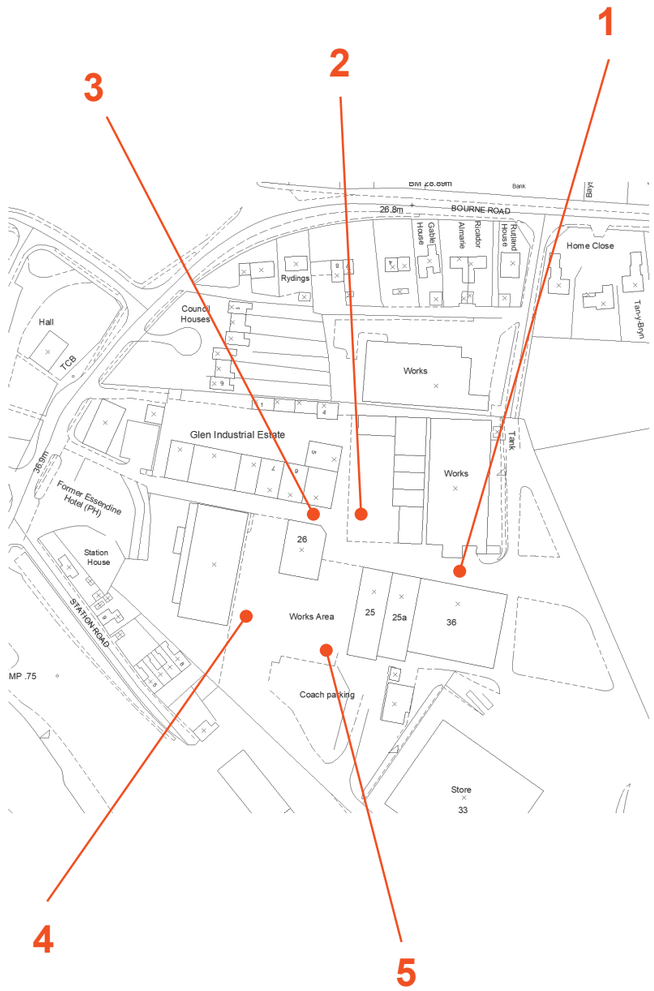
1. View from bottom of internal north road, looking towards building 26. On the left hand side are buildings 36, 25a and 25.

2. View looking west towards the gap between buildings 25 (on the left) and 26 (on the right), where the new warehouse will be located.

3. View looking south at the gap between buildings 25 (on the left) and 26 (on the right) where the new warehouse will be located.

4. View looking east at the location of the proposed new warehouse. Building 26 in on the left; building 25 is in the background.

5. View looking north at the location of the proposed new warehouse. Building 26 in on the left; building 25 is on the right.



Walters Architects

3

Proposals

3.1 – Introduction

The applicant wishes to build a new warehouse adjacent to buildings 25 and 26. This is on land previously occupied by industrial buildings.

The new warehouse will be operated by Stamford Storage, as additional storage facilities to their existing facilities on site (building 33 and warehouse in the southeast corner of the site).

3.2 – Use

The table below lists the buildings on site and their respective use.

Building	Existing	Use	New	Use
26 – ground floor	507 m^2	E (was B1)		
26 – first floor	507 m^2	E (was B1)		
26 – second floor	507 m^2	E (was B1)		
25 – ground floor	640 m^2	B2		
25a – ground floor	600 m^2	B2		
25a – first floor	300 m^2	B2		
36 – ground floor	1,590 m^2	B8		
33 – ground floor	3,040 m^2	B8		
Unit 1	198 m^2	B2		
Unit 2	193 m^2	B2		
Unit 3	193 m^2	B2		
Unit 4	193 m^2	B2		
Unit 5	193 m^2	B2		
Unit 6	193 m^2	B2		
Unit 7	193 m^2	B2		
Unit 8	294 m^2	B2		
Unit 9	290 m^2	B2		
Unit 10	300 m^2	B2		
SE warehouse	3,030 m^2	B8		
Coach workshop	258 m^2	SuiG		
New warehouse			1,497 m^2	B8
TOTAL	13,219 m^2		1,497 m^2	

3.3 – Amount

Whole site area	64,450 m^2
New Warehouse Footprint	1,497 m^2

3.4 – Layout

The new warehouse will be located between and against adjoining existing buildings, using the same portal frame construction.

3.5 – Scale

The new warehouse fits on the site in a location previously occupied by industrial buildings. Its footprint lines up with the walls of adjoining buildings.

The height of the ridge is 9.9m maximum, similar to the height of the adjoining buildings, and lower than the 11.8m of the tallest building on site (building 26).

3.6 – Appearance

The new warehouse will have steel cladding matching the appearance of the cladding of the adjoining buildings (Solent Blue).

3.7 – Landscaping

N/A. All existing hard standing surfaces to be retained.

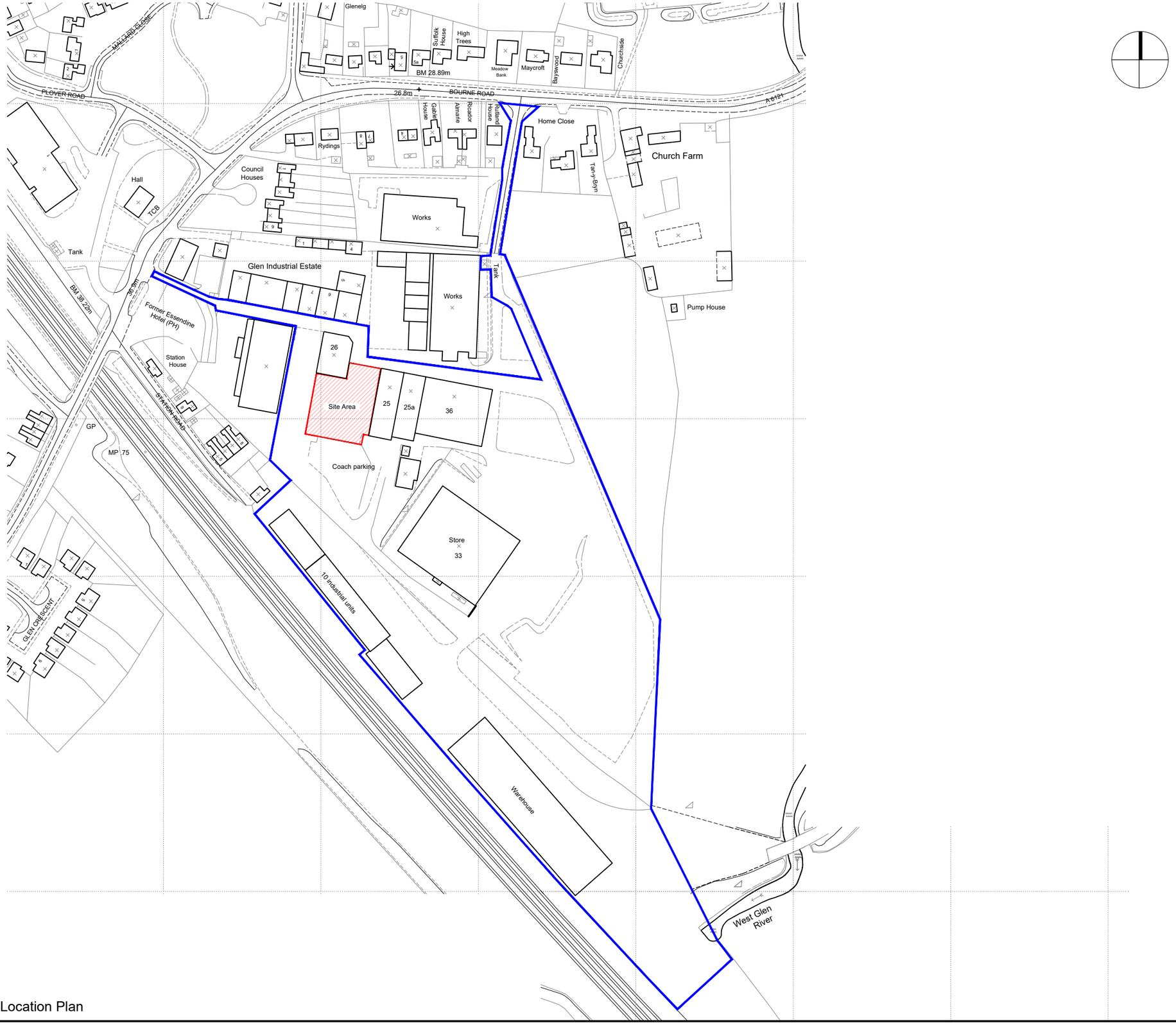
3.8 – Access Statement (Inclusive Design)

Not applicable to this project.

141 London Road
Leicester
LE2 1EF

0116 254 1830
waltersarchitects.com
info@waltersarchitects.com

Walters
Architects



Location Plan

AMENDMENTS

A	19.04.21	Red line limited to site area. Adjoining ownership shown in blue.	LRD

PLANNING DRAWINGS
Printed or electronic copies of the plan can be scaled for planning purposes.
It is the responsibility of the person scaling from the drawings to make sure that reference is made to the drawn scale.

0 20m 100m

DRAWING TITLE
Location Plan

JOB TITLE
Stamford Storage
Essendine New Warehouse

DRAWING NUMBER
WA 533 (01) 01A

SCALE 1:2500 @A3

DATE 10.03.21

DRAWN LRD

CHECKED KW

STATUS
PLANNING DRAWING ONLY

CONTACT
0116 254 1830
waltersarchitects.com
info@waltersarchitects.com

141 London Road
Leicester
Leicestershire
LE2 1EF

Walters Architects

Meadow Park Industrial Estate

Reference	2021/0379/MAF
Alternative Reference	PP-09658428
Application Received	Thu 25 Mar 2021
Application Validated	Thu 25 Mar 2021
Address	Land Adjacent To Buildings 25 And 26 Meadow Park Industrial Estate Essendine Rutland
Proposal	New warehouse (Class B8 Storage/Distribution).
Status	Decided
Decision	Approve
Decision Issued Date	Thu 24 Jun 2021
Planning Permission expiry	24 Jun 2024 (3 years from date of permission)

Existing Site Plan

AMENDMENTS

0 2m 10m

DRAWING TITLE
Existing Site Plan

JOB TITLE
Stamford Storage
Essendine New Warehouse

DRAWING NUMBER
WA 533 (04) 03

SCALE 1:250 @A3

DATE 19.03.21

DRAWN LRD

CHECKED KW

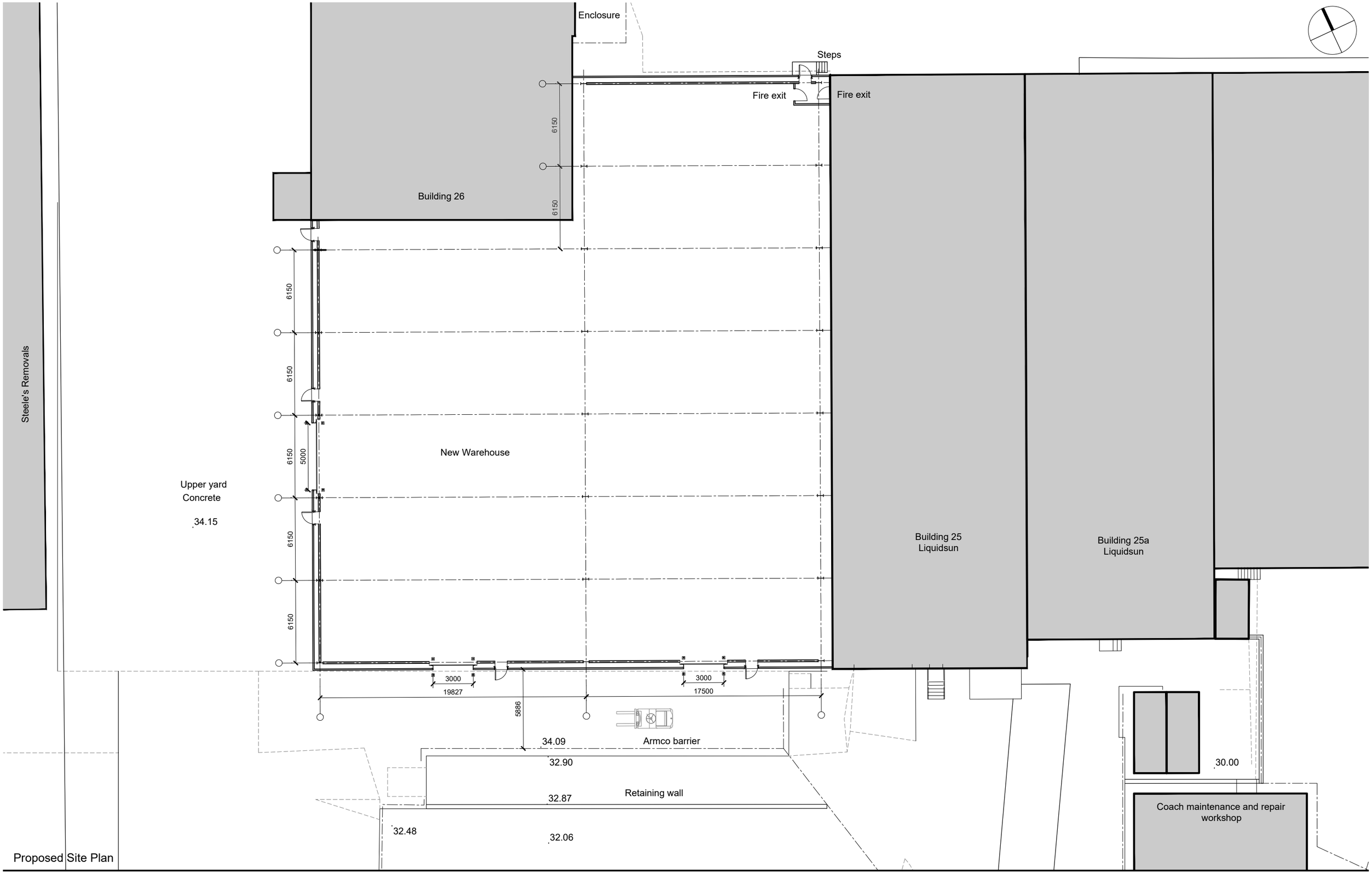
STATUS
PLANNING DRAWING ONLY

CONTACT
0116 254 1830
waltersarchitects.com
info@waltersarchitects.com

141 London Road
Leicester
Leicestershire
LE2 1EF

Walters Architects

PLANNING DRAWINGS
Printed or electronic copies of the plan can be scaled for planning purposes.
It is the responsibility of the person scaling from the drawings to make sure that reference is made to the drawn scale.



Proposed Site Plan

AMENDMENTS

0 2m 10m

PLANNING DRAWINGS
Printed or electronic copies of the plan can be scaled for planning purposes.
It is the responsibility of the person scaling from the drawings to make sure that reference is made to the drawn scale.

DRAWING TITLE
Proposed Site Plan

JOB TITLE
Stamford Storage
Essendine New Warehouse

DRAWING NUMBER
WA 533 (04) 04

SCALE 1:250 @A3
DATE 19.03.21
DRAWN LRD
CHECKED KW
STATUS PLANNING DRAWING ONLY

CONTACT
0116 254 1830
waltersarchitects.com
info@waltersarchitects.com

141 London Road
Leicester
Leicestershire
LE2 1EF

Walters Architects

Appendix P Q8.0.19 Requested Landscape Policy Documents

South Kesteven

Landscape Character Assessment

January 2007

fpcr

CONTENTS

INTRODUCTION

1.1 South Kesteven in Lincolnshire covers an area of nearly 943km² and is very fortunate in the range and diversity of the landscapes found within its boundaries. The District includes the market towns of Grantham, Stamford, Bourne and The Deepings, with many smaller villages.

1.2 The 20th Century has witnessed a degree of change in landscape fabric and character prompted by the emphasis on maximising agricultural production and development pressures. Fortunately, the importance of unique local landscape distinctiveness has now been recognised at a national level, with policy advocating the protection and enhancement of landscape resources on a comprehensive basis.

1.3 In response to this guidance, in 2005 South Kesteven District Council commissioned a full assessment of landscape character to be carried out to coincide with the preparation of the District Local Development Framework.

1.4 Landscape Character Assessment is a tool used to define areas in the landscape which are distinctly different from one another by looking at a combination of geology, landform, soils, vegetation, landuse and human settlement. The assessment process involves a desk based study and field assessment to identify distinct features within the landscape and this baseline information is then analysed and used to identify the current key characteristics and variation found across the District.

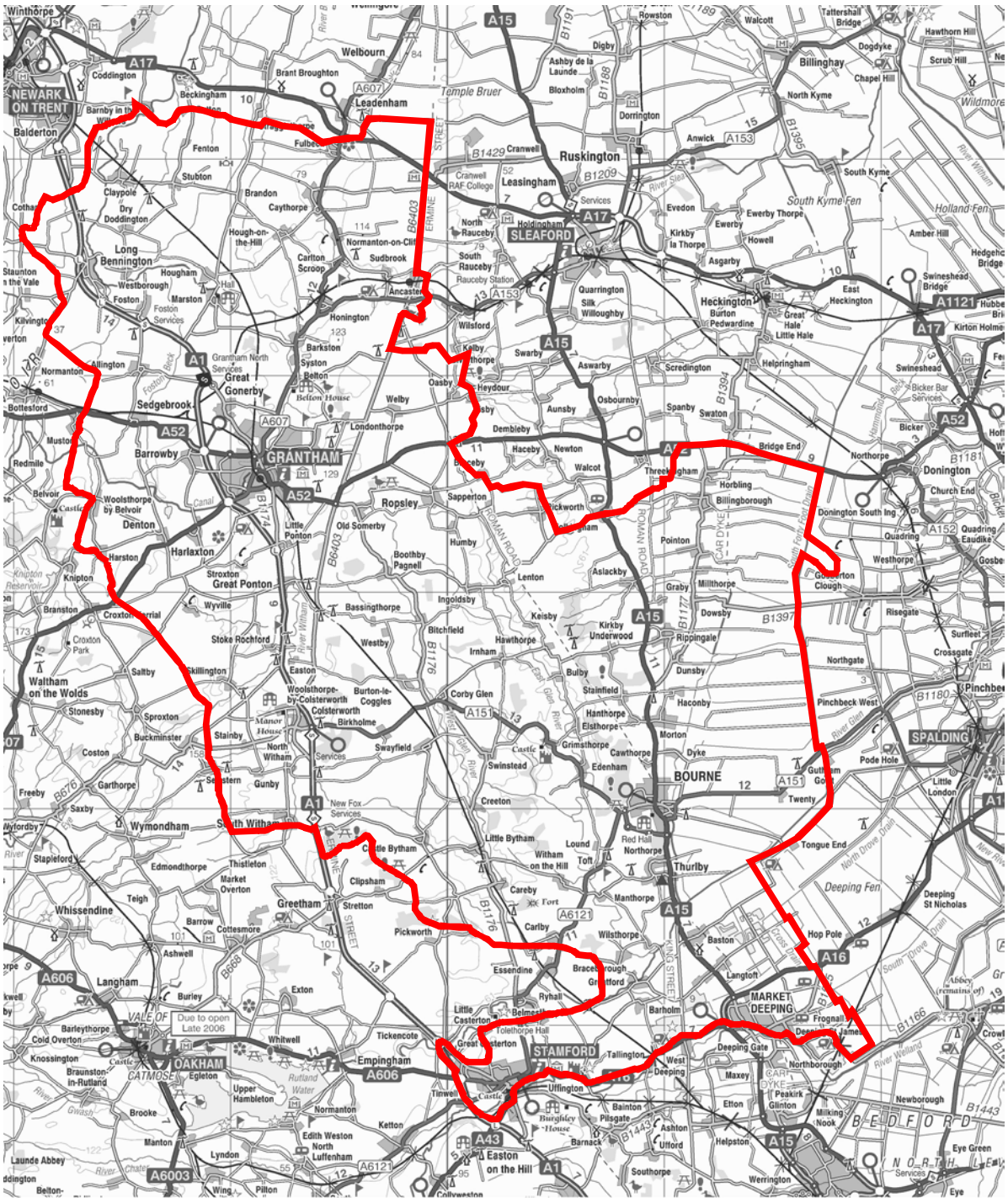
1.5 The Landscape Character Assessment should provide an understanding of the landscape, it's history and future pressures and is designed to provide guidance for future management strategies which will help secure the unique qualities and subtle idiosyncrasies which make South Kesteven special. This can then be used to ensure that sensitive areas are protected and also that opportunities for improving the landscape character are highlighted.

1.6 The 21st Century will no doubt continue to witness gradual landscape evolution, things never simply stand still. Climate change will pose a significant challenge, although it is extremely difficult to be certain about the nature of that change and the ability of the landscape and its wildlife to adapt to differing conditions. Whilst some existing species may struggle, others will welcome the new opportunities which develop, perhaps resulting in subtle shifts in overall biodiversity.

1.7 The District-wide Landscape Character Assessment aims to provide a bench mark document against which future trends can be measured. The benefits of the latest environmental stewardship agricultural measures can be assessed to monitor whether they succeed in enhancing landscape and habitat features. It can also provide a tool to guide future development pressures and to ensure that these are in harmony with prevailing landscape character, local distinctiveness, and a sense of place.

1.8 The Regional Forestry Framework, 'Space4Trees' may also contribute to the restoration of a more wooded character across large parts of the District reinforcing the beneficial characteristics already found around South Kesteven.

1.9 This document is intended to be the start of a continuing process of landscape character assessment. The District Council welcomes input from the community at large, and trusts that this document will stimulate stakeholder involvement in landscape enhancement and wildlife conservation.



KEY

District Boundary

South Kesteven Landscape Character Assessment

LOCATION MAP

Figure 1

July 2006

OBJECTIVES OF ASSESSMENT

1.10 The aims of this assessment are to provide a thoroughly researched landscape study upon which the planning system can :-

- Base criteria-led policies which will protect and enhance the unique locally distinctive landscape characteristics of the District.
- Address issues including environmental improvements, regeneration, nature conservation and sustainable land management.
- Ensure that appropriate future development is successfully integrated within the environment.

1.11 The main objectives of the assessment are as follows :-

- To identify the Landscape Character Areas within the District.
- To provide guidance that can be used to develop policy that will encourage landscape character and local distinctiveness to be reflected in new development.

METHODOLOGY

1.12 Guidelines for carrying out a landscape character assessment have been clearly outlined by the Countryside Agency and Scottish Natural heritage (2002). The urban assessment follows guidance within the 'Landscape Character Assessment Guidance for England and Scotland'. The basic work stages are outlined as follows :-

Inception and Data Review

1.13 Relevant background data was received and reviewed, and preliminary site reconnaissance carried out to allow familiarisation of the Study area.

Desk Study and Initial Mapping

1.14 Available published literature and mapping relevant to the District was collated, reviewed and analysed, including District Council information and plans, historic maps, heritage information, ecological sites and data, regional landscape appraisals and soil and geology survey data of the District.

1.15 The context for the district-wide study was defined through a desk based study of broader landscape character information including, importantly, the "Landscape Character Map of England" (Natural England), and also a study of Landscape Character Assessments completed for adjacent Counties and Districts.

1.16 The information was then combined through initial mapping and layering and areas of similar or common character were provisionally identified.

Field Survey Landscape Character

1.17 A comprehensive field survey was carried out, based on the initial character area mapping from the desk study, to identify consistent landscape character areas.

Classification, Description and Management Strategy

1.18 Character areas were then classified through the combination of professional judgement, results of the field survey work and the physical mapped data.

Landscape Character Areas were identified for the whole of the District and are clearly described and their key characteristics identified for each of the areas.

LANDSCAPE SENSITIVITY

1.19 Following the classifications and description for each character area, an assessment of landscape sensitivity has been made. This assesses how each character area could accommodate change without adverse impacts on character. This mostly involves decisions about whether or not significant characteristic elements of the landscape will be liable to loss, whether the characteristics could easily be restored and whether important aesthetic aspects of character will be liable to change. Consideration is also given to the addition of new elements. The assessment considers three factors;

- The elements that contribute to landscape character, their significance and vulnerability to change.
- The overall quality and condition of the landscape.
- Aesthetic aspect of landscape character.

1.20 Within South Kesteven, pressure for change arises from a range of proposals. These include wind energy proposals, new housing and employment development. For each character area an assessment of sensitivity to these potential developments has been carried out. The criteria for landscape sensitivity is outlined below :-

Landscape Sensitivity

High - Landscape areas with particularly distinctive or positive characters or with valued landscape features. The areas may be sensitive to relatively small changes.

Medium Landscape areas with reasonably positive character, but with evidence of alteration or degradation of the character or features. Potentially tolerant of some change.

Low Landscape areas with a weak character or relatively few features of value, potentially tolerant of significant change.

Policies and Recommendations

1.21 Once the character areas have been classified and described, the Character Assessment will be used as a basis for the development of a number of criteria led policies for the Local Development Framework.

Reporting the Outputs

1.22 The Assessment has been produced in a form which is intended can be extended and updated in the future to take account of changes in the District, and to allow opportunities to add more detailed tiers of data and related information at a later date.

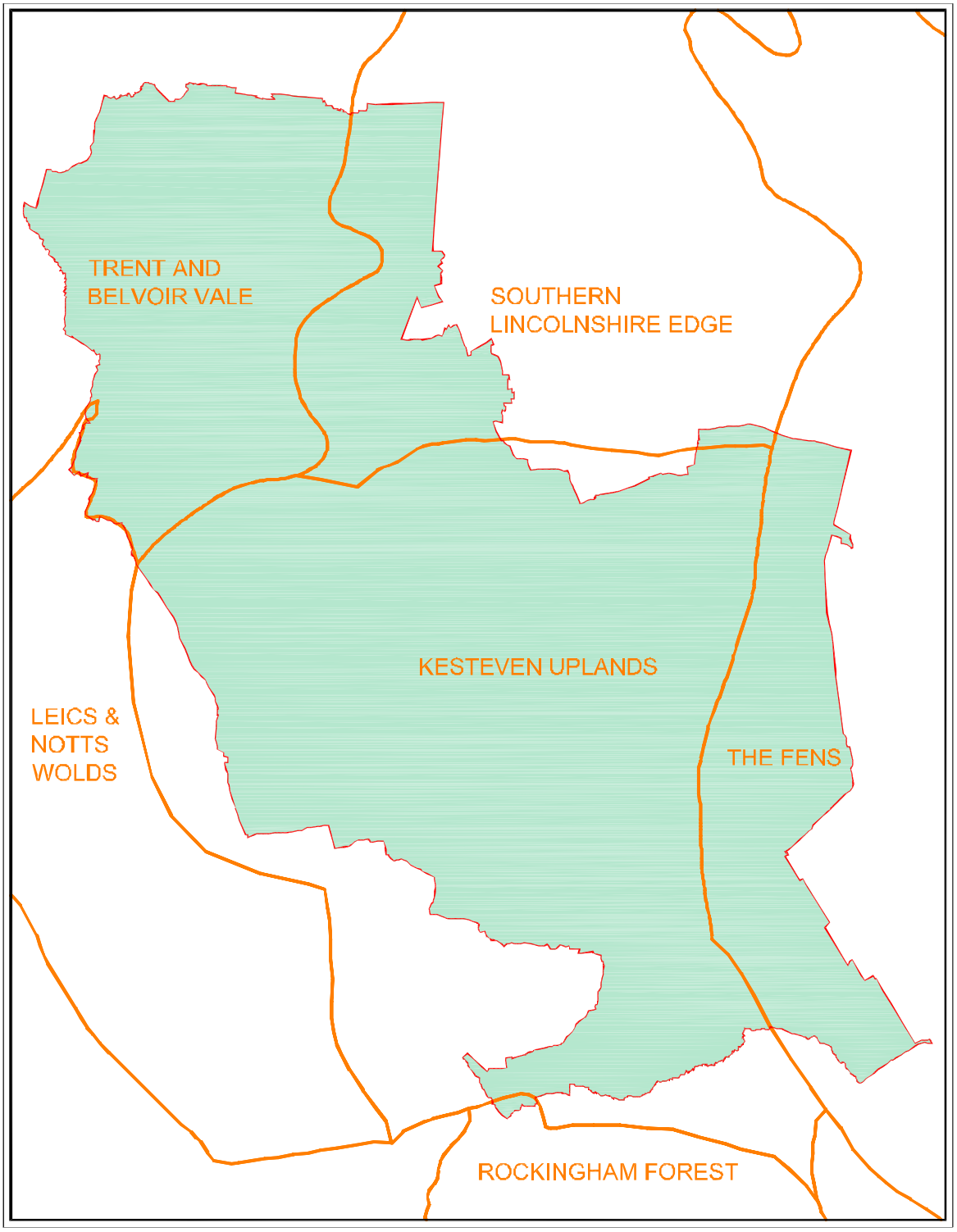
LANDSCAPE CONTEXT

1.23 The District of South Kesteven is predominantly rural, with areas of open farmland and small towns and villages.

The Natural England Character Map of England

1.24 Natural England is concerned with the whole of England's countryside and has produced the Landscape Character Map of England. This defines national character areas where publications have been produced which included detailed descriptions of the areas as well as explanations of how the character had arisen and how it is changing.

1.25 The District of South Kesteven is located within the East Midlands region (Countryside Character Volume



KEY

District Boundary

Character Area Boundary

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
English Nature Datasets

South Kesteven Landscape Character Assessment

COUNTRYSIDE AGENCY CHARACTER AREAS

Figure 2

July 2006

4, 1999) and is largely covered by four different character areas. In addition, two very small areas extend into other character areas. These areas are shown on figure 2 and are briefly described as follows :

Area 75 Kesteven Uplands

1.26 This character area covers the central part of the district and is the largest character area within the district.

1.27 This is a medium-scale, undulating, mixed farming landscape dissected by rivers Witham and East and West Glen. Enclosure is generally by hedgerows and, more locally, by stone walls to the south. There are significant areas of woodland, including semi-natural and ancient woodland, and a high concentration of historic houses and associated parklands. There is generally a dispersed but nucleated settlement pattern, with picturesque villages constructed in local limestone. These include distinctive collyweston slate roofs to the south and pantiles to the north.

Area 48 Trent and Belvoir Vales

1.28 This area lies to the northwest of the District. It is described as a gently undulating landform, with shallow ridges dropping down gently to broad river valleys. It is an open, arable or mixed, farmed landscape, strongly rural in feel, with trimmed hedges and few hedgerow trees; woodlands are only locally significant. These are frequent nucleated villages with red brick houses, roofed with pantiles, and spired churches prominent in long views.

Area 47 Lincolnshire Edge

1.29 This area, which lies to the north east of the District is described as a Large-scale 'upland' arable escarpment. The open landscape has rectilinear fields and few boundaries. Where enclosure is still present, there is a mixture of limestone walls, discontinuous hedges and shelter belts. There is sparse settlement on top of escarpment.

Area 46 The Fens

1.29 To the east of the District the land descends to the Fens. This is a large-scale, flat, open landscape with extensive vistas to level horizons and huge skies. A hierarchy of rivers, drains and ditches provides a strong influence throughout the area. Embanked rivers and roddons create local enclosure and elevation. Woodland cover is sparse.

1.30 A very small area of land south of Stamford lies within the Rockingham Forest Character Area (92). This area is so small and marginal that it is not of significance to this study.

Natural Areas

1.31 Natural England, formerly known as English Nature, has developed a series of 'Natural Areas' for the Country. These are areas with characteristic associations of wildlife and natural features. They provide a way of interpreting the ecological variations of the country in terms of natural features, illustrating the distinctions between one area and another. Each Natural Area has a unique identity resulting from the interaction of wildlife, landforms, geology, land use and human impact.

1.32 Whilst many of the natural area boundaries correspond with the landscape character areas, there are differences. Figure 3 shows the natural areas across South Kesteven District. To the north, the Trent Valley And Rises natural area corresponds with the Trent and Belvior Vale landscape character area. To the south west, the Fens form a distinctive natural area

and landscape character area. The central part of the district is described as the Lincolnshire and Rutland Limestone Natural Areas. This covers the Kesteven Uplands and Southern Lincolnshire Edge landscape character area.

The natural areas are summarised as follows:

Area 38 Lincolnshire and Rutland Limestone

1.33 The Lincolnshire and Rutland Limestone Natural Area has a lot of woodland, particularly on the boulder clay on the Kesteven Plateau. Broadleaved woodland, scrub and wood pasture can all be found. Small pockets of calcareous grassland are scattered about the Natural Area, mainly within protected sites and roadside verges, and these support a high diversity of wildlife. Freshwater habitats in the Natural Area include rivers and streams and a few flooded sand and gravel pits. The gravel pits support important populations of breeding birds. Farming is the principle land use of the Natural Area, and the farms have some habitats important for wildlife including unimproved grasslands, hedges, streams, ponds and woodland copses.

Area 33 Trent Valley and Rises

1.34 Most of the Natural Area comprises a geology that produces a fertile soil ideal for agriculture. Despite a large part of the area being under intensive agriculture, there are a number of important habitats remaining. These include neutral grassland, which is the most common type of unimproved grassland, and a number of acidic and calcareous grassland sites associated with local differences of geology.

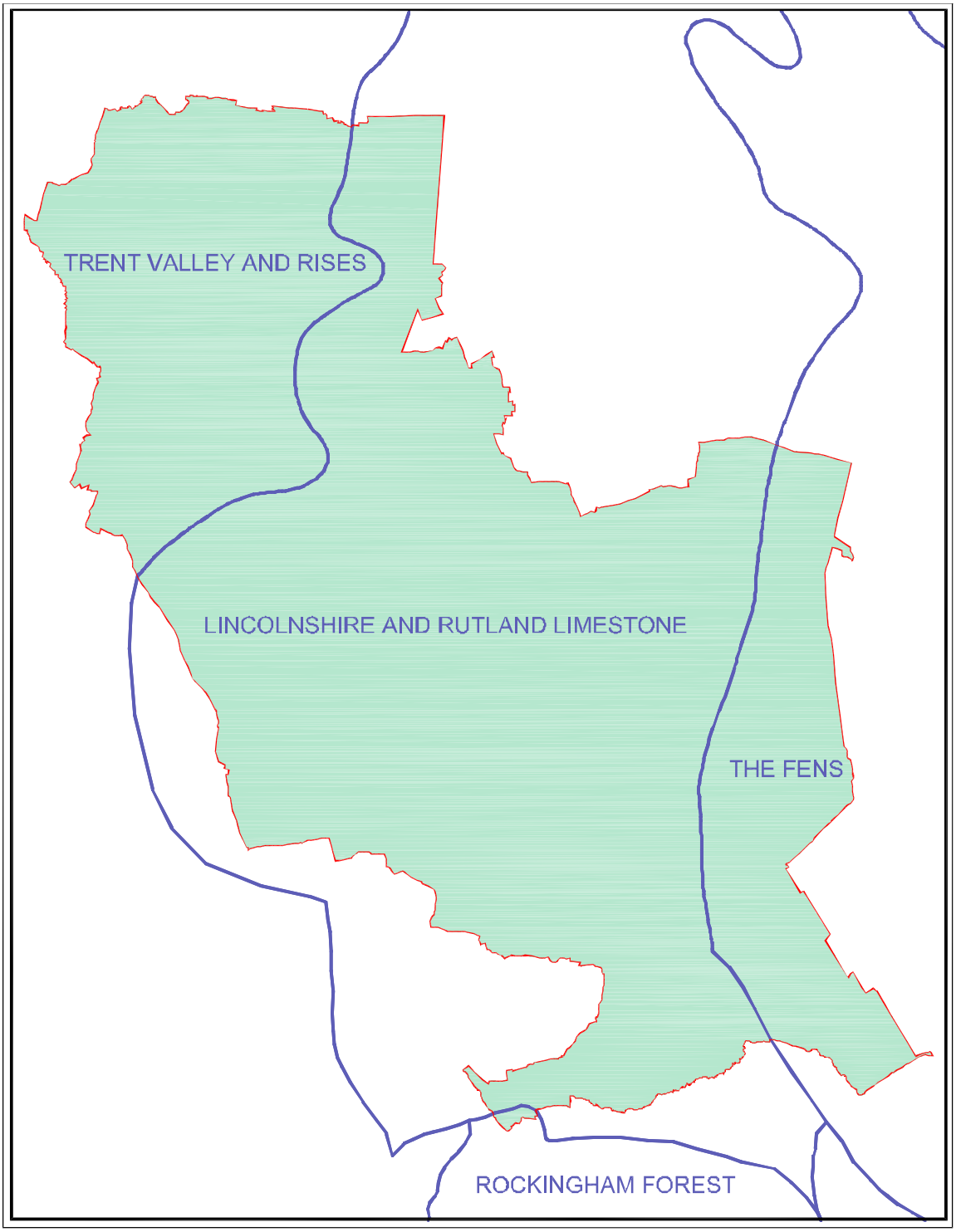
Area 37 The Fens

1.35 The Fens Natural Area is a low-lying, level terrain which rarely reaches 10m above sea level, except for fen 'islands' such as the Isle of Ely. The land is predominantly cultivated with little natural or semi-natural habitat remaining. Rich soils and varied intensive agricultural use emphasise the scale and geometry of the land and produce strong seasonal colour changes within the landscape. Woodland cover is very sparse with the majority of trees found lining roads and villages and shelterbelts. Marshes, swamps and fens add a distinct character to the area and provide outstanding habitats such as swamps, fen meadow and neutral and improved grasslands.

Other Landscape Assessment Work

1.36 The District of South Kesteven lies on the south-eastern edge of Lincolnshire, and borders Nottinghamshire, Leicestershire, Rutland and Cambridgeshire. Whilst at the time of the study there was no published landscape character assessment for Lincolnshire, most adjacent Counties/Districts have carried out landscape assessment. The adjacent character areas have been reviewed and have provided context to the South Kesteven study.

1.37 Landscape character rarely changes abruptly across District boundaries, so the existing work published by the adjacent authorities has provided useful background.



KEY

District Boundary

Natural Area Boundary

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
English Nature Datasets

South Kesteven Landscape Character Assessment

ENGLISH NATURE NATURAL AREAS

Figure 3

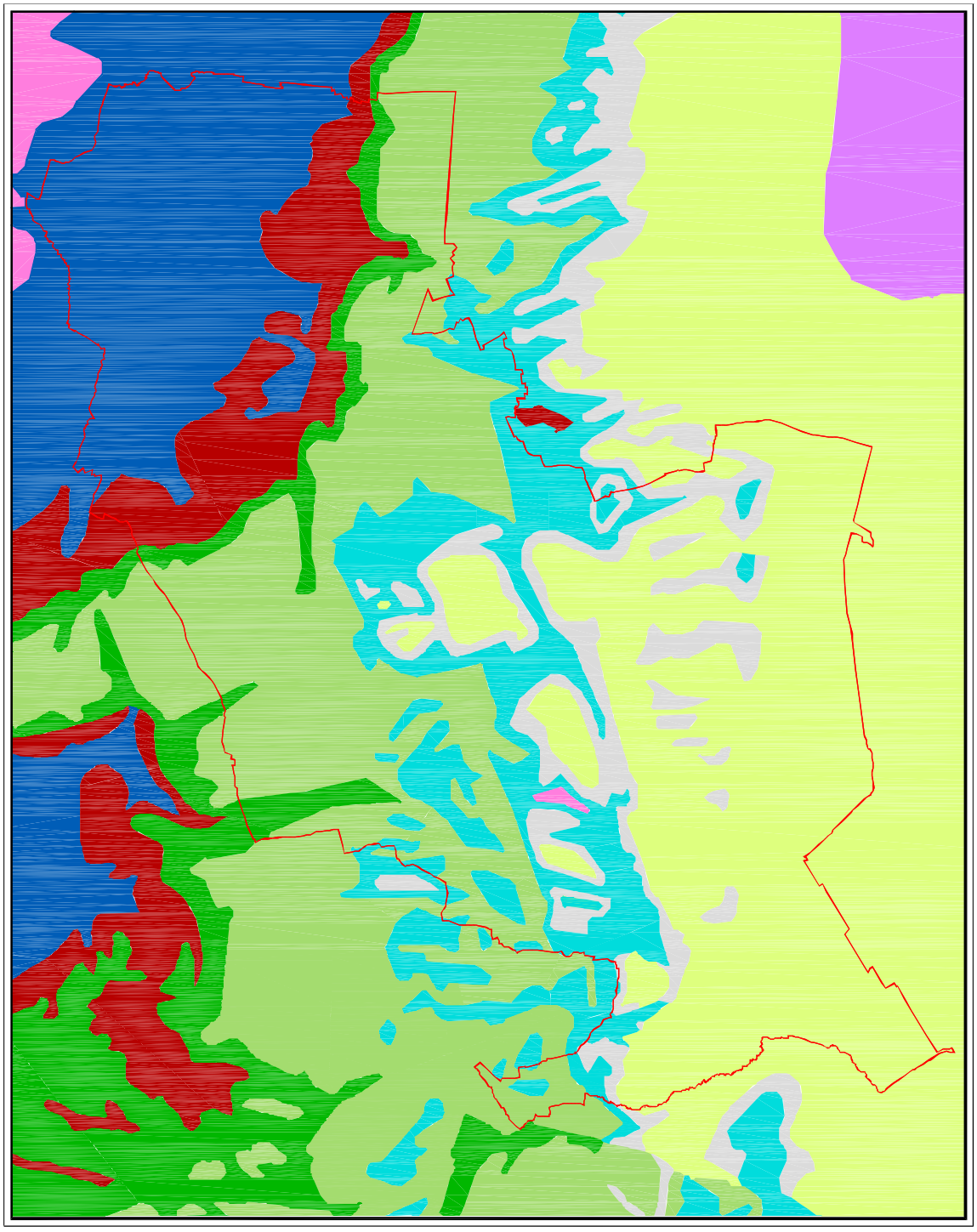
July 2006

GEOLOGY AND SOILS

2.1 The geology and soils across the district broadly follow the three natural areas described in Section 1. The solid geology is shown on Figure 4 and the Superficial Deposits on Figure 5. The northern and western part of the district comprises the Trent and Belvoir Vales. The solid geology in this area is dominated by the mercia mudstones. The superficial geology is complicated by extensive deposition of glacial debris, producing local clays and glacial pebbles.

2.2 The central part of the district comprises almost entirely Jurassic limestone rocks. Some significant areas are covered by glacial boulder clay drift. Highly calcareous loams are found mainly on the steeper slopes.

2.3 The eastern part of the district lies within The Fens. The underlying geology comprises Oxford clay, overlain with river terrace deposits and alluvium. This has given rise to some highly fertile soils.



KEY

- District Boundary
- Corbrash
- Great Oolite
- Oxford Clay & Kellaways Beds
- Middle Lias
- Upper Lias
- Inferior Oolite
- Amptill Clay, Kimmeridge Clay & Corallian
- Lower Lias
- Triassic mudstones (inc. Keuper marl, Dolomitic Conglomerate and Rhaetic)

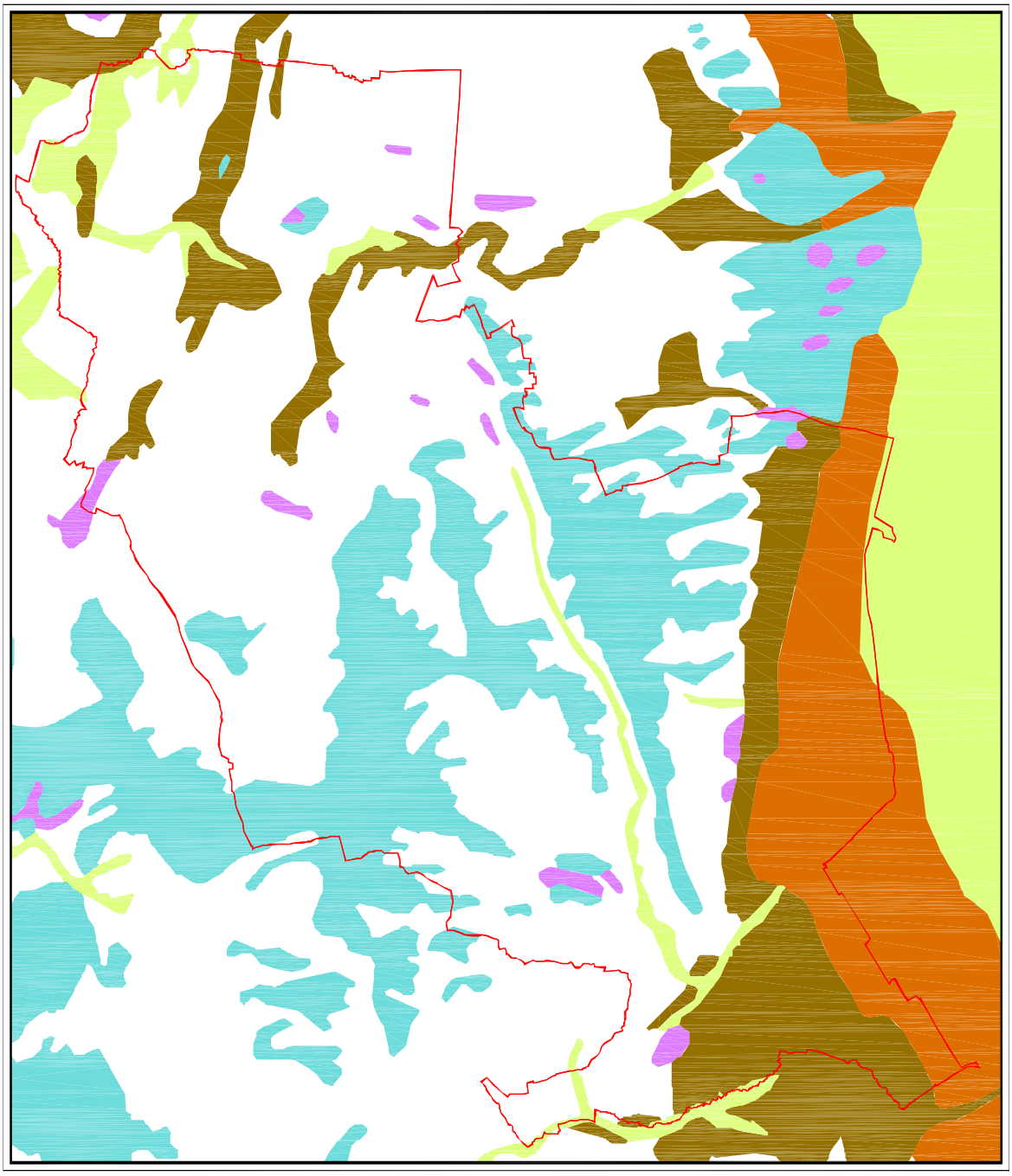
Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
British Geological Survey

South Kesteven Landscape Character Assessment

SOLID GEOLOGY

Figure 4

July 2006



KEY

- District Boundary
- Glacial Sand and Gravel
- Till
- Alluvium
- Peat
- River Terrace Deposits (Undifferentiated)

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
British Geological Survey

N

South Kesteven Landscape Character Assessment

SUPERFICIAL DEPOSITS

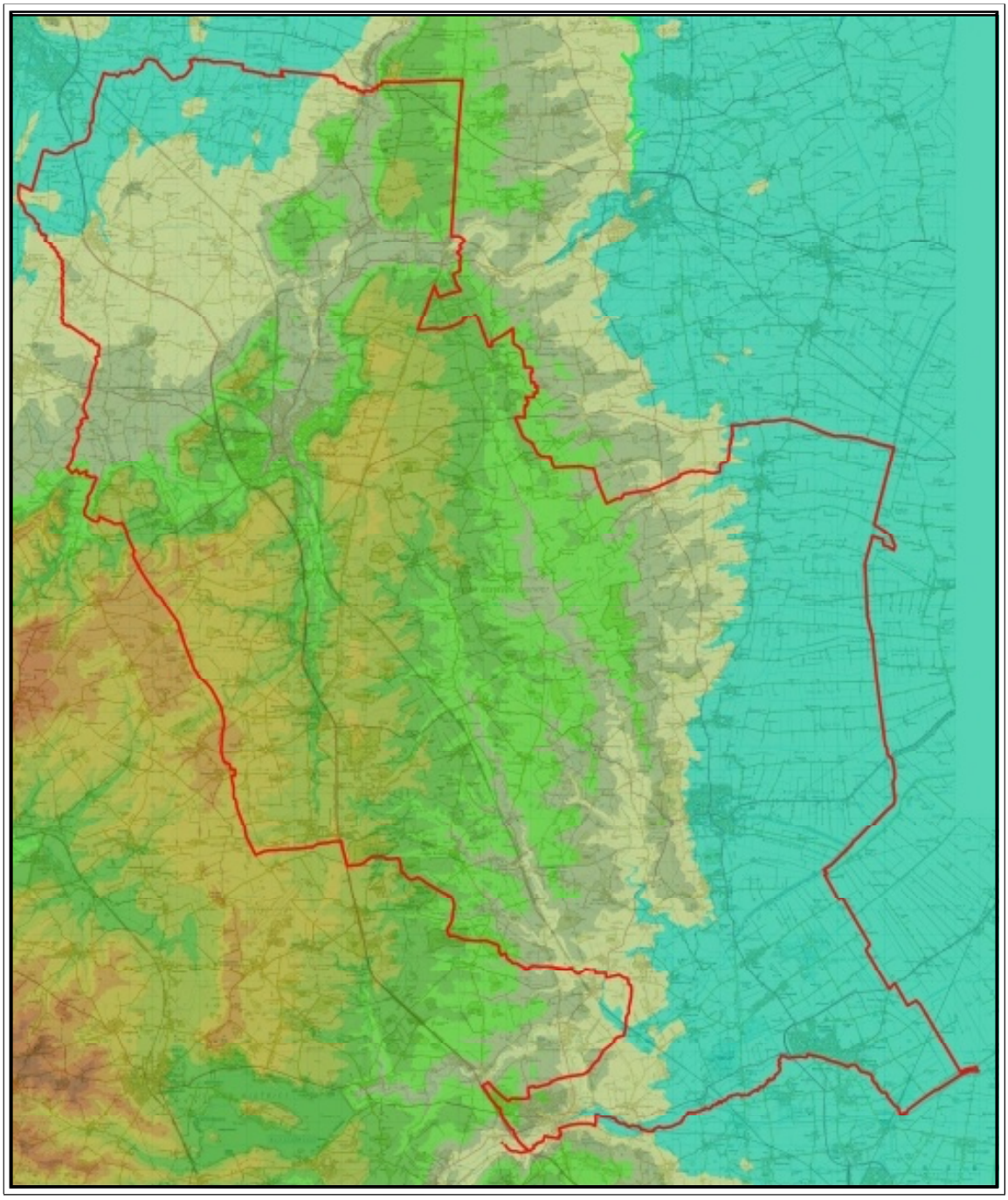
Figure 5

July 2006

TOPOGRAPHY

2.4 Topography plays an important role in determining landscape character across South Kesteven. Figure 6 shows the topography of the District. The central part of the District is characterised by higher land, typically between 100m and 140m above ordnance datum (AOD). This area corresponds with the Natural England 'Kesteven Uplands' and 'Southern Lincolnshire Edge' character areas. This upland area is disected by three valleys which generally run in a north/south direction. The valley of the River Witham extends to the north through Grantham. The valley of the East and West Glen Rivers extend to the south opening out on to The Fens. The Fens are typically flat and low lying less than 20m AOD.

2.5 Land to the north-west of the District lies in the Trent and Belvoir Vales Natural England character area. This area is very gently undulating and generally lies between 20m and 80m AOD. The area around Grantham has a more complex topography, with a series of hills and valleys, with the majority of the town lying on the lower ground between the surrounding hills.



KEY

- District Boundary
- 0-20m
- 20-40m
- 40-60m
- 60-80m
- 80-100m
- 100-120m
- 120-40m
- 140-160m
- 160-180m
- 180-200m

N

South Kesteven Landscape Character Assessment

TOPOGRAPHY

Figure 6

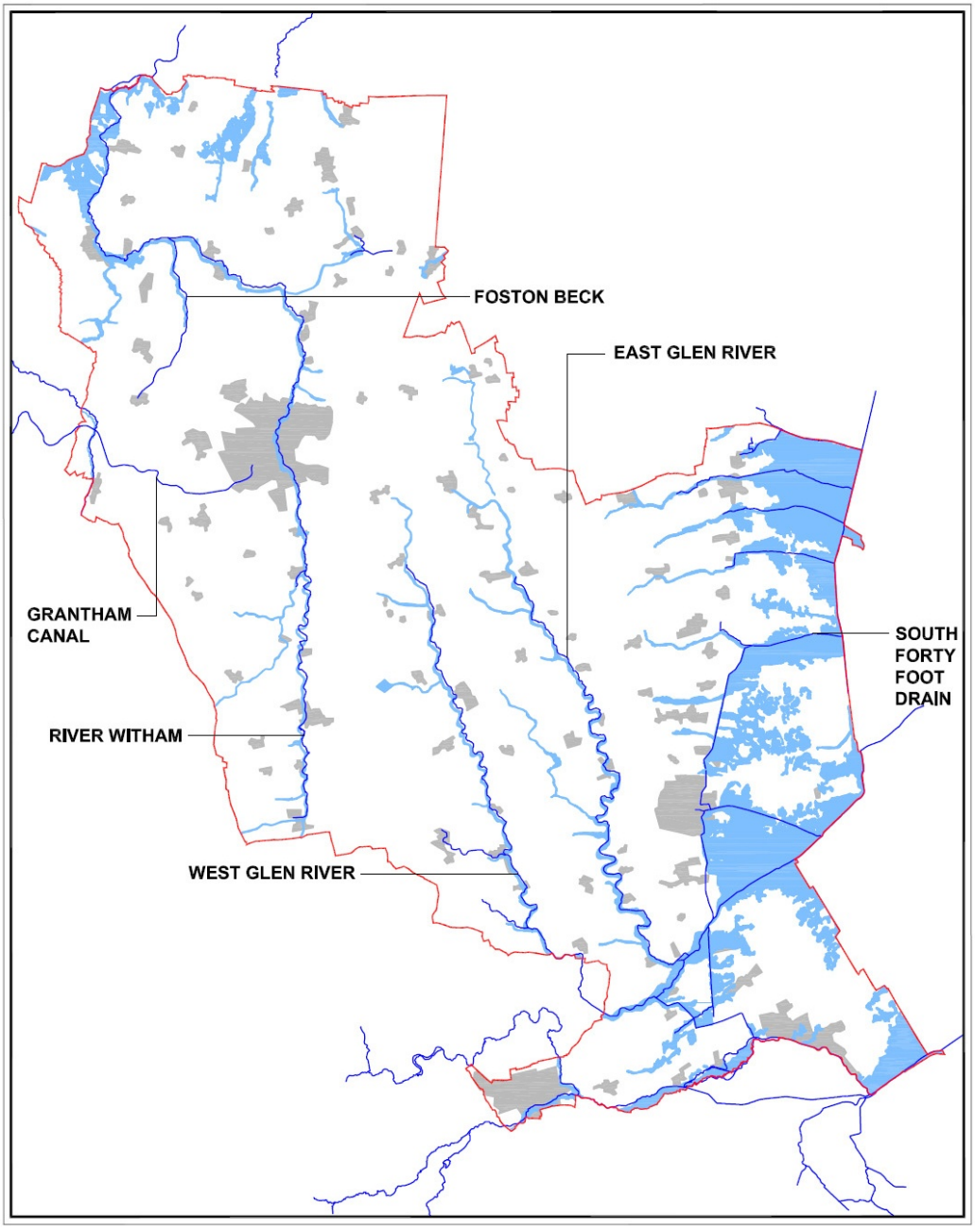
July 2006

HYDROLOGY

2.6 The hydrology of the District is closely related to the topography and the geology of the area. The main watercourses are shown on Figure 7. The River Witham runs north through Grantham with the East and West Glen Rivers running to the south. Whilst the topography and hydrology plans demonstrate that these rivers have determined the form of the central part of the District, the rivers themselves are not so dominant 'on the ground'. The limestone geology of the area results in these rivers being modest features in the landscape. The rivers are often bounded by hedgerows and trees, and it is sometimes difficult to discern them from other field boundaries.

2.7 To the south east of the District there is an obvious change in hydrology with the east/west running drains across The Fens. These drains feed into the 'South Forty Foot Drain', which forms the District boundary. The River Witham extends east through Stamford to the south of the District.

2.8 To the north west of the District the Foston Beck runs north into the River Witham, which extends across the Vale of Belvoir.



KEY

- District Boundary
- Settlement
- Main Water Courses
- Approx. Floodplain Extent

N

South Kesteven Landscape Character Assessment

HYDROLOGY

Figure 7

July 2006

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
South Kesteven District Council GIS Data | Environment Agency Flood Map

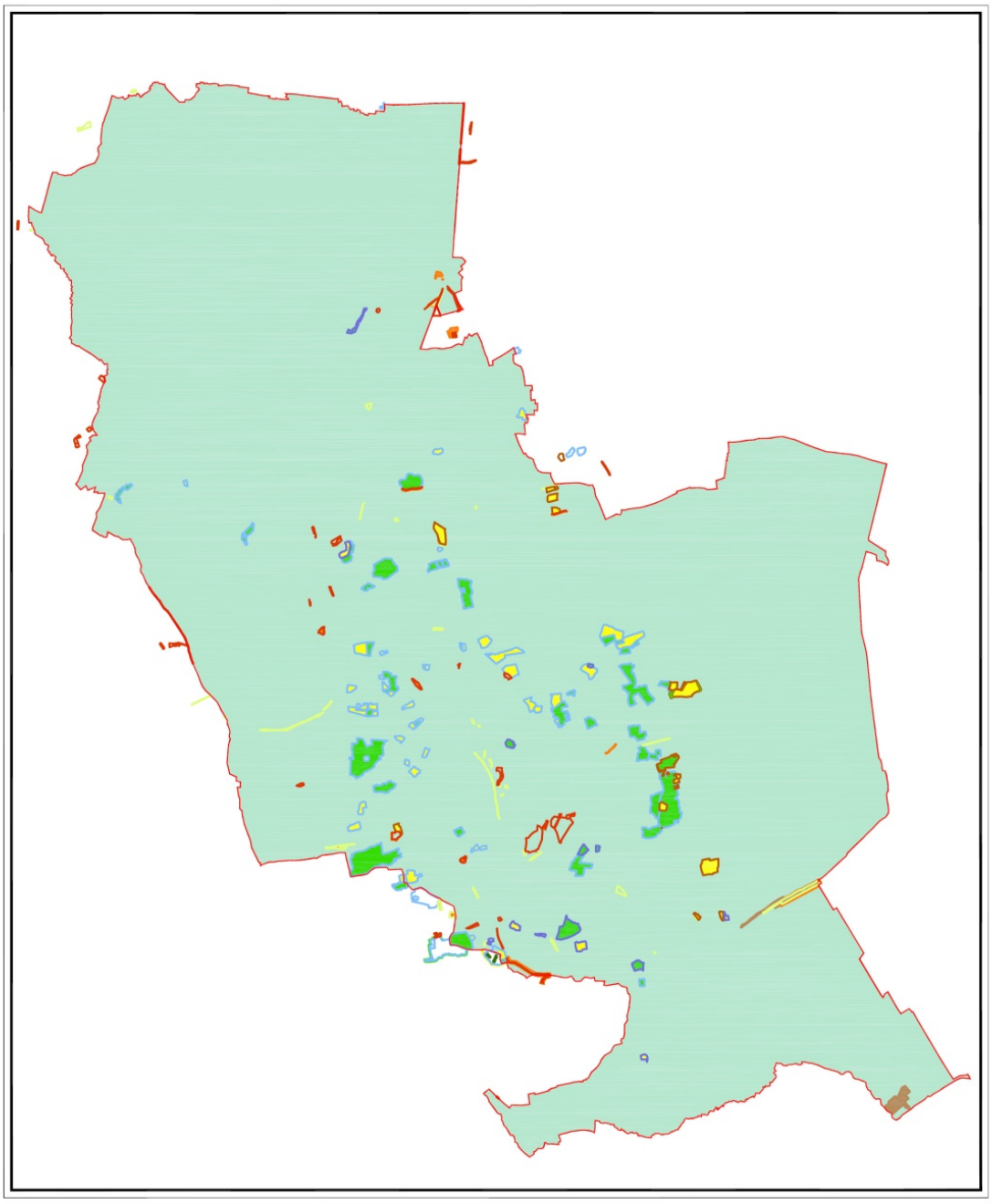
BIODIVERSITY

2.9 Biodiversity across the district varies significantly from one area to another. Figure 8 shows designated areas for biodiversity across the district. The plan shows that the central part of the District within the 'Kesteven Uplands' contains the highest proportion of woodlands, but also important grassland sites. There are few significant areas of importance to the north and east of the distict in the Vales or Fens.

2.10 The Kesteven Uplands include a high proportion of ancient woodlands, both semi-natural and replanted. There are also areas of calcareous grassland; within protected sites and on road verges. Hedgerows, streams and ponds provide other features of conservation importance. The River Witham supports important native crayfish.

2.11 Within the fens, ecological interest is concentrated around the drainage ditches, which can support a range of wetland species. A significant area of reedbed exists east of the Deepings.

2.12 There are relatively few features of ecological value within the Trent and Belvoir Vale, although local interest is provided by the Grantham Canal, woodlands and hedgerows.



KEY

- District Boundary
- Ancient Replanted Woodland
- Ancient Semi-natural Woodland
- Grassland Inventory Site
- Lowland Beech and Yew Woodland
- Lowland Calcareous Grassland
- Lowland Mixed Deciduous Woodland
- Reedbeds
- Undetermined Grassland
- Undetermined Woodland
- Wet Woodland

N

South Kesteven Landscape Character Assessment

BIODIVERSITY

Figure 8

July 2006

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
Magic.gov.uk Datasets ¦ English Nature Datasets ¦ South Kesteven District Council GIS Data

SETTLEMENT AND COMMUNICATIONS

3.1 The settlement and communications pattern of roads and railways across the district largely follows the topography and land use. The settlement and communication links are shown in Figures 9 & 10. The principle settlement in the district is Grantham, which has developed along the Great North Road (The A1), a historic route between London and the north. Grantham was mentioned in the Domesday Book, and became a preferred stopping place for Kings and Gentleman as they travelled up and down the country. The Angel and Royal hotel was originally a court of King John. Grantham contains some fine stone buildings, including St Wulfrains Church, with its 282ft spire. Belton House, a find example of a neo Caroline English Country house lies north of the town. Grantham also has an industrial/engineering heritage.

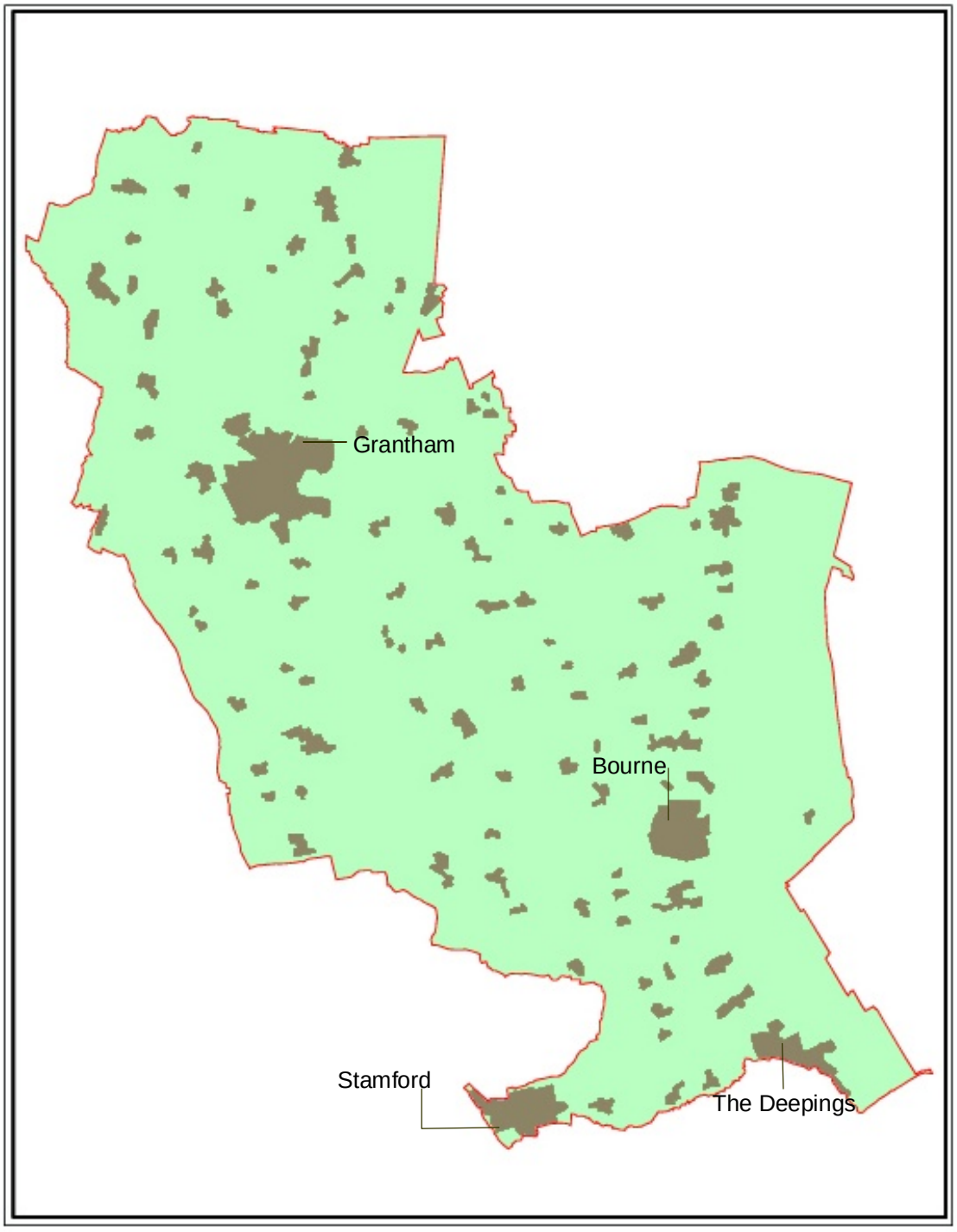
3.2 Stamford, in the very south-west of the District was described by Sir Walter Scott as 'the finest stone town in England'. Stamford was another popular stopping point along the Great North Road, and retains some fine coaching inns, including the George Hotel. Stamford also has a more recent industrial past.

3.3 Bourne lies towards the east of the District, on the edge of the Fens. Bourne is a red brick market town that has been settled since Roman times and was reputedly the birthplace of Herward the Wake.

3.4 The Deepings lie to the south of the District. The name reflects the low lying nature of the land. The area has been inhabited since prehistoric times and contains some fine stone buildings. The Roman Carr Dyke passes through the town.

3.5 In general the settlement and communication pattern follows the topography, with towns and villages in the valleys, and with a more remote settlement pattern on the higher ground. Most of the central parts of the District have a north/south and east/west communications pattern. The Fens are accessed by a series of east / west tracks with virtually no settlement, access is restricted by the network of dykes and drains.

3.6 Many of the villages include vernacular buildings. In the central part of the District these are mostly built of limestone, giving way to brick in the north towards the Trent Valley and to the east in The Fens.



KEY

District Boundary

Settlement

Disclaimer:
This information has been gained from the sources below. Accuracy of information can not be guaranteed.
South Kesteven District Council GIS Data

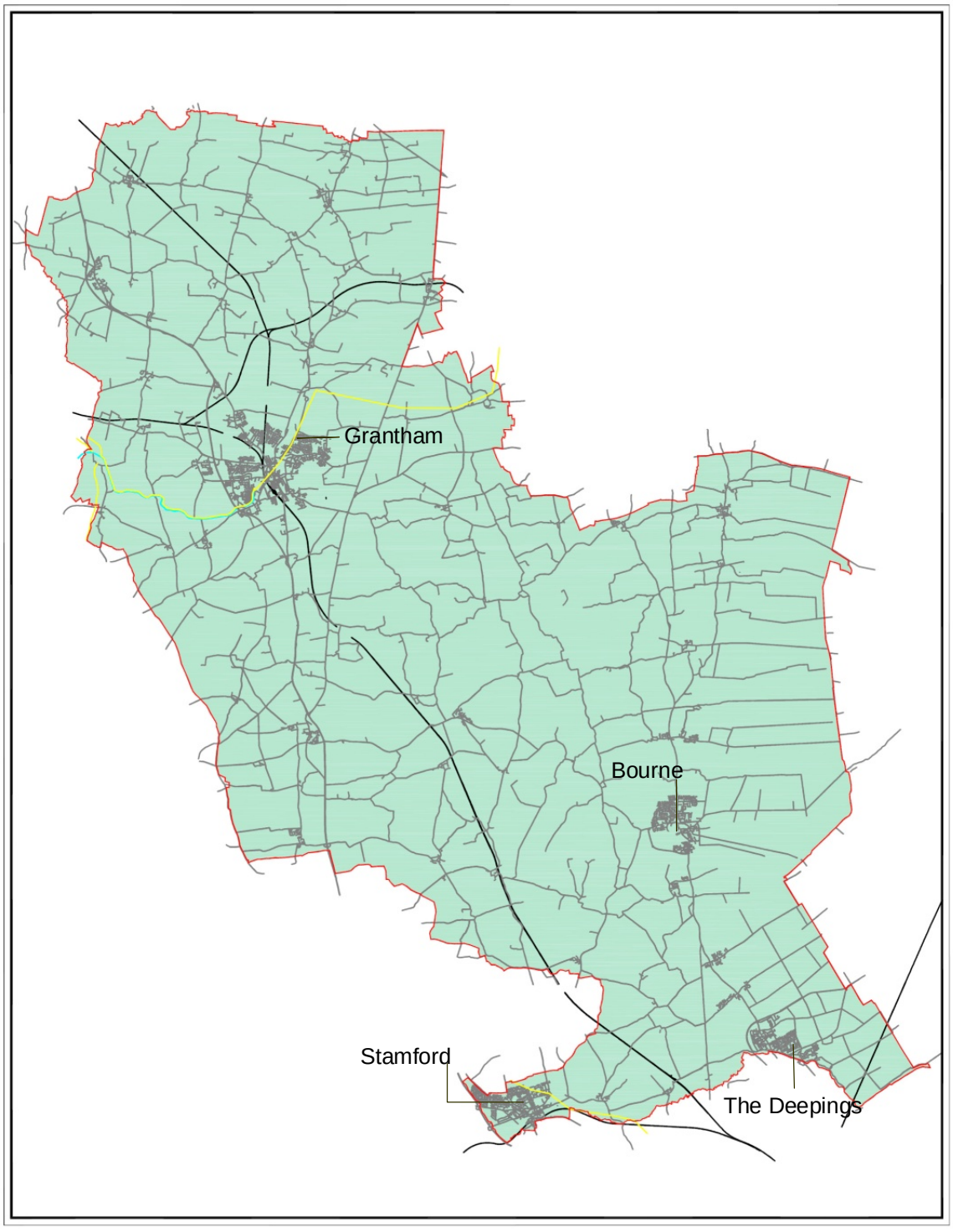
N

South Kesteven Landscape Character Assessment

SETTLEMENT

Figure 9

July 2006



KEY

- District Boundary
- Roads
- Railways
- Cycle Network
- Grantham Canal

N

South Kesteven Landscape Character Assessment

COMMUNICATIONS

Figure 10

July 2006

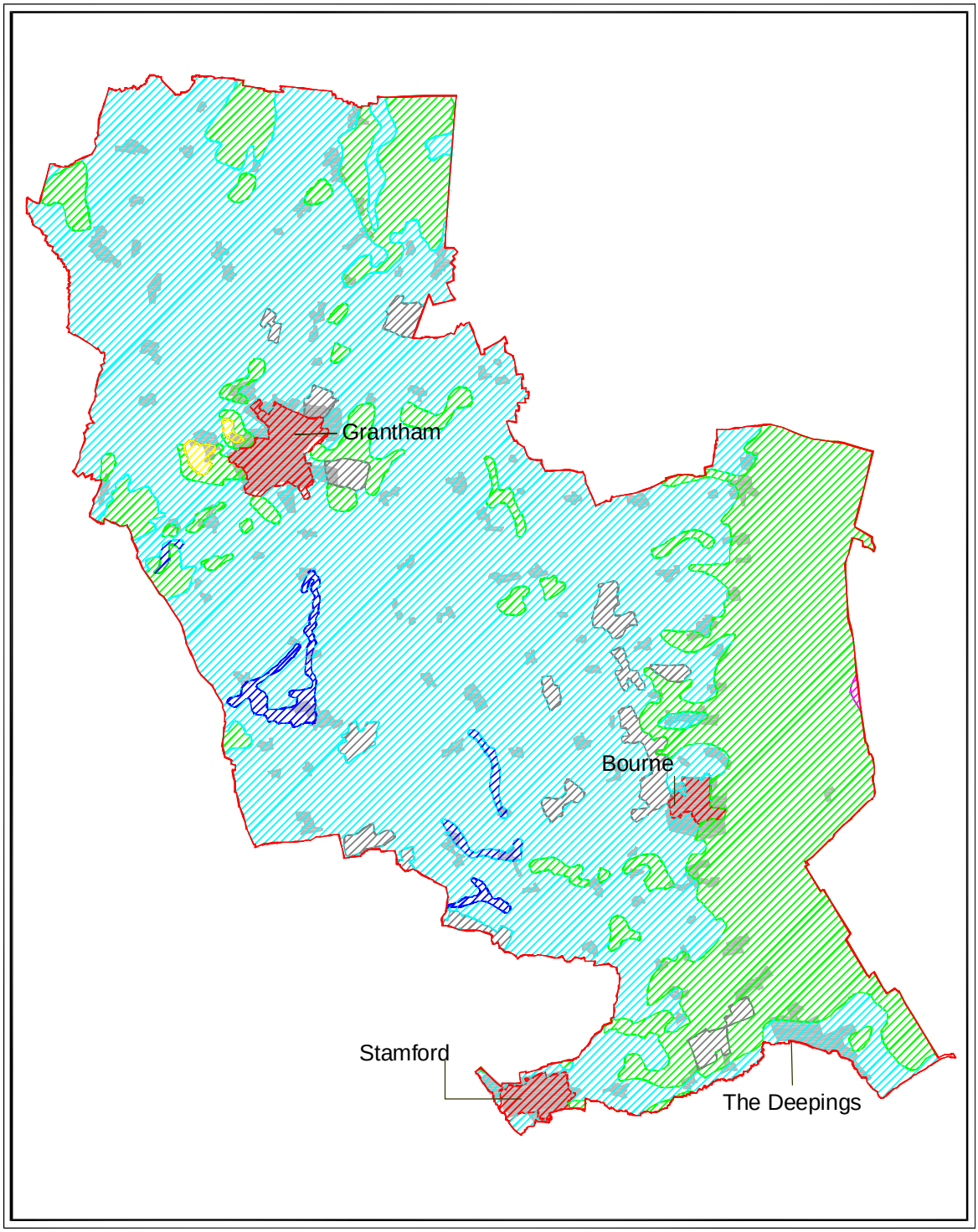
Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
Magic.gov.uk Datasets ¦ English Nature Datasets ¦ South Kesteven District Council GIS Data

AGRICULTURE

3.7 The agricultural use of the District is closely related to the topography and soils. The agricultural land quality is shown on Figure 11. To the north of the District in the Trent and Belvoir Vale, and on the Southern Lincolnshire Limestone Edge, the land is mainly Grade 2 and 3, providing high quality agricultural land.

3.8 The central part of the District, within the 'Kesteven Uplands' is mostly Grade 3 agricultural land. This slightly lower quality of agricultural land may have resulted in the survival of a greater proportion of woodland than otherwise exists across the District.

3.9 The Fens to the east comprise virtually all Grade 2 land reflecting the highly productive soils.



KEY

- District Boundary
- Urban
- Settlement
- Grade 1 Agricultural Land
- Grade 2 Agricultural Land
- Grade 3 Agricultural Land
- Grade 4 Agricultural Land
- Non-Agricultural Land

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
Magic.gov.uk Datasets ¦ English Nature Datasets ¦ South Kesteven District Council GIS Data

N

South Kesteven Landscape Character Assessment

LAND USE

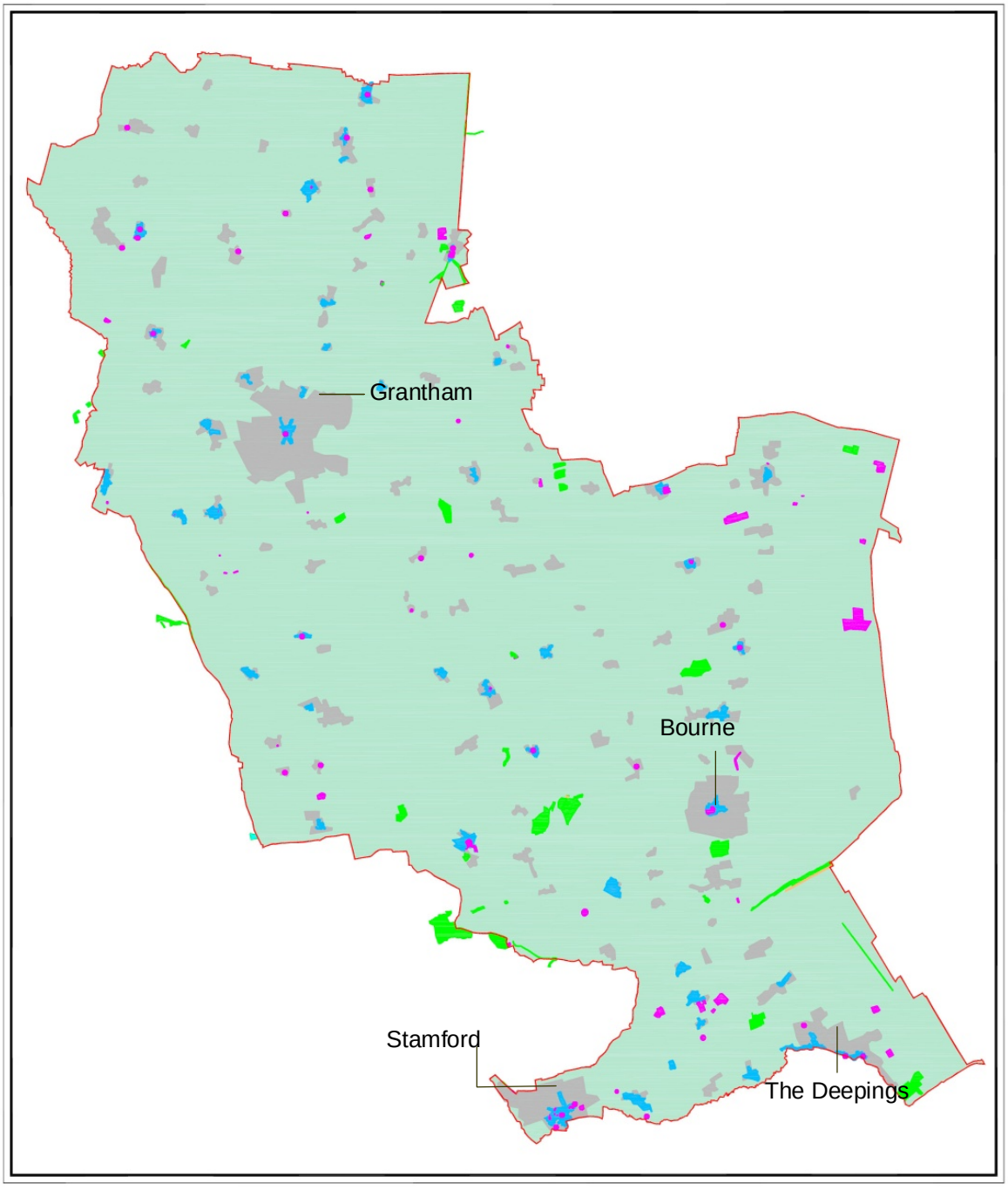
Figure 11

July 2006

ENVIRONMENTAL DESIGNATIONS

3.10 Environmental survey and appraisal work across the District carried out by South Kesteven Council and other external agencies has built up a base of information over the years. This work includes the designation of nationally important areas and sites such as Sites of Special Scientific Interest, Ancient Monuments and Historic Parks and Gardens. These areas are shown on Figure 12.

3.11 In summary, the plan shows a concentration of Nature Conservation Designations across the central part of the District. Many of the villages include Conservation Areas. The Fens and the Trent and Belvoir Vales contain relatively few designated areas.



KEY

- District Boundary
- Ancient Monument
- Area Conservation
- SSSI
- Special Area of Conservation
- NNR (Outside district boundary)
- Settlement

Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
Magic.gov.uk Datasets ¦ English Nature Datasets ¦ South Kesteven District Council GIS Data

N

South Kesteven Landscape Character Assessment

ENVIRONMENTAL DESIGNATIONS AND POLICIES

Figure 12

July 2006

INTRODUCTION

4.1 Landscape character areas are broad geographic areas with a distinct pattern of elements that occur consistently in a particular type of landscape. This arises from the combination of geology, topography, soils, land use, field patterns and human settlement. These create distinctive landscapes and places of individual character.

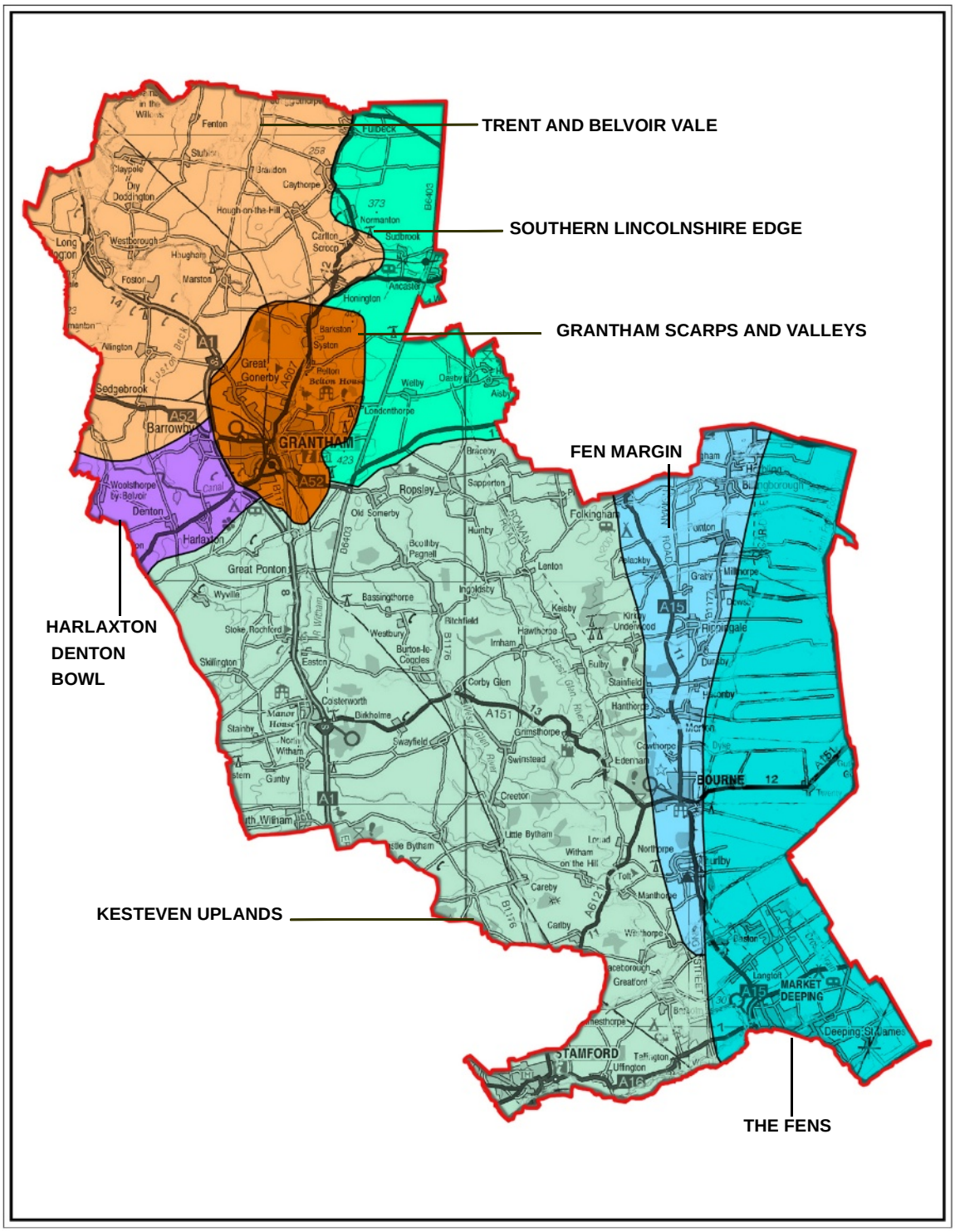
4.2 Landscape character assessment can be applied at a variety of scales from the national level, to the county, district or parish level. This district scale assessment provides an approach to identify the key variations in character that occur within South Kesteven. It is not a detailed record of every individual woodland field, lane or village.

4.3 This assessment builds upon the national assessment of landscape character completed by Natural England. In some instances, for example the Kesteven Uplands, the character area name is unchanged from that identified within the Natural England assessment, although the boundary of the area has been amended as a result of more detailed assessment. In other areas, the countryside character areas have been subdivided to reflect local variations in character, for example the Fen Margin and the Harlaxton Denton Bowl, where new character areas have been identified as part of this assessment. A total of seven district landscape character areas have been identified as follows;

1	Kesteven Uplands
2	Trent and Belvoir Vale
3	Southern Lincolnshire Edge
4	Harlaxton/Denton Bowl
5	Grantham Scarps and Valleys
6	Fen Margin
7	The Fens

4.4 The boundaries of each character area are identified on Figure 13. A detailed description of each character area is provided on the following pages.

4.5 In some instances, the boundaries between individual landscape character areas are clearly defined and easily recognisable on the ground. For example, the boundary between the Fens and Fen Margin landscape character areas is clearly defined by a marked change in visual enclosure. In other locations, such as the boundaries between the Kesteven Uplands and the Southern Lincolnshire Edge, the change in the landscape is more subtle and the boundaries are less distinct. No definitive line can be drawn between areas and the boundaries illustrated should be considered loosely defined.



KEY

District Boundary

Character Area Boundary

South Kesteven Landscape Character Assessment

CHARACTER AREAS

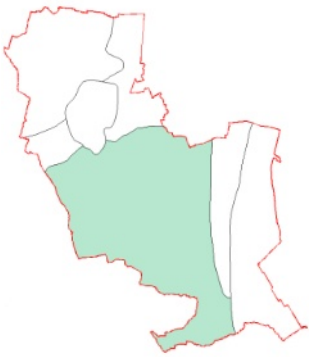
Figure 13

July 2006

4.6 **Key Characteristics**

- A relatively unified, simple, medium-scale agricultural landscape, with a high proportion of historic woodland.
- Undulating landform based around the valleys of the Rivers Witham and East and West Glen and the Welland to the south.
- Picturesque villages built of local limestone, with collyweston slate roofs to the south, and pantiles to the north.
- High concentration of houses and parks, with areas of farmland under estate management.
- A dispersed, nucleated settlement pattern, mostly following the river valleys.
- Enclosed mostly by hedgerows, with hedgerow trees.
- Modern human influences include airfields and the A1, Great North Road.

4.7 **Location and Boundaries**



4.8 The Kesteven Uplands share its name and most of the same geographic area with the Natural England character area number 75. Differences to the boundaries occur to the north around Grantham and Harlaxton and to the south west where the area meets the Fens. This District character assessment includes additional character areas in these locations and amends the countryside agency boundaries.

4.9 The Kesteven Uplands extend from Grantham in the north, covering a large part of the District to the south. The District boundary forms the western and southern boundary to this character area. The eastern boundary extends north to south, broadly in a line between Folkingham through to Thurlby, where the upland character gives way to a transitional zone with the Fens.

Physical Influences

4.10 The landform rolls very gently with the three north/south valleys of the Rivers Witham, East and West Glen providing the main topographic features. The rivers meander through their valleys. The River Welland runs to the east through Stamford creating a valley to the very south of the character area.

Stamford

4.11 The underlying limestone geology provides free drainage over much of the area. The rivers themselves are mostly small in scale, and the East and West Glen Rivers in particular are rather hard to discern in the wider landscape. Scattered swallow holes exist along the West Glen River.

4.12 The underlying limestone generates and supports a sheltered well-drained loam, but there are also areas of clay which are less permeable and seasonally waterlogged.

Human Influences

4.13 The word 'Kesteven' comes partly from the Celtic word 'coed' meaning wood, and much woodland still occurs across the area. This is particularly evident in Figure 8 which shows the contrast with the surrounding areas. Much of the woodland is established on the higher wetter ground. The Roman Road 'Ermine Street' passes through the area, and part of the route is now followed by the A1, Great North Road. There are monastic influences in the area, and the medieval farmed landscape can still be seen in places with regular field boundaries.

4.14 Settlement is dispersed, with small traditional villages, mostly following the river valleys, though a few are located in the valley bottom. Traditional buildings are generally constructed with the warm honey-coloured local stone, and to the south with 'colleyweston' slate, which is actually a slightly sandy limestone. The town of Stamford has some particularly fine buildings and is noted for its architecture and unspoilt medieval and Georgian character. To the north of the Kesteven Uplands, brick and pantile become more frequent building materials alongside the stone.

4.15 The landscape contains a number of historic parks and houses, including Stoke Rochford and Grimsthorpe. The parkland character of the sites contributes positively to the wider landscape.

4.16 Alongside forestry, agriculture is the main land use in the Kesteven Uplands. The higher ground is dominated by arable land, pylons in large side fields, enclosed by hedgerows with intermittent trees. Pasture fields are more common in the valleys. Farms are generally medium in size with a range of traditional and modern farm buildings. Large areas of land appear to be managed by estates, particularly Stoke Rochford and Grimsthorpe. These areas combine forestry, farming and parkland, and have a well tended appearance.

4.17 The woodlands vary but most are medium in size, with a good proportion of deciduous and ancient woodland, alongside some more commercial plantations.

4.18 Modern human influences include the A1 and the East Coast Main Line Railway. These are both locally dominant features, and the traffic on parts of the A1 can be seen over a relatively wide area. Other modern human influences include powerlines, airfields and

occasional industrial complexes such as at Easton. Overall however, these are minor elements in the wider predominantly rural landscape.

Landscape Character

4.19 The physical and human characteristics combine to create a distinctive and mostly unified and consistent landscape character. This is a mostly harmonious rural landscape, with farmland, woodland and parkland with small stone-built villages. Where the undulations are more pronounced, with small woodlands and fields, it is a relatively small-scale intimate landscape. The higher land tends to be more open with bigger fields and woodland blocks creating a larger scale yet simple rural landscape.

4.20 The character of the Kesteven Uplands merges gently to the north with the Lincolnshire Edge, and with the more complex landscape around Grantham and Harlaxton.

4.21 To the east, the land descends, giving way to a less undulating landscape with fewer woodlands in the Fen Margins. This area is less scenic than the area of the Kesteven Uplands to the east.

4.22 The south-eastern corner of the character area near Tallington has a less defined character as the landscape merges with the Fens to the east. This landscape is less undulating, with a greater proportion of human influences including mineral works.

Settlement

4.23 Settlement is dispersed across the Kesteven Uplands, with a series of mainly small villages, with a high proportion of traditional buildings. The villages often follow the river valleys, but are not necessarily in the valley bottom.

4.24 The villages are mostly nucleated with a simple street layout. There are few sizeable public spaces or villages greens. Within the historic centres of the villages, properties frequently front directly onto the streets, with minimal or no front gardens. Some properties are set back further, with garden enclosure formed by stone walls or hedges.

4.25 Building materials are predominantly warm honey-coloured local stone and roofing materials are mainly red clay tiles and pantiles, with some 'collyweston slate' to the south of the area.

4.26 The settlement edges are typically varied often with lower density development. Some properties are set within large gardens, which allow trees to develop providing a softer edge and transition to the often wooded landscape.

4.27 The villages contain some more modern developments. These are often sympathetically incorporated at an appropriate scale to the surrounding landscape. The villages contain few significant areas of modern development.

4.28 The town of Stamford is located to the south of the character area. Stamford was described by Pevesner as “The climax (of Lincolnshire) in terms of historical as well as architectural significance.” The town of Stamford dates back over 1000 years. It thrived under the

Local stone buildings in Stamford

Corby Glen

Ropsley

Corby Glen

Normans with an economy based on wool, with good communication provided by the Great North Road, and via the River Welland to the north sea. By the 13th Century Stamford was one of the 10 largest towns in England, and many buildings still survive from this period.

4.29 The town prospered further during the Georgian period and the fabric of the town today reflects this history. The centre of the town, protected by Conservation Area status retains a strong historic character. The valley of the River Welland extends into the town and provides a valuable open space and fine views to some of the churches.

4.30 More modern development exists around the edge of the town, including residential and employment development. The settlement edges are varied, some providing a soft planted edge, and other areas that are more stark and regular. Any new development on the edge of town should present a varied settlement edge including landscape treatment. Views towards the town centre and the church towers and spires should be protected.

Landscape Sensitivity

4.31 The landscape of the Kesteven Uplands is medium in scale with a strong landscape pattern of woodland and hedgerows. It contains areas of sensitive landscape including the historic parks and areas around the edge of the often picturesque villages. Away from the main transport corridors it is a relatively tranquil landscape.

4.32 Landscape sensitivity to new employment or residential proposals is likely to be **medium** to **high**, because of the high proportion of valuable landscape elements and relatively undisturbed character. The strong landscape pattern including many woodlands could, however, in places be beneficial in assimilating new development.

4.33 Landscape sensitivity to wind energy proposals is also

Stamford

Great Casterton

likely to be **medium** to **high** to large scale proposals. Proposals are likely to be difficult to accommodate in this medium-scale landscape with its high proportion of valuable landscape elements.

4.34 **The landscape management objectives for the Kesteven Uplands include:**

- Protect and improve field boundary condition.
- Protect existing hedgerow trees.
- Plant new hedgerow trees.
- Maintain important grassland areas.
- Protect important and distinctive woodland cover.
- Protect historic parkland.
- Protect field trees, particularly in parkland and in large arable fields.
- Maintain traditional village forms.
- Use of limestone for new construction in the villages and countryside.
- Use of new planting to minimise the visual impact of major roads and industrial buildings.
- Pay special attention to sensitive spaces around the edge of historic towns such as Stamford and the villages.
- Maintain open areas that extend into the towns and villages.

4.35 **Key Characteristics**

- A relatively simple, medium to large-scale, open arable or mixed farming landscape.
- Flat or very gently undulating topography
- Simple regular fields enclosed by hawthorn hedges.
- Relatively few hedgerow trees and virtually no woodland.
- Small villages typically located on slightly rising land.
- Church towers and spires visible across the landscape.
- Buildings styles vary, but a high proportion of brick with dark red pantiles

4.36 **Location and Boundaries**

4.37 The Trent and Belvoir Vale character area lies to the north-west of the District. The southern boundary is formed by the undulating and rising ground that extends from south of Woolsthorpe by Belvoir, to the north of Barrowby and Great Gonerby and on towards Barkston. The eastern boundary is formed by the rising ground east of Barkston and Fulbeck. The western and northern boundaries of the character area are formed by the district boundary, although the Trent and Belvoir Vale extends beyond the district boundary into Leicestershire and Nottinghamshire.

Physical Influences

4.38 Within South Kesteven, the vale overlies Lower Lias triasic clays, with alluvium and river terrace deposits, forming the superficial deposits. The vales are generally flat or gently undulating, with land typically between 20m and 40m AOD. Glacial activity has influenced the landform and soils of the area. Deposits from the glacial lake which formed in what is now the Vale of Belvoir forced the River Trent to take a northerly course.

4.39 Where the soils overlie the clay without the glacial deposits they tend to be heavy and poorly drained. This land is often under pasture. Where the patchy deposits of glacial materials including sand and gravel overlie the clay, thinner free-draining soils occur which are more commonly under arable cultivation.

4.40 The River Witham is the main watercourse across the

vale, flowing north from Grantham, past Barkston and through Marston and Long Bennington. The Witham eventually reaches the Lincoln Gap. There are a number of smaller watercourses including Foston Beck. The watercourses tend not to be prominent in the landscape.

Human Influences

4.41 There is little evidence of early use of settlement in the area, probably because the heavy soils would have been covered by dense damp woodland making the area relatively inaccessible. Roman activity is evident, however, with the Great North Road which extends between Grantham and Newark. Once cleared and drained the land was reasonably productive, and in recent history the area has always been reasonably wealthy. The pattern of small villages and larger market towns developed during the medieval period.

4.42 Enclosure of the area was relatively early, beginning in the Vale in the 16th century. By the 1800's most of the land was enclosed.

4.43 Settlement comprises a network of small clustered villages dispersed through the area. The settlements are initially all located on areas of slightly rising ground, where better drainage improved agricultural productivity, and livestock could graze on the lower lying areas. This characteristic is particularly noticeable at Dry Doddington.

4.44 Building styles vary but there is a large proportion of brick, with dark red pantiles and tiles or slate. Stone is limited in use to churches and other major buildings. There are a few major urbanising influences in the area. The A1 passes through the area and is locally noticeable. Major powerlines also extend from the power stations (beyond the District) along the Trent Valley.

Landscape Character

4.45 The gentle landform, and open or arable or mixed farmland, creates a strongly rural feel. The landscape is medium to large in scale, with relatively simple regular fields, frequently enclosed by hawthorn hedgerows. The hedgerows are in places fragmented. There are relatively few hedgerow trees and virtually no woodlands. Tree cover is most noticeable around the villages, which are typically situated on slightly rising ground.

4.46 The villages with their church towers and spires are noticeable in the views across the landscape and provide character. The villages include a range of traditional brick buildings and some more modern housing. Most, however, are small in scale and are in keeping with the traditional form of the settlements.

4.47 Within South Kesteven the vale contains no power stations or major areas of mineral extraction, helping to maintain a rural feel compared with the wider Trent Valley to the north. The Trent Valley power stations are visible at a distance in clear conditions.

Settlement

4.48 Settlement across the Trent and Belvoir Vales comprises small to medium sized villages, distributed relatively evenly across the area and connected via a network of roads and lanes. Many villages are situated in slightly

rising land that historically would have been better drained than the surrounding vales. Churches within these villages can provide elevated landmarks across the wider landscape, and the distinctive leaning spire at Dry Doddington is a good example.

4.49 The smaller villages tend to have a core of vernacular buildings, with modern infill. Typical building materials comprise red brick and clay pantile. A distinctive English bond within the local brickwork, sometimes using different coloured bricks for the headers and stretches is characteristic of the area. Stone is usually reserved for churches and major houses. To the east of the area, within villages including Hough on the Hill and Caythorpe, stone becomes a more commonly used building material.


Allington


Allington


Long Bennington


Long Bennington


Claypole brick

.

4.50 Most villages follow a nucleated form, some with small greens in the centre. Building densities are generally low.

4.51 Larger villages include Allington and Long Bennington, and these contain some larger areas of twentieth century development, including detached houses and bungalows, which are not always locally distinctive.

4.52 Any new development in the villages should be consistent with established character. This should be sympathetic to the generally low density of development, and provide a varied edge to the settlement, including some tree planting.

Landscape Sensitivity

4.53 The landscape of the Trent and Belvior Vale is medium to large in scale, with a simple and sometimes weak landscape pattern. There are few woodlands, which ensures open views are possible. Powerlines and the A1 ensure human influences. There are few landscape features of intrinsic sensitivity.

4.54 Landscape sensitivity to new employment and residential proposals is likely to be **medium**. Whilst the landscape itself contains relatively few sensitive features, there is little structure to help assimilate new development. Woodlands and trees in the landscape are typically associated with the settlement, so new development assimilated within existing settlement edges, could be mitigated by appropriate landscape proposals in keeping with the established character.

4.55 Landscape sensitivity to wind energy proposals is likely to be **medium**. Whilst there are few features of intrinsic landscape sensitivity**,** the open visual character of the landscape would ensure extensive visibility. Locations away from sensitive settlements, and close to existing human influences such as the A1 and power lines are likely to offer the more appropriate locations. The open nature of the landscape would mean that the cumulative impact of any proposals should be considered so that the character of the landscape does not become dominated by any wind energy proposals.

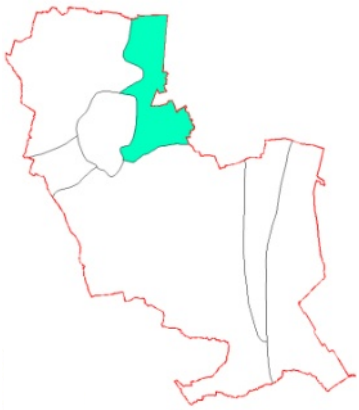
4.56 **The landscape management objectives for the Trent and Belvoir Vale include;**

- Maintain and improve field boundary condition.
- Retain ditch patterns.
- Maintain wet grassland areas.
- Protect any woodland cover.
- Maintain existing hedgerow trees and plant new hedgerow trees.
- Provide new woodland planting with any new large-scale agricultural buildings.
- Maintain views to elevated villages and churches.

4.57 **Key Characteristics**

- Large-scale open arable landscape.
- Dominant western scarp slope known as the 'Cliff'.
- Large rectilinear fields with some fragmented hedgerows and shelterbelts.
- Sparse settlement pattern on top of the escarpment.
- Active and redundant airfields.

4.58 **Location and Boundaries**



4.59 The Southern Lincolnshire Edge lies to the north and east of Grantham, The western boundary generally follows the A607 through Belton, Barkston and Normanton. The A52 broadly defines the southern boundary where the character area merges with the Kesteven Uplands character area. The district boundary forms the northern and eastern limits of the character area, which extends beyond the district boundary into North Kesteven.

Physical influences

4.60 Within South Kesteven the Southern Lincolnshire Edge forms the base of a distinctive spine of limestone that extends north from Grantham, beyond the district, eventually to Whitton on the Humber Estuary. The limestone also extends south, but as a more undulating landscape described as the 'Kesteven Uplands'. The higher ground contrasts with the lower lying vale to the west.

4.61 The limestone spine forms a distinctive western scarp slope known as the 'Cliff'. Within South Kesteven this is not so pronounced as it is to the north. Between Leadenham and Grantham the scarp comprises a two-tier arrangement with the upper limestone scarp and lower ironstone scarp. A noticeable gap in the higher land occurs at Ancaster, at the head of the river Slea.

4.62 The land descends gently to the east from the crest of the Cliff (which is typically at 120-130m AOD), creating an open area of upland, with occasional dry valleys.

4.63 The soils developed over the limestone are generally thin and well-drained. Heavier clays with poorer drainage

occur on some of the slopes.

Human Influences

4.64 The area has been settled since the Bronze Age, with archaeological evidence present along the edge. Roman settlement occurred at Ancaster on the Roman road Ermine Street. The area was farmed during the Medieval period. The villages are mainly located along the west of the Edge on the lower lying ground. The higher eastern slopes contain very few settlements, with only some isolated farms and properties. The buildings comprise a mixture of stone and brick-built buildings with tile or pantile roofs.

Landscape Character

4.65 The overall character is of a large-scale, open, arable landscape. The west-facing scarp contains some small areas of woodland along the steeper slopes, but it is mostly open. The higher land on top of the escarpment comprises open rectilinear fields under arable cultivation, with some fragmented hedgerows, and few hedgerow trees. There are some shelterbelts. The farmsteads are isolated, with some containing large scale agricultural buildings. Airfields are a characteristic element in the landscape; Barkston Heath remains as an active airfield, but others such as Spitalgate airfield, next to the Prince William Barracks in Grantham are now disused.

4.66 Syston Park, and the associated woodland and parkland adds variety in the landscape, and extends across the western scarp slope.

4.67 Overall it is a remote and relatively simple agricultural landscape. The large rectilinear arable fields allow extensive views, limited by distant woodlands or the overlapping of hedgerows. There is a sparse settlement pattern. The airfields provide activity in an otherwise relatively quiet landscape.

Settlement

4.68 The Southern Lincolnshire Edge is a sparsely populated area. Settlement is mostly concentrated along the western edge of the character area at the boundary with the Trent and Belvoir Vales. These villages include Fulbeck, Caythorpe and Honington.

4.69 The villages are mostly small and of varied form, some with closely developed centres to the villages, whilst others are looser collections of properties. The villages are typically developed around a number of streets, none have notable areas of village greens.


Ancaster


Fulbeck


Welby


Fulbeck

4.70 Typical building materials include limestone, with pantile or slate roofs for the older properties. Brick has been used for most of the twentieth century infill development.

4.71 There are a number of new stone houses and barn conversions. Building densities vary in the villages, although many properties are set within large gardens. The larger plots have allowed mature gardens to develop, and these soften the boundaries between the villages and the surrounding open arable land.

4.72 Any further built development in the villages should respect and reinforce this characteristic and should

maintain the shape and form of the villages.

Landscape Sensitivity

4.73 The Southern Lincolnshire Edge is a large scale relatively open, landscape, with a simple pattern of fields and lanes. Woodland is orientated on the scarp edge to the west of the area and there is little settlement. Airfields provide a human influence.

4.74 There are few features of intrinsic sensitivity, and few detracting elements. The landscape is mostly rural and remote.

4.75 Landscape sensitivity to new employment and residential proposals is likely to be **medium to high.** Whilst the landscape itself contains relatively few sensitive landscape features, the remote and rural character suggests that large-scale new built development would be inappropriate. Large-scale agricultural buildings linked to existing farmsteads would be more easily accommodated if accompanied by an appropriate landscape scheme.

4.76 Landscape sensitivity to wind energy proposals would be **medium**. The open nature of the landscape would result in long range views of any turbines, but there are relatively few sensitive landscape features, and little settlement. The large scale and nature of the landscape**,** and simple topography**,** could accommodate turbines more easily than the smaller**-**scale landscape in other parts of the district.

4.77 **The landscape management objectives for the South Lincolnshire Edge include;**

- Retain and enhance traditional field boundaries including hedgerows and limestone walls.
- Maintain field sizes, avoiding rationalisation into larger fields.
- Protect and enhance shelterbelts and woodland.
- Protect historic parks.
- Maintain traditional village forms.
- Use of limestone for new construction in the villages or countryside.
- Large-scale agricultural buildings could be acceptable if carefully designed with appropriate landscape schemes.

4.78 **Key Characteristics**

- Varied topography, hills, slopes and valleys.
- Small to medium-scale landscape.
- Patchwork of land use including woodlands, arable and pasture land.
- Historic parkland at Harlaxton, and tree lined roads associated with other estates.
- Villages with stone built or brick properties, with some distinctive properties associated with the estates.

4.79 **Location and Boundaries**

4.80 This character area lies to the east of Grantham and encompasses the villages of Woolsthorpe by Belvoir, Denton, Harlaxton and Barrowby. The northern boundary lies north of Woolsthorpe and Barrowby, where the character area gives way to the flatter topography of the Vale.

4.81 The A1 and Grantham form the eastern boundary. The District boundary forms the western edge of the character area, west of Woolsthorpe, although a similar landscape character exists to the west beyond the District boundary, encompassing Belvoir Castle, within Melton Mowbray Borough.

4.82 The southern boundary is formed by the scarp of land south of Harlaxton and Denton, where the land rises to become the Kesteven Uplands character area.

Physical Influences

483 Most of the character area overlies middle lias, overlain with glacial till, which gives rise to a variety of soils. There is some high quality agricultural land. The topography of the area is quite varied, which is one of the distinguishing features from the Vale of Belvoir to the north and the Kesteven Uplands to the south.

4.84 A broad scarp of high land typically between 120 and 140m AOD extends east/ west, to the south of Harlaxton and Denton, which descends to a valley or bowl of lower ground typically between 60m and 80m AOD including Harlaxton and Denton.

4.85 The land then rises again to the north, reaching 115m AOD east of Woolsthorpe, and rises separately to the north east, to reach 100m at Barrowby. Woolsthorpe village lies on lower ground hill, typically at 60m AOD.

These valleys, hills and slopes create a fairly small-scale landscape distinctive from the land around to the north and south.

Human Influences

4.86 The land use within the area follows the topography and soils that underlie it. Much of the steeper valley slopes support deciduous woodlands, which are particularly noticeable on the rising land. The areas of higher and flatter land are typically under arable cultivation, although many of the field boundaries are still maintained by hedgerows, with a good proportion of hedgerow trees. Some of the lower-lying land and small-scale fields around the villages are under pasture.

Woolsthorpe

4.87 There is a nucleated settlement pattern, with the villages of Woosthorpe, Harlaxton and Denton generally nestled within the valleys. These villages contain many older properties, often associated with the Bevoir and Welby estates, which control much of the land within the area. The older properties are often constructed of local limestone or ironstone, which has a distinctive orange colour. Roofing materials include tile and pantile. There are also a number of brick-built houses, and properties constructed of both brick and stone. The villages of Harlaxton and Denton contain some large impressive properties associated with the estates.

4.88 Barrowby lies on the higher land west of Grantham and has a small core of vernacular properties. It also has a much larger area of 20th century housing, that is not locally distinctive.

4.89 Harlaxton Manor, now part of the University of Evansville, forms a dramatic feature in the landscape. The towers and spires of the Manor rise against the wooded slopes overlooking Harlaxton Park.

Denton

View along driveway leading to Harlaxton Manor

4.90 There are no major roads crossing the area, but historic transport routes including the Grantham Canal and dismantled railway lines cross the landscape. These are frequently lined by hedges and trees, and contribute to the small-scale wooded character of the landscape, as well as providing opportunities now for walking and cycling. A number of roads have avenue planting alongside, probably associated with the local estates. Denton reservoir, constructed to supply the Grantham Canal, now provides an area of open water and offers an opportunity for recreation.

Landscape Character

4.91 The character of the landscape arises from the physical characteristics, including the small-scale variations in topography, combined with the varied landcover and distinctive villages. The Belvoir and Welby estates also appear to have significant influence on the landscape character, through consistent management of the land and high proportion of woodland and tree cover. The area also provides a transition between the larger-scale, flatter and more open landscape of the Vale of Belvoir to the north, with its brick and tile buildings, and the Kesteven Uplands to the south, with its more wooded character and stone properties.

4.92 Within the Denton Harlaxton Bowl there are few detracting landscape features. The A607 passes through the area, and the A1 forms the western boundary, but the influence of these roads on overall landscape character is limited. A number of overhead powerlines cross the area but are mostly sensitively sited to minimise adverse landscape impacts. There are longer-range views across the landscape to Belvoir Castle which lies west of the District.

4.93 Overall it is a landscape of high scenic value, with a variety of landscape elements including farmland, woodland, water and historic parks. There is a good network of accesses to the countryside, and the villages add to the character of the countryside, particularly with their 'historic estate character'.

Settlement

4.94 Settlement in the Harlaxton Denton Bowl comprises small villages, with building styles influenced by former or existing estate management. Woolshorpe, Denton and Harlaxton contain a high proportion of orange 'ironstone' buildings, with pantile roofs. There are also red brick properties. Buildings include simple cottages and some grander individual houses. Harlaxton has a nucleated form, whilst Denton and Woolsthorpe follow a more linear arrangement along the main street. The estate management results in a number of properties having consistent building details and colours, providing an attractive unity. The villages also contain more modern houses and conversions, but overall an attractive consistent character remains.

Harlaxton

Harlaxton

4.95 Building densities vary, and the built form includes properties at the back edge of footways, along with houses set within larger gardens. The varied layout adds to the character of the villages. Boundary treatments include stone walls, hedges and some fences.

4.96 The villages tend to have varied settlement edges, with some gardens including mature trees and hedgerows. This arrangement generally provides a successful transition to the rural area beyond the village. Any new or infill built development should respect this characteristic.

4.97 Barrowby is larger village, with a small core of vernacular buildings and some more extensive areas of twentieth century development. Parts of the village edge have a more abrupt boundary with the adjacent countryside. Any further built development should provide a more varied settlement edge and a softer transition with planting.

Landscape Sensitivity

4.98 The Harlaxton Denton Bowl is a small to medium-scale landscape, with a varied topography and landcover. The landscape contains some important elements including Harlaxton Park, tree avenues and woodlands and a number of attractive villages. It is a landscape of high scenic value with important views to Belvior Castle which lies outside the District.

4.99 Landscape sensitivity to new employment and residential proposals is likely to be **high**. The scale of the landscape and range of landscape elements would make it difficult to assimilate major development within most of the character area. The eastern edge of the character area adjacent to Grantham and the A1 may**,** however**,** provide some opportunities if new landscape planting associated with new development is used to soften the existing urban edge.

4.100 Landscape sensitivity to wind energy proposals would be **high**. Wind turbines are likely to be on a scale that would be difficult to assimilate in this landscape. Views across the landscape are also important to Harlaxton Manor, Belvior Castle and the villages. Wind turbines could detract from these existing landmarks and are**,** therefore**,** likely to be unsuitable.

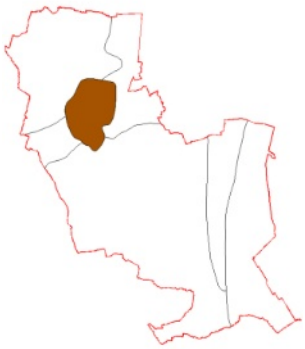
4.101 **The landscape management objectives for the Harlaxton Denton Bowl include;**

- Maintain the variety of land uses, with mixed farmland, woodland and parkland.
- Protect and enhance the woodlands.
- Resist the development of large-scale agricultural buildings, unless very carefully sited and designed.
- Protect and enhance ditches watercourses and the Grantham canal.
- Maintain expansive views from the rising land.

4.102 **Key Characteristics**

- Built development in Grantham is generally on the lower lying land in the valleys.
- Steep scarp slopes to the east and south, with woodland or pasture cover.
- Generally medium-scale arable fields, with relatively few hedgerow trees to the west and north.
- Small-scale hedged pasture fields with hedgerow trees to the east and south.
- Attractive parkland with attractive woodland and parkland trees at Belton.
- Small villages, separated from Grantham town by narrow areas of open countryside.

4.103 **Location and Boundaries**



4.104 Grantham lies at the junction of a range of landscape areas, with the Trent and Belvoir Vales to the north and west, the Lincolnshire Uplands to the east and the Kesteven Uplands to the south. The town of Grantham has grown up broadly following the valley of the River Witham, which flows to the north, and on other generally lower lying land at the junction of these character areas. The landscape and the town combine to influence the character of the wider landscape. The urban influences, and agricultural landscape, combine to create a distinct landscape character area with its own characteristics and landscape issues. Inevitably with a character area at the junction of other distinct areas, the boundaries are not easy to define. However, for the purpose of this study the boundaries of this character area are established to the north by Great Gonerby and Belton, to the west by the A1, to the south by Gorse Lane, and to the east by the rising land at Halls Hill /Londonthorpe Wood.

Physical Influences

4.105 Physically this character area is influenced by the surrounding areas. The higher land to the south east is situated on the limestone and contains some free-draining loams. Higher land over limestone occurs to the east and north at Great Gonerby and towards Barrowby. The valley of the River Witham and its tributaries contain river deposits and the majority of the town is developed on these.

4.106 Topography is one of the most important physical influences on the character of the area, with the valley of the River Witham extending to the north towards

Barkston. Other smaller watercourses extend from the east, creating tributary valleys that feed into the Witham.

4.107 The land rises quite sharply to the east at Somerby Hill, Halls Hill towards Harrowby and Londonthorpe.

4.108 The land also rises steeply to the south towards Gorse Lane.

4.109 To the west of Grantham, construction of the A1 during the mid 20th century took the main through traffic out of the town itself. The new road is mostly "in cutting" as it passes the town, reducing its physical influence. Industrial and residential development now extends to the A1.

4.110 The historic Belton House and Parkland lies immediately north of Grantham, and the Parkland provides an attractive edge to the town. Free pedestrian access to the park is possible from Grantham, with paying visitors entering through Belton village.

4.111 The more recently planted parkland west of Belton, at Belton Country Club and Golf course, extends the parkland character.

4.112 The open areas around the town have a variety of uses. The steeper slopes tend to be wooded, or under pasture, such as at Londonthorpe Wood and Halls Hill. Some of the less steep slopes are under arable cultivation, such as the land north of the A52. Across other areas of land the topography is less dramatic, but it rises towards the A1 and Great Gonerby. The surrounding higher land characterises Grantham and has undoubtedly shaped the form of the town today.

Human Influences

4.113 Grantham developed along the Great North Road and the town centre contains a range of fine stone buildings, including coaching inns. The East Coast Main Line also passes through the town, and the good communications led to a range of industrial and commercial development. Most of the historic development in the town lies in the valley bottom.

Manthorpe

Manthorpe

4.114 The town saw a more rapid expansion during the twentieth century with some larger housing estates and industrial development spreading out along the valleys, and in some cases up the surrounding slopes. The town has now extended towards Great Gonerby, Belton and Barrowby, although the villages do retain their separate identities, and some relatively small areas of open landscape between the villages and Grantham town itself. Many of the 20th Century housing areas are not particularly locally distinctive.

Landscape Character

4.115 The landscape character varies around the town, with the physical and human influences. In general the character

is defined by the residential and industrial development in Grantham following the base of the valleys with rising ground beyond.

4.116 Built development on the rising ground is generally avoided, which gives the town an enclosed character.

4.117 In some of the older parts of town, such as at Somerby Hill, relatively low density housing with mature gardens gives a wooded feel to the valley bottom, with more open arable land in the higher slopes.

4.118 Some more recent higher density development, such as at Gonerby Hill Foot, provides a stark edge to the town, and the housing contrasts with the countryside beyond.

4.119 In general, however, keeping the development to the lower slopes has maintained a rural feel to the higher land, and has contained the urban influence on the wider landscape.

4.120 The parkland at Belton House and Belton Country Club is also distinctive, and a positive influence on the surrounding landscape character.

Settlement

4.121 The town has developed in the valley of the River Witham, with the core of historic development on the lower lying ground. The town centre comprises some fine stone buildings, and St Wulframs Church, the spire of which is visible over a wide area. The good communications provided by the Great North Road and the East Coast Main Line, (formerly the Great Northern Railway) have led to more recent expansion. Some 20th Century residential areas, and employment development, have spread along the valleys and in some cases up the surrounding slopes.

4.122 The town of Grantham now includes the once separate village of Manthorpe, which lies to the north. Manthorpe nevertheless retains a distinct character, with a range of stone and brick-built properties extending along the A607.

4.123 To the north west of the town 20th Century development has extended up the valley slopes at Gonerby Hill Foot. A small open area of land separates Gonerby Hill Foot from the village of Great Gonerby, which is located on a crest of higher land, and retains its distinct identity with its own church and community facilities. Great Gonerby includes a core of older properties, constructed of stone and brick, with extensive surrounding areas of more recent residential development of less distinctive character. The context of the village on the higher land contrasts with Grantham in the valley bottom and the separate identity should be maintained.

4.124 To the west of the town residential and employment development has extended towards the A1. Much of the A1 is in cutting and is enclosed by mature highway planting. This provides a firm boundary to the town. There are currently areas of open land along the western edge of town.

Grantham

4.125 Some open areas are farmed, such as north of the A52, and some are unmanaged such as at Fairview Farm south of the A52. These areas of landscape are influenced by the residential areas adjacent to them and do not make a significant contribution to the setting of the town. Stubbock Hill to the north of the A52 is an area of higher land and is more important in containing the town in the valley, following the established character.

4.126 The land rises abruptly to the south and west of the town and urban development has extended to the base of the slopes. The rising land, which is partly wooded, provides a context to the residential and employment area. Some of these areas are developed to a relatively low density, with mature trees established in the gardens. This provides a soft character to the areas and helps to assimilate the urban areas with the more rural countryside on the higher land.

4.127 An area of employment land, including car showrooms is established on the higher ground south of Grantham along the B1174. The large-scale buildings in this location fit with the larger-scale flatter landscape. Whilst the buildings are visible, the relatively flat landform restricts visibility to the front buildings.

4.128 The village of Belton and Belton House lies north of Grantham. Belton House is owned by the National Trust and is a fine example of a neo Caroline Country House. Belton village itself contains some fine stone built houses and cottages, of character consistent with Belton House. The village and immediate surroundings are a high quality environment where it is important to retain the existing character.

4.129 The valley of the River Witham extends into the town from the north, and provides an important green space within the urban area. To the north the valley is farmed. As the valley extends into the town, it includes sports pitches and areas of parkland, with a more intensively-managed character.

4.130 To the north of Great Gonerby, the land descends towards the Trent and Belvoir Vale. An area of land with an established urban character has developed at Gonerby Moor. This includes large-scale employment and retail development set against the backdrop of rising land. The area includes modern large-scale metal-clad buildings and extensive parking areas. There is little landscape structure and the area would benefit from a stronger green infrastructure to assimilate the area within the wider landscape.

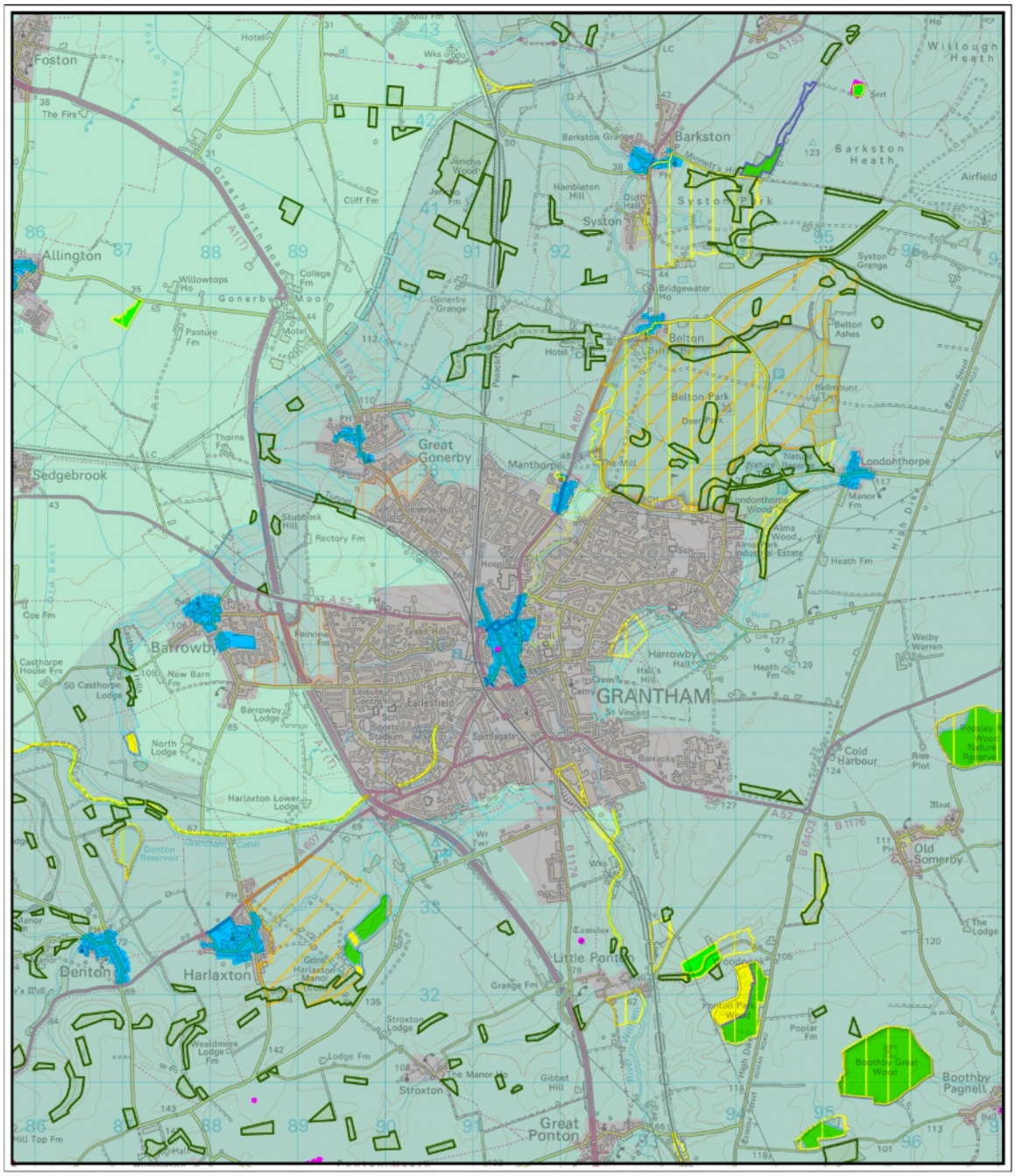
Landscape Sensitivity

4.131 The Grantham Scarps and Valleys character area is a complex area influenced by the surrounding character areas, and depending on the topography, landscape and human influences. The landscape is generally small in scale, and areas of particular sensitivity includes the historic Belton Park and the wooded and parkland slopes to the east of the town. There are some areas closer to the edge of town, containing little of intrinsic landscape interest, that would offer the scope for development. New development and associated landscape planting could soften some of the existing hard urban edges to the town. Other areas are of medium sensitivity because of the landscape elements, visibility or general character. These areas may offer some scope for development if sensitively designed and mitigated. The plan at Figure 17 shows a broad area of sensitivity to new employment and residential purposes. Sensitivity would range from **low** to **high**, depending on the nature of the site, and the scale and type of the development proposal. In general terms**,** new development should avoid the higher valley slopes, and should not establish new built development on the skyline.

4.132 Landscape sensitivity to wind energy proposals would be **high** across the whole of the character area. The small scale of the landscape, the complex landscape elements and the proximity to settlement would make it unlikely that any major turbines could be accommodated.

4.133 **The Landscape Management Objectives for Grantham Scarps and Valleys include;**

- Protect and enhance woodlands and parklands.
- Protect and manage field boundaries and hedgerow trees.
- Protect and enhance watercourses.
- Soften harsh urban edges by new woodland planting.
- Avoid built development encroaching on the higher scarp slopes, or 'skylining'.
- Use new development, and associated structural landscape, to soften existing harsh urban edges.
- Maintain a varied urban edge with fringes of countryside extending into the town.
- Consider opportunities for enhanced access to the countryside around the edge of town.
- Protect gaps between Grantham and adjacent villages.
- Where existing development occurs on higher ground such as at Gonerby Hill Foot, consider tree planting proposals to soften the roofscapes on the skyline.



KEY

- District Boundary
- Prominent Areas for Special Protection EN4
- Prevention of Coalescence EN5
- Historic Parks and Gardens EN7
- Protection of Wildlife and Geological Sites EN6
- Area of Great Landscape Value EN3
- Ancient Monument C1
- Open areas important to character and setting of built-up areas EN6
- Area Conservation Policy C9
- SSSI
- Settlement
- Ancient Replanted Woodland
- Ancient Semi-natural Woodland
- Lowland Beech and Yew Woodland
- Undetermined Woodland
- Wet Woodland

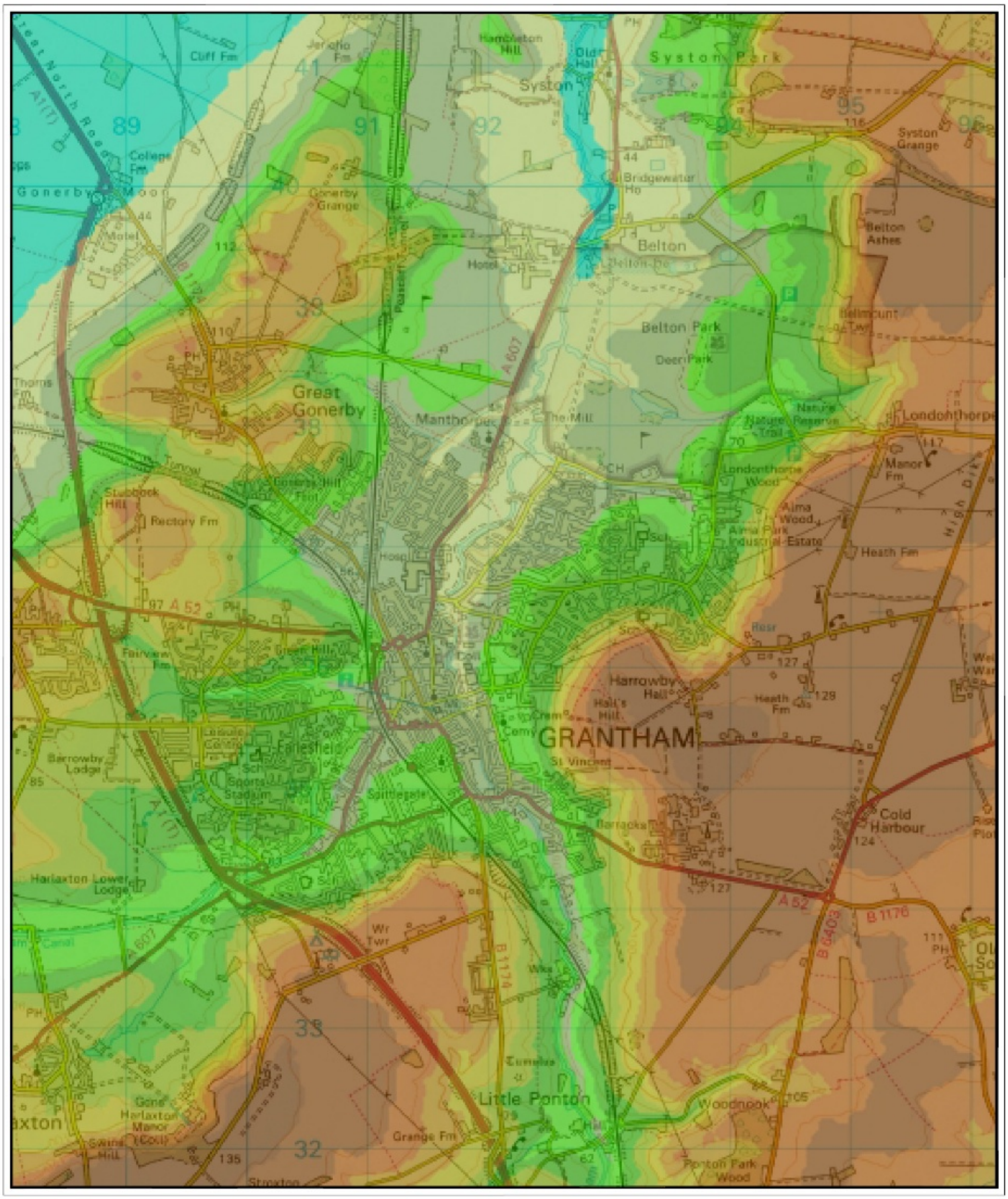
Disclaimer:
This information has been gained from the sources below. Accuracy of information cannot be guaranteed.
Magic.gov.uk Datasets ¦ English Nature Datasets ¦ South Kesteven District Council GIS Data

South Kesteven Landscape Character Assessment

ENVIRONMENTAL DESIGNATIONS AND POLICIES AND WOODLAND AROUND GRANTHAM

Figure 14

July 2006



KEY

- 30-40m
- 40-50m
- 50-60m
- 60-70m
- 70-80m
- 80-90m
- 90-100m
- 100-110m
- 110-120m
- 120-130m
- 130-140m

N

South Kesteven Landscape Character Assessment

TOPOGRAPHY AROUND GRANTHAM

Figure 15

July 2006

4.134 **Key Characteristics**

- A transitional area between the wooded Kesteven Uplands and the flat open fens.
- Broad east-facing slope, with local variations in topography.
- Medium-scale rectilinear fields with some hedgerow trees and a variety of farming uses.
- High proportion of settlement along the A15 and B1177 roads provides activity in the landscape.

4.135 **Location and Boundaries**

Physical Influences

4.136 Physically, the area comprises the east-facing slopes descending from the Kesteven Uplands. Oxford clay is overlain by glacial till, forming land that generally descends to the east with a series of east-facing minor valleys. The slope gives way to the flat topography of the Fen east of B1177 and the A15. The valley of the East Glen River lies to the west and a series of minor watercourses drain east onto the Fens.

Human Influences

4.137 The location of the rising land next to the Fens has led to the establishment of a line of settlement benefiting from the higher dryer ground, and the proximity to the Fen. Bourne comprises the largest settlement, with smaller villages including Morton, Haconby, Dunsby, Rippingale, Ponton, Horbling and Billingbough. These villages lie along the A15 and B1177.

4.138 The villages contain a variety of properties, with some older limestone and brick properties alongside a variety of modern construction. Many of the newer buildings do not demonstrate a distinct sense of place.

4.139 The land is under a variety of farming uses, with pasture and arable land enclosed by medium-scale hedged fields.

Landscape Character

4.140 The character of the Fen Margin arises from it being a transitional area between the Kesteven Uplands to the west and the Fens to the east. The area demonstrates characteristics evident in both these areas, but at the same time is not typical of either of them.

4.137 The topography is less varied and the landscape generally less scenic than the true Kesteven Uplands to

the west. There is, however, a higher degree of enclosure, with more hedgerow and tree cover than is typical of the Fen. Fields tend to be medium in scale and rectilinear in shape. The high proportion of settlement and the A15 and B1177 roads provides a higher level of activity in the landscape than exists either to the east or west.

4.141 The rising land to the west, on the edge of the Kesteven Uplands, contains a high proportion of woodland. Whilst most of this lies outside the Fen Margin character area, views are possible across the landscape to it. This edge helps to characterise the landscape.

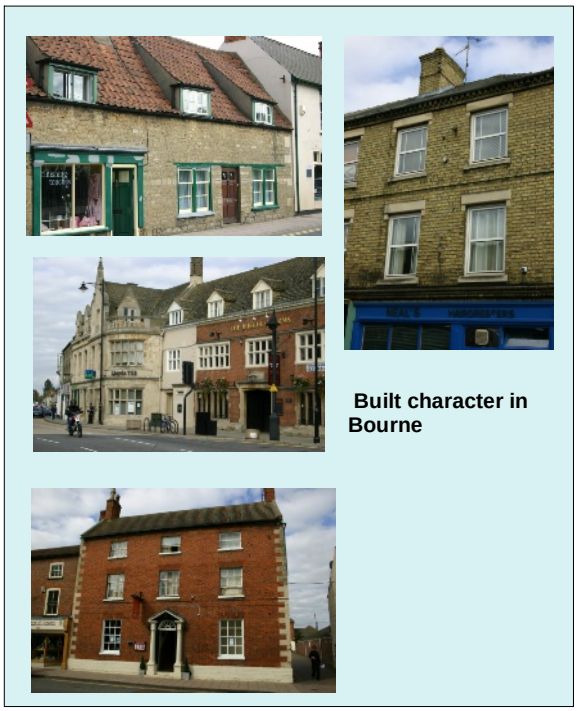
4.142 Whist the Fen Margin contains few detracting elements, it contains little of intrinsic character or quality either. It is a transitional landscape, borrowing characteristics from adjacent areas. It is also, however, a landscape containing many small settlements, with a number of important routes passing through it. It is, therefore, an area requiring sensitive management.

4.143 This transitional landscape between the Kesteven Uplands and the Fens is medium in scale with a high proportion of settlement, and a varied level of enclosure. There is little of intrinsic landscape interest**,** but also no major detractors. Long views across the landscape are possible to the rising land to the west and the open landscape of the fens to the east. The settlements also influence landscape character, and in places some have stark edges against the open agricultural land. Some development could provide the opportunity to provide a more successful urban edge.

Settlement

4.144 The largest settlement within the Fen Margin is Bourne which lies at the base of the rising land which extends to the Kesteven Uplands. Bourne Wood lies to the west of the town on the rising land and provides a valuable landscape, ecological and recreational resource.

4.145 Bourne contains an attractive core of historic buildings and the centre is designated as a Conservation Area. Building materials include stone and brick. Bourne Castle lies to the south-west of the town centre. The perimeters of the settlement contain a range of more modern residential and employment development.



Built character in Bourne

4.146 A series of smaller villages and hamlets extends through the fen edge landscape character area. These villages include some of the townscape character of villages further west in the Kesteven Uplands. Overall, however, these settlements have a much more varied mix of building ages and styles and materials.

4.147 The villages generally have a linear form following the main roads that run through the villages. Some villages exhibit a denser urban form close to the village centre, near the church, with a more open or fragmented form towards the village edge. Other villages have a loose

urban form throughout.

4.148 Red brick with clay or concrete tile is the dominant building material, but buff brick and render are also common. There are a limited number of stone buildings.


Pointon


Billingborough


Pointon


Billingborough


Haconby


Haconby

4.149 The village edges are varied with some soft edges formed by trees and shrubs and other edges much more open, with exposed garden fences.

4.150 In some cases this presents a rather scruffy appearance. Any new development within or around the villages should consolidate the existing urban form, and provide a sensitive edge to the countryside, including planting.

Landscape Sensitivity

4.151 The Fen margin comprises a narrow triangular wedge of land extending north from near Baston to Horbling and Folkingham, between the Kesteven Uplands and the Fens. This is a transitional zone with a landscape borrowing characteristics from the very different landscapes that exist to the east and west.

4.152 Landscape sensitivity to new employment and residential proposals is likely to be **low** to **medium**. Opportunities could exist in certain locations around the edge of existing settlements for limited new development. Large-scale proposals within the rural area are unlikely to be successfully assimilated.

4.153 Landscape sensitivity to wind energy proposals would be **medium**. Whilst the landscape contains relatively few features of intrinsic landscape interest**,** the scale of the landscape and the relative proximity of settlements are likely to make it difficult to find locations to successfully accommodate wind turbines.

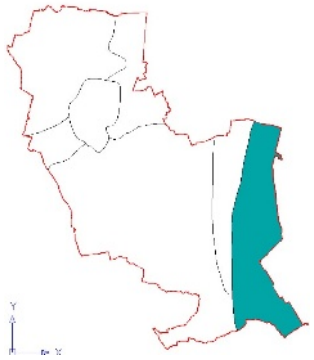
4.154 **The landscape management objectives for the Fen Margin include;**

- Careful design and new planting to development on the edges of villages.
- Maintain and enhance hedgerow boundaries.
- Protect sensitive woodlands.
- Consider new woodland planting on the higher ground.
- Maintain open views towards the rising land to the west.
- Protect and manage ditches and dykes.

4.155 **Key Characteristics**

- Low flat terrain, level horizons and large skies.
- Large-scale open rectangular fields, divided by drainage ditches and embanked rivers.
- Sparse trees and woodland cover.
- Little settlement apart from individual farmsteads, often with large-scale agricultural buildings.

4.156 **Location and boundaries**



4.157 Within South Kesteven, the Fens extend east from the Car Dyke to the South Forty Foot Drain. The Fens continue to the east beyond the district boundary. To the west of the Car Dyke lies a transitional area to the Kesteven Uplands, described as the 'Fen Margin'.

Physical Influences

4.158 The Fens are a complex landscape formed by the draining of land over the last 2000 years, but with most land drained during the last 150 years. Within South Kesteven the Fens comprise peat, overlying Oxford Clay. The land only exists because of man's intervention, and continued management, to prevent inundation. Within this area the land lies below 5m AOD, typically at 2-3m above sea level. The land is drained by a series of east/west drainage ditches, such as Haconby Lode and Rippingale Running Dike, which are pumped into the South Forty Foot Drain, which lies to the east and forms the District Boundary.

Human Influences

4.159 The whole landscape of the Fen is directly attributable to human influences, as discussed in the previous section. The landscape exists because of the draining of the land from the fen, turning bog, woodland and rough ground to create productive agricultural land. The drainage of the land resulted in the shrinking of the peat fen, further reducing the levels of the land and increasing the need for drainage. Historically this required windmills to lift water from the low lying drains into the more major drains and rivers. Today electric pumps continue this work, as the peat continues to shrink and be eroded by the wind.

4.160 The Lincolnshire Fens were some of the last to be drained, and the Fens within South Kesteven contain few older buildings, and no villages. The Fens are accessed by a series of lanes or 'Droves', which extend east from the B1177 and the B1394. These lanes serve individual

farmsteads. Most lanes are dead ends, limited by the South Forty Foot Drain. The Fens within South Kesteven contain no significant woodlands, historic parks or houses, ecological conservation areas or nationally designated areas of wildlife value. They are a working landscape based on intensive agricultural production.

Landscape Character

4.161 The character of the Fens is determined by the level low lying terrain. The man-made rectangular fields are large in scale divided by drainage ditches, with virtually no trees or woodland. This results in an open landscape of huge scale, with enormous skies which have a significant influence on the character of the landscape. The open fields are punctuated only by the groups of individual farm buildings spread along the Droves. Most of these include large-scale agricultural buildings with some scattered trees amid the farms themselves. The rising land to the west of the Kesteven Uplands provides enclosure and visual diversity in this direction. The Fens continue to the north, east and south of the District boundary, adding to the large-scale open character of the landscape. Distant vertical interest in the landscape is provided by wind turbines beyond the District boundary.

4.162 The distinctive landscape of the fens draws a varied human response. Some find the openness uplifting and dramatic, while others find the landscape oppressive and intimidating. Whatever response, the landscape remains distinctive and a contrast to much of the rest of the District.

4.163 The western edge of the character area is more influenced by settlements such as near Tallington. Here the character merges with the Kesteven Uplands to the west.

4.164 The lack of communities or settlements provides a character that is remote and isolated, though punctuated by intensive activity depending on the season and agricultural activity.


Baston


Market Deeping


Market Deeping

Settlement

4.165 Settlement within the Fens is generally sparse and restricted to isolated farms and houses. The farms


Fen Farm, Aslackanby


Deeping St James


Deeping St James


Deeping St James

often contain some large-scale metal-clad agricultural buildings.

4.166 The main settlement is located on the edge of the Fen at Market Deeping and Deeping St James. These settlements merge with each other. Vernacular buildings in the village centres are mostly constructed of limestone, often with collyweston slate roofs.

4.167 Many properties appear Georgian in age, with some older smaller buildings. Building characteristics are similar to the southern part of the Kesteven Uplands to the west, from where the building materials would originate.The settlement centres are typically linear, with more extensive areas of modern development beyond. These are typically brick- built, of varying age and style.

4.168 With few notable landscape features in the surrounding fen landscape, there is little to dictate the form of the settlement. The towns appear to have expanded along the roads and where space was available. The towns do not, therefore, have a distinctive form. Some settlement edges within the wider fen are quite abrupt, perhaps marked by a boundary hedgerow. Any new development around the settlement should carefully consider the settlement edge. In some places it may be appropriate to have properties looking out over the countryside and in other areas to have areas of planting. Back fences backing onto open countryside would not be appropriate

Landscape Sensitivity

4.169 The large-scale of the fen landscape, and the lack of trees and woodlands, creates a very distinctive landscape. The features of value in this landscape include the ditches and watercourses and the wide open views. There is little settlement and few well used roads and lanes.

4.170 Landscape sensitivity to new employment or residential provisions would be **low** to **medium** and at the edge of the existing settlements. Large-scale development would not, however, be appropriate in the more remote parts of The Fens. Any major proposals within this remote and open landscape would be highly visible and would interrupt the openness of the landscape. Agricultural buildings at existing farmsteads could, however, be assimilated, building on the existing landscape pattern.

4.171 Landscape sensitivity to wind energy proposals would be **low** to **medium**. The scale of the landscape, and the relative lack of features of intrinsic landscape value**,** would mean that some wind turbines may be accommodated.

4.172 Wind turbines are relatively visually permeable, and a limited development would allow the overall character of the landscape to be maintained. Acceptability in the landscape would, however, depend on the detailed siting and design, and overall cumulative impact with any other proposals within the district or surrounding areas. Locations close to existing large-scale human influences such as electricity lines, are likely to be most appropriate. Locations near to larger settlements are not likely to be appropriate.

4.173 **The landscape management objectives for The Fens include;**

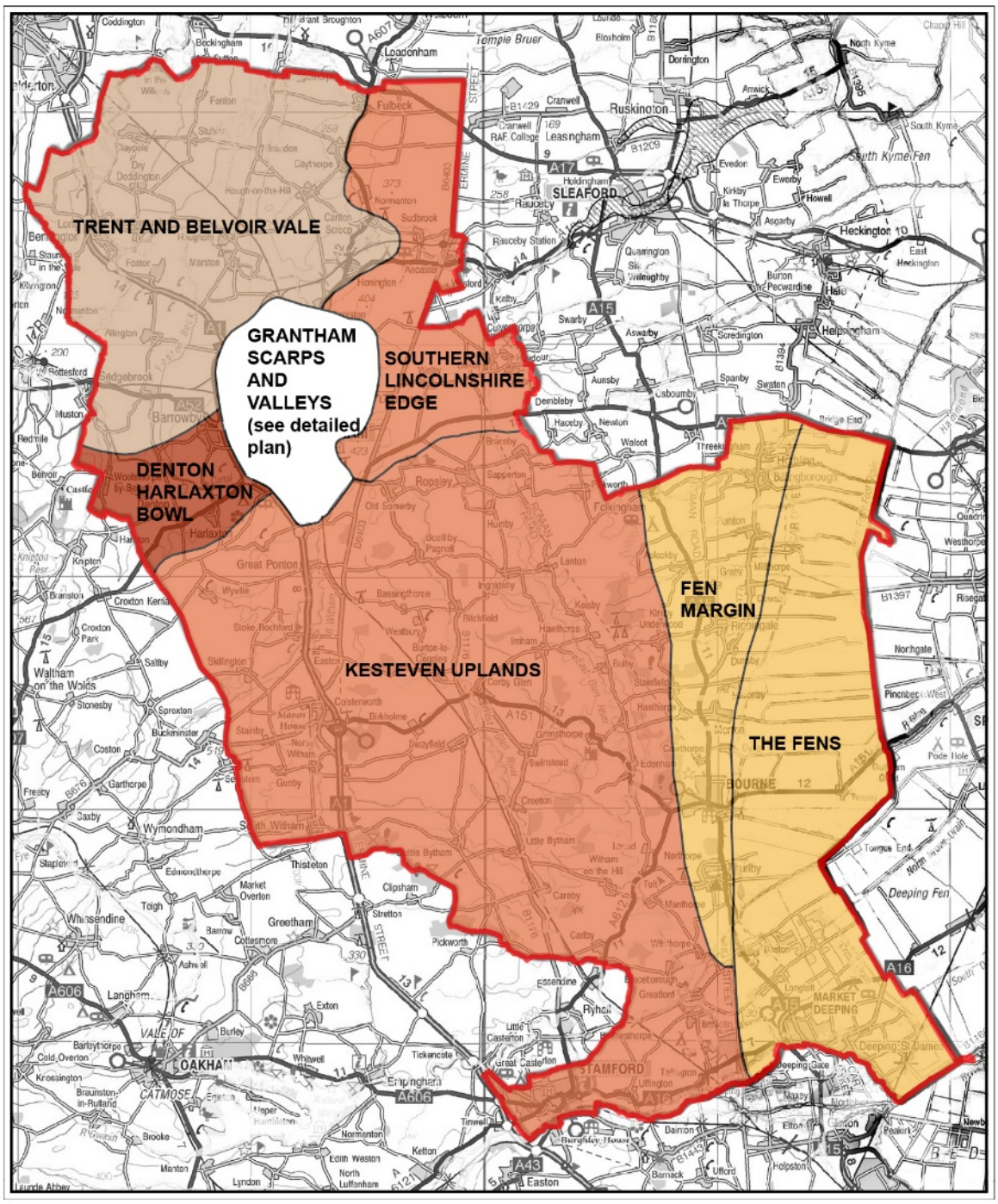
- Maintenance of field boundaries, including ditches and dykes.
- Phased management of the ditches and dykes to minimise wildlife disturbance.
- Protection of historic and archaeological sites.
- Conservation and management of grazing marsh.
- Protection of water quality.
- Consider the scale and design of new farm buildings.
- Concentrate new planting around farms and large-scale farm buildings.

:

Summary Landscape Sensitivity

4.174 Landscape Sensitivity to different types of development would vary from character area to character area. The plans at Figures 16 and 17 summarise the sensitivity across the district to residential and employment land development. The plans are based on the potential of the landscape to accommodate new development because of the established character, visibility and type and distribution of landscape elements. A more detailed plan for the area around Grantham is shown at Figure 17. The justification for the sensitivity of the different character areas is contained within the text for each character area.

4.175 Figure 18 shows the sensitivity of the different character areas to potential wind energy development. In general terms, the larger-scale, more open and flatter landscapes are most appropriate for this type of development. The actual impact of any key proposal would, however, depend on the detailed location, design and potential cumulative impact of each proposal.



KEY

- District Boundary
- Character Area Boundary
- Low Sensitivity
- Low-Medium Sensitivity
- Medium Sensitivity
- Medium-High Sensitivity
- High Sensitivity

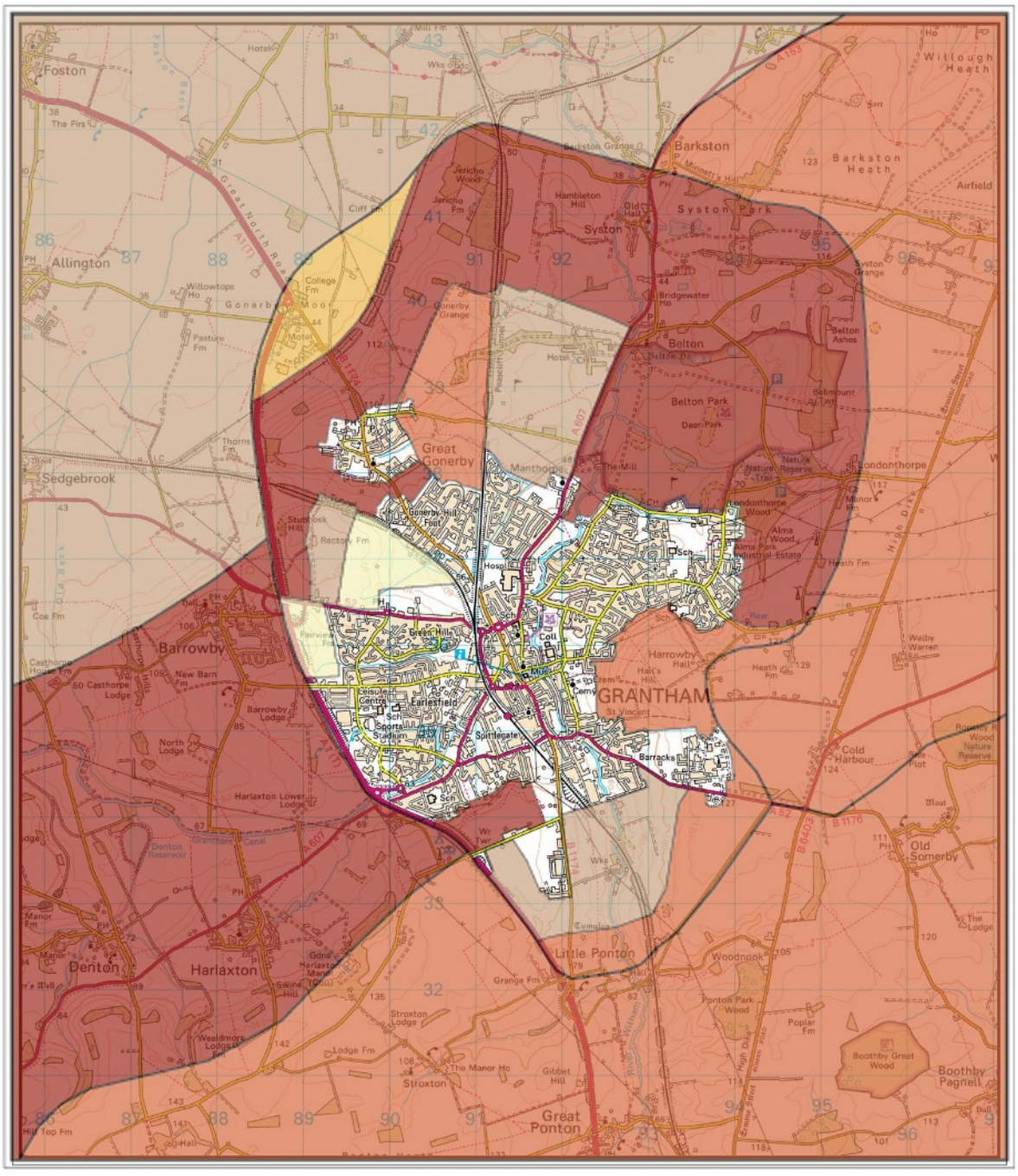
N

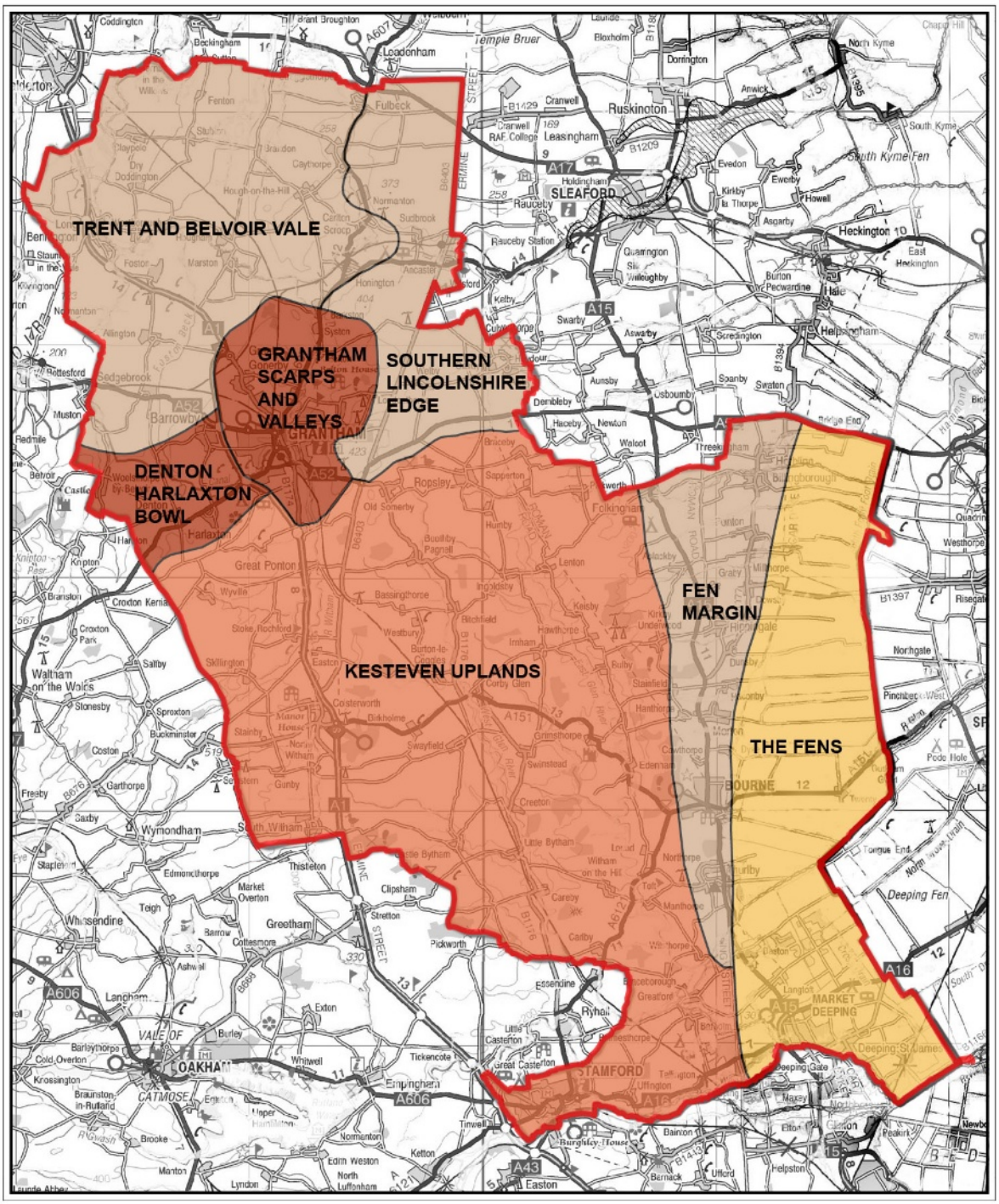
South Kesteven Landscape Character Assessment

LANDSCAPE SENSITIVITY FOR EMPLOYMENT AND RESIDENTIAL DEVELOPMENT

Figure 16

September 2006


Foston
Barkston
Willough Heath
Barkston Heath
Syston Park
Syston
Allington
Belton
Belton Park
Great Gonerby
Sedgebrook
Londonthorpe
Barrowby
GRANTHAM
Harrowby
Cold Harbour
Old Somerby
Denton
Harlaxton
Little Ponton
Woodnook
Stroxton
Great Ponton
Boothby Pagnell
KEY
Character Area Boundary
Low Sensitivity
Low-Medium Sensitivity
Medium Sensitivity
Medium-High Sensitivity
High Sensitivity
N
South Kesteven Landscape Character Assessment
LANDSCAPE SENSITIVITY FOR EMPLOYMENT AND RESIDENTIAL DEVELOPMENT AROUND GRANTHAM
Figure 17
September 2006



KEY

- District Boundary
- Character Area Boundary
- Low Sensitivity
- Low-Medium Sensitivity
- Medium Sensitivity
- Medium-High Sensitivity
- High Sensitivity

South Kesteven Landscape Character Assessment

LANDSCAPE SENSITIVITY FOR WIND ENERGY DEVELOPMENT

Figure 18

September 2006

RUTLAND
LANDSCAPE CHARACTER ASSESSMENT

BY
DAVID TYLDESLEY AND ASSOCIATES

Sherwood House
144 Annesley Road
Hucknall
Nottingham
NG15 7DD

Tel 0115 968 0092
Fax 0115 968 0344

Doc. Ref. 1452rpt Issue: 02 Date: 31st May 2003

Contents

Figures and Maps

Photographs

References

1 Leicestershire County Council, 1976, *County Landscape Appraisal*

2 Leicestershire County Council, 1995 published 2001, *Leicester, Leicestershire and Rutland Landscape and Woodland Strategy*

3 Countryside Agency and Scottish Natural Heritage, 2002, *Landscape Character Assessment Guidance for England and Scotland*

4 Institute of Environmental Management and Assessment and the Landscape Institute, 2002, *Guidelines for Landscape and Visual Impact Assessment*, Spons

5 Countryside Agency and English Nature, 1997, *The Character of England: Landscape Wildlife and Natural Features* and
Countryside Agency, 1999, *Countryside Character Volume 4: East Midlands*

6 Department of Environment, 1997 *Planning Policy Guidance 7 The Countryside - Environmental Quality and Economic and Social Development*

1. PURPOSE OF THIS REPORT

1.1 David Tyldesley and Associates have been commissioned by the Rutland County Council to prepare a Landscape Character Assessment for the County of Rutland. The work was commissioned in February 2003 and completed in early June 2003, with all field work having been undertaken in March 2003.

1.2 The environmental quality of the County of Rutland, particularly of the landscape, is very high. It is widely appreciated by residents and visitors. It makes a substantial contribution to the quality of life in the County.

1.3 The County Council recognises that the landscape is dynamic. It is the result of the interaction of natural influences, such as geology, soils, climate and vegetation growth, and the actions of people over thousands of years. The landscape will continue to change. This assessment of landscape character identifies what is important and distinctive about the Rutland landscape, so that in managing future change we can conserve and enhance, and where necessary restore, that distinctiveness and the characteristics that make Rutland special and gives the County its sense of place.

1.4 This report explains what landscape character is and how it is assessed. It describes the five main landscape character types in Rutland, which we call High Rutland, The Welland Valley, The Vale of Catmose, Rutland Water Basin and the Rutland Plateau, see Figure 1.

1.5 This report is intended to help the Council and all others involved in development and land use change in the countryside. It will be used to inform the preparation of countryside design guidance and policies and proposals in the development plan.

2. INTRODUCTION TO LANDSCAPE CHARACTER ASSESSMENT

2.1 Landscape Character Assessment is a process used to help plan and manage landscape change. It has evolved over the last 30 years or so. This is not the first Landscape Character Assessment for Rutland. The first was carried out in 1976 by the Leicestershire County Council (ref 1). This was refined and updated in 1995, again by the Leicestershire County Council, in conjunction with the Rutland County Council (although the 1995 assessment was not published until 2001) (ref 2). The Landscape character assessment described in this report does not supersede that of 1995, but builds on it and develops it in a way that looks at Rutland in more detail and addresses the specific requirements of this project. Most notably it is at a more detailed scale - 1/25,000.

2.2 At the outset it may be useful to explain some of the terms used in landscape character assessment. The definitions are consistent with terminology in good practice publications by the Countryside Agency (ref (3 at pages 8 - 9) and Landscape Institute (ref 4 at pages 12 - 13 and 119 - 121). It helps to explain that landscape character assessment is not entirely subjective but based on a blend of objective assessment and subjective judgement of professional landscape planners. All of these various expressions are used in this report.

2.3 Landscape **Elements** - these are the individual components which make up the landscape including, for example in Rutland, hills, valleys, rivers, woods, trees, hedges, ponds, stone walls, buildings and roads. They are visible, physical components which generally are capable of being measured and quantified and they can easily be described in an objective way.

2.4 Landscape **Features** - these are particularly prominent or eye-catching elements such as a tree clump on a hill top, a church spire, conspicuous buildings such as Burley on the Hill or telecommunication masts and ridges that form the skyline.

2.5 Landscape **Characteristics** - these are components of the landscape, or combinations of them, that make a particular contribution to the character of an area. They will therefore include combinations of the physical elements and features but will also include aspects of landscape experience which are not of a physical nature. Thus, landscape characteristics may be **visible and physical** elements as already described above, or they may be **visible and spatial but not physical** characteristics such as scale, pattern, colour and texture. There may also be **non-visible characteristics** of the landscape which, although they cannot be seen, can influence our experience of a landscape and include sound, smell, temperature and our prior knowledge of the history or artistic or cultural associations with the landscape. The non-physical characteristics of the landscape are more difficult to describe objectively. They can rarely be measured or quantified but their contribution to landscape character is just as important as the physical elements.

2.6 Landscape **Character** - this is the distinct and recognisable pattern of elements, features and characteristics that occurs consistently in a particular type of landscape. It reflects particular combinations of, for example, geology, landform (the shape of the land), soils, vegetation, land use and human settlement. It creates the distinctiveness, identity and the sense of place which makes one landscape different from another. The recognition and understanding of landscape character is fundamental to contemporary landscape planning and landscape management which seek to manage change in the landscape in ways that will generally conserve, enhance and, where necessary, restore its

character as an important contribution to sustainable development and quality of life.

2.7 Landscape **Classification** - this is the process of identifying the character of different landscapes in any particular area and sorting them into distinctive **landscape character types**. The landscape character types can be mapped and described in a systematic way at various scales, ranging from national to local, a process referred to as landscape characterisation.

2.8 Landscape **Characterisation** - this is the process of identifying areas of similar character, classifying, mapping and describing them. It is a fundamental part of landscape character assessment. England=s national landscape characterisation is expressed in the Countryside Agency=s Character of England Map (ref 5)

2.9 **Landscape Character Assessment** - this is the whole process of landscape classification, characterisation, understanding the history and evolution of the landscape, identifying pressures and trends for change in the landscape and often producing guidelines to advise on the management of landscape change. This process is widely endorsed and encouraged by the Government in national planning guidance (re 6) and by the Countryside Agency (ref 4).

2.10 **Landscape Evaluation** - this is a different and separate process from landscape character assessment. It is the valuation of different areas or landscapes, normally against a set of pre-defined criteria. The evaluation process may, or may not, classify or characterise the landscape in the way described above, but it always relies on judgements being made as to the relative worth or value of landscapes for different interests or groups or to underpin designations. Landscape evaluation may lead to designations such as, in the case of Rutland, Areas of Particularly Attractive Countryside, and elsewhere, National Parks and Areas of Outstanding Natural Beauty.

2.11 Landscape **Capacity** - this is the capability of a landscape to accommodate a particular kind of change, for example, increased woodland cover or new built development. It is usually expressed in relative, rather than absolute, terms. For some changes there may be identifiable thresholds or limits of acceptable change beyond which the character of a landscape would be changed in negative or positive ways. For most changes, however, capacity is a relative measure expressing how increasing levels of change increasingly affect landscape character.

2.12 **Landscape Impact Assessment** - the process of assessing the effects of one or more proposed changes to the landscape, as a resource in its own right, how its character may be changed, beneficially or adversely, by changes to its elements, features or characteristics. Usually the effects (impacts) are judged as a relative degree of change and expressed in terms such as substantial, moderate or slight adverse or beneficial impacts etc. In this context beneficial impacts would strengthen, enhance, restore or otherwise improve the distinctiveness of landscape character. Adverse impacts would diminish or eliminate distinctiveness, remove characteristic elements and / or add uncharacteristic elements and thereby damage landscape character.

2.13 **Visual amenity** - the benefit or advantages gained from a view in terms of what is seen and may be enjoyed by an observer.

2.14 **Visual Impact Assessment** - the process of assessing the effect of one or more proposed changes to views that are experienced by people and how the changes may affect the (visual) amenity of the view, beneficially or adversely. For example, a view

may be impeded, narrowed or shut off (visual obstruction), views of unsightly features may be hidden (screened) or partly hidden (filtered), new features may be introduced (visual enhancement or intrusion), or features may be removed (visual reduction). Usually the relative degree of change is judged and expressed in terms such as substantial, moderate or slight beneficial or adverse effects on visual amenity.

2.15 The **sensitivity of the landscape** depends on a range of factors including its character, its capacity to accommodate a proposed change, its condition and integrity, trends or pressures for change in landscape character and whether it has been identified as a landscape of particular importance in policy terms (eg Areas of Particularly Attractive Countryside). The most sensitive landscapes are those with limited capacity to accommodate the proposed change, landscapes with a particularly typical or distinctive character which has historical continuity and integrity, rare landscape types, designated landscapes and landscapes that have been specifically designed or planned for visual amenity eg designed landscapes or parklands forming the setting of a country house.

3. LANDSCAPE CHARACTER TYPES IN RUTLAND

3.1 The 1995 Landscape Character Assessment identified four landscape character types in Rutland. These four types were High Leicestershire, Vale of Catmose, Cottesmore Plateau and Welland Valley. They remain valid at the broad, strategic level of Leicestershire and Rutland combined. The High Leicestershire, Welland Valley and Plateau types remain unchanged in this study of Rutland, although two of them are renamed for reasons explained below. Their boundaries have been refined and mapped at a more detailed level (though the changes between landscape character types are sometimes sharp and sometimes transitional) and they have been sub-divided to provide a more detailed assessment of their character to help to inform the guidance. Their boundaries are generally consistent with those in the 1995 Landscape Character Assessment (ref 2).

3.2 This more detailed assessment, of the County of Rutland only, also allowed a more subtle appreciation of the variations within and between the landscape types in Rutland. Most notably, at the Rutland scale, Rutland Water and its setting is a much more important and distinctive landscape. It is considered that, at County level, the basin of Rutland Water is a landscape character type in itself, rather than a sub-division of the Vale of Catmose. Whilst the area to the west of the reservoir (south of Oakham) lies in the Vale of Catmose, the area of the reservoir is located in the Gwash Valley, running west to east across the plateau of higher land. The river cut out the basin-like valley area now comprising the reservoir and its immediate surroundings. A fifth landscape character type has therefore been generated in this study - Rutland Water Basin.

3.3 As this is a Rutland only assessment, the name of the High Leicestershire landscape character type is inappropriate and is renamed High Rutland.

3.4 Further, a more detailed examination of the areas previously classified as the Cottesmore Plateau indicate that the plateau landscapes are much more extensive than the area around Cottesmore. In the context of this Rutland study, the whole of the eastern part of the County is an extensive plateau (with subtle variations and cut by some valleys) and it would be more appropriate to rename the area as The Rutland Plateau and to classify sub-areas of the type to reflect the subtle variations within it, as may be expected, one such sub-area is the Cottesmore Plateau.

3.5 Consequently, despite the remaining validity of the 1995 Landscape Character Assessment generally at the strategic scale, this study re-classifies the Rutland landscapes as follows (see Figure 1 and detailed plans 1 - 10) for the spatial extent of the areas:

A. High Rutland - in the west and central parts of the County, here sub-divided into:

   i. Leighfield Forest
   ii. Ridges and Valleys
   iii. Eyebrook Valley
   iv. Chater Valley

B. Vale of Catmose -a single unit to the north and south of Oakham and including the town of Oakham.

C. Rutland Water Basin - a single unit of a distinctive landscape type based on the

reservoir and its immediate surroundings.

D. Rutland Plateau in the north and east of the County, here sub-divided into the:
   i. Cottesmore Plateau
   ii. Clay Woodlands
   iii. Gwash Valley
   iv. Ketton Plateau

E. Welland Valley - along much of the southern boundary of the County because the River Welland forms the boundary with Northamptonshire, here subdivided into
   I. Middle Valley West (Caldecott - Seaton)
   ii Middle Valley East (Barrowden - Tinwell).

3.6 These landscape Character Types and Sub-Areas are summarised in Table 1 and described in sections 5 - 9 below.

Table 1 Landscape Classification

Landscape Character Type Leicestershire and Rutland Study	**Landscape Character Type this Study**	**Landscape Character Sub Area**
High Leicestershire	A. High Rutland	Ai. Leighfield Forest
		Aii. Ridges and Valleys
		Aiii. Eyebrook Valley
		Aiv. Chater Valley
Vale of Catmose	B. Vale of Catmose	B. Vale of Catmose
	C. Rutland Water Basin	C. Rutland Water Basin
Cottesmore Plateau	D. Rutland Plateau	Di. Cottesmore Plateau
		Dii. Clay Woodlands
		Diii. Gwash Valley
		Div. Ketton Plateau
Welland Valley	E. Welland Valley	E.1 Middle Valley West (Caldecott - Seaton)
		Eii. Middle Valley East (Barrowden - Tinwell)

4. THE LANDSCAPE OF HIGH RUTLAND

(Area A, Figure 1 and Maps 1- 4, 7 and 8, Photograph Sheet 1)

4.1 In Rutland, the High Leicestershire landscape character type generally comprises the eastern part of a large hilly plateau, located mainly in Leicestershire and extending from Leicester and the Soar Valley in the east, across south-east Leicestershire, over the Rutland border and eastward towards Oakham and Ketton. It is related to the English Nature Natural Area called "Trent Valley and Rises" and to the "High Leicestershire" and "Leicestershire and Nottinghamshire Wolds" regional character areas of the Countryside Agency. The geology is of ironstone and clays often overlain with boulder clay or, in the valleys, alluvium. High Rutland forms part of the watershed between the Soar - Trent - Humber and the Welland catchments. It is dissected by radiating rivers and streams which have formed steep sided valleys separated by ridges. This gives the whole area the distinctive steeply rolling landform familiar to travellers who are either continually ascending and descending the steep slopes or travelling along the ridges enjoying panoramic views across the surrounding countryside.

4.2 The highest parts of the landscape character type in Rutland reach over 190 metres AOD. Much of High Rutland is deeply rural and locally feels relatively remote. A distinctive feature is the network of narrow gated roads connecting isolated hamlets and farms. The only major roads within the area are the A47 running east to west and the A6003 running north to south, neither of which is seriously visually intrusive in the landscape but they do create a busier, noisier ambience in the main road corridors.

4.3 Land use is a mixture of arable on the flatter and more gently sloping ridge areas and grassland mainly on the steeper slopes and in the valley bottoms. Ridge and furrow is fairly well distributed throughout the area and reflects the intensity of arable cultivation here in the early Middle Ages. Field ponds are also characteristic. The field pattern is mainly one of regularly shaped fields bounded by thorn hedges with mainly ash, and in a few places oak, as hedgerow trees. These enclosure hedges contrast with the older mixed species hedges that form the more sinuous parish boundaries.

4.4 Throughout the area, but especially in Leighfield Forest, some hedgerows are substantial and many still perform an important function in this pastoral landscape, providing containment, shelter and shade for stock. Whilst a number of hedges have been neglected, relatively few have been removed and there is evidence of the increasing practice of traditional hedgerow management by laying, protection of hedgerow trees and fencing of new field and hedgerow trees to protect them from grazing animals. A number of hedgerow trees are over-mature, including some left isolated in the fields when associated hedgerows were removed, these need careful maintenance and surgery to extend their lives and replacement to ensure continuity of hedgerow tree cover. Some ponds are being cleaned, restored and nurtured demonstrating that all these important contributions to landscape character can still be practicable today.

4.5 Whilst horse-keeping helps to maintain the pastoral character, a number of the fields are over-grazed. The use of inappropriate fencing and the accumulation of stables, barns and other, usually temporary and unsightly, buildings, vehicles, lighting and clutter detracts from the generally unspoilt rural character and is particularly intrusive in views of, to and from the villages.

4.6 Woodland is a significant feature throughout the area reflecting the old Leighfield Forest. The woodlands tend to be broadleaved, mainly ash and oak, but there are also mixed conifer and broadleaved plantations associated with 19th century sporting estates and a number of mature poplar plantations. In general the woodlands tend to be even aged. Parkland is an important component of the landscape in some parts. Other concentrations of sites of ecological value are provided by small streams, ponds, disused railway lines and Eyebrook Reservoir.

4.7 Whilst the Leighfield Forest and Chater Valley sub-areas have remained pastoral and well wooded, elsewhere there has been extensive conversion or reversion to arable with attendant loss of pasture, woodland, field boundaries, hedgerow trees and small pockets of semi-natural vegetation. However, in parts new woodland planting is quite extensive; the Woodland Trust has new plantations between Oakham and Braunston-in-Rutland. Some parkland landscapes are in good condition, others urgently need restoration and reinstatement of good management practice.

Leighfield Forest (Sub-area Ai, Figure 1 and Maps 1- 3, Photograph Sheet 1)

4.8 This sub area is in the far west of the County. It has a particularly dramatic topography with very steep slopes and generally narrower ridges than in the rest of High Rutland. Some ridges are so narrow that travelling over them is like crossing a hump-backed bridge. The ridges are high giving very panoramic, long-distance views out, some extending right across Rutland to the Rutland Plateau.

4.9 It is a deeply rural, pastoral, wooded landscape with a strong sense of place and history. The valleys are generally narrow, enclosed, steep-sided and intimate in character, the ridges are high, long, narrow and steep with pronounced shoulders or other distinct profiles. Pasture is almost everywhere that is not woodland. The fields are generally improved or semi-improved pasture grazed mainly by cattle and sheep, but also by horses particularly near the villages.

4.10 There is a distinct feeling of antiquity with many noticeable historical features including extensive ridge and furrow, medieval ponds and earthworks, ancient tracks, ancient mixed species hedgerows, large veteran trees, Saxon and medieval settlements and settlement patterns, medieval lost villages, and many very old buildings including houses, outbuildings and doocots. Farms are notably mainly in the villages and the general lack of buildings out in the open countryside adds to its very rural, rather isolated nature.

4.11 The landscape is perceived as the most densely wooded in Rutland. Although the woods are not as large as in the Eye Brook Valley or on the Clay Woodlands on the Rutland Plateau, they are much more frequent and tree cover is dense. There are thousands of trees in the hedgerows and copses, small woods and shelter belts and along the roadsides where they plunge into cuttings or narrow valleys the sides of which are too steep to mow.

4.12 Leighfield Forest is popular with walkers and is crossed by the Leighfield / Macmillan Way and the Leicestershire Round with many other rights of way giving good access on foot to the remoter areas, despite the absence of metalled roads in many parts which are accessible otherwise only by gated tracks. The long, narrow, sheltered, often

intimate single track roads penetrate deep into the countryside. The area has many small ponds and strips of wetland habitats along the streams but most of the ecological interest of the area is in the woodlands, pastures and hedgerows.

4.13 The only settlement is Belton-in-Rutland.

Recommended Landscape Objectives High Rutland - Leighfield Forest

To sustain and reinforce the small-scale, deeply rural, remote, still, calm, quiet, green, pastoral, well-wooded landscape, its dramatic topography of intimate, enclosed valleys and high, steep-sided ridges, its deep sense of antiquity and historical continuity, its many historic landscape features and its attraction as an area for quiet walking along well maintained rights of way, including the gated roads and tracks characteristic of the area.

Ridges and Valleys (Sub-area Aii, Figure 1 and Maps 1- 4, 7 and 8)

4.14 This extensive part of west, south and central Rutland has typical generic landscape elements, features and characteristics of High Rutland but differs from Leighfield Forest by lacking the sense of rural isolation and having a much more open, regular, geometric field pattern (exacerbated by some boundary removal) with fewer, low-cut or gappy hedges, fewer hedgerow trees and less enclosure. The ridges and valleys are evident but not as pronounced as to the west. There are fewer woodlands and those that occur tend to be enclosure or post-enclosure, straight-edged plantations. In parts there are a number of small plantations and some of the valley streams have linear strips of woodland or narrow, linear wetland habitats.

4.15 Mixed or arable farming prevails with a variety of crops and intensively managed, improved grasslands grazed by cattle and sheep. There are more farm steadings in the countryside and more and larger farm buildings.

4.16 Although the sub-area does exhibit a number of historic features, with ridge and furrow and old lanes linking medieval villages still characteristic, this part of High Rutland has a less obvious feeling of antiquity and continuity. It is busier and noisier with the main roads passing through it, settlements are more frequent and larger (including Uppingham) and settlement pattern much denser, especially between North and South Luffenham and Uppingham. Roads, railways and disused railways form important linear features sometimes seeming to run against the grain of the ridges and valleys which run generally east - west.

4.17 The northern-most part of the sub-area, around Whissendine, differs from the rest of the sub-area in that it is more obviously a transition from the characteristic High Leicestershire / High Rutland landscapes to the west and the Vale of Catmose to the east. Notably, the ridges and valleys tend to run generally north - south rather than east west and the ridges are more rounded and lower, and the valleys shallower, than in the rest of the sub-area.

4.18 It differs from the Eyebrook Valley because it does not generally exhibit the same large scale valley structure and character, being more like a series of ridges and smaller valleys, some of which have no noticeable watercourse at all. Another distinguishing feature is the density of settlement pattern and larger size of the villages.

4.19 The settlements are Ayston, Bisbrooke, Braunston-in-Rutland, Brooke, Glaston, Lyndon, Morcott, North Luffenham, Pilton, Preston, Ridlington, South Luffenham, Uppingham, Whissendine and Wing.

Recommended Landscape Objectives High Rutland - Ridges and Valleys
To sustain and restore the rural, mixed-agricultural, busy, colourful, diverse landscape with regular patterns, straight lines, frequent movement, many large and small historic, stone-built conservation villages that fit well with the landform, to protect the landscape setting and conserve and enhance the edges of villages, to increase the woodland cover and other semi-natural habitats whilst protecting historic features and panoramic views from the ridges.

Eyebrook Valley (Sub-area Aiii, Figure 1 and Maps 3 and 4, Photograph Sheet 1)

4.20 This sub-area is, in places, similar to Leighfield Forest but differs in its larger scale, fewer hedgerow trees but very large, single, Parish woods at Wardley Wood and Stoke Dry Wood. Historic features are still evident in ridge and furrow, the lost medieval village of Snelston and the impressive motte and bailey at Castle Hill. However, around Eyebrook Reservoir the slopes are more gradual and the drowned-valley landscape is more open and utilitarian with larger, predominantly arable fields set out in more obvious geometric patterns and lower cut hedges with few hedgerow trees, around the modern landscape of the reservoir. The water birds on and around the reservoir and along the Eye Brook are an important feature of the valley. The reservoir is a popular destination for fishing, bird watching and other informal recreation.

4.21 The A6003 north of Caldecott runs along the ridge separating the Eyebrook Valley from the Welland Valley and provides good views of both.

4.22 The only settlements are Stoke Dry and Wardley.

Recommended Landscape Objectives High Rutland - Eye Brook Valley
To sustain and restore the broad, generally open, rural, agricultural, diverse valley landscape dominated by the river, reservoir and large woodlands and the regular field pattern. To improve the landscape fit of Stoke Dry in the setting of the reservoir, to protect historic features and their settings and the wetland wildlife, and increase woodland and other semi-natural habitats.

The Chater Valley (Sub area Aiv, Figure 1 and Maps 3 and 7)

4.23 Part of this narrow valley in the Ridges and Valleys sub-area is classified separately because, although small in area, it is distinctly different to the landscape around. It is a narrow, intimate, sheltered valley with a particularly high level of tree cover in woodlands, roadside and railway-side tree belts, hedgerow trees and copses. It has more sinuous lines and irregular patterns in a less colourful predominantly green landscape.

4.24 In places it is dominated by the railway and its structures of embankments, cuttings and bridges as it runs the length of this section of the valley which is also crossed by the A6121. The railway creates sudden bursts of noise as a train rattles by but otherwise this valley is very like those in Leighfield Forest, quiet, calm and rural. Despite being

overlooked by villages such as Pilton, Lyndon and North Luffenham and from the narrow lanes along the shoulders of the upper valley slopes the valley feels secluded, away from the noise and movement of the A47. Like Leighfield Forest it also has many trees and historical features such as earthworks.

4.25 There are no villages in the Chater Valley sub area.

Recommended Landscape Objectives High Rutland - Chater Valley

To sustain and reinforce the small-scale, enclosed, intimate, rural, quiet, calm, well-wooded and pastoral valley with its semi-natural habitats, notable lack of villages and very few buildings. To protect its historic features and carefully control any road, railway, water services or other infrastructure improvements in the valley, including any further modifications to the river and its riparian features and habitats.

Settlement Form and Pattern in High Rutland

4.26 In addition to Uppingham and the 17 villages in High Rutland there are a number of farmsteads and occasional other buildings in the landscape. In Leighfield Forest villages are generally widely distributed and the settlement pattern is less dense than any other part of Rutland. Most of the High Rutland villages are located in a belt of denser settlement from Uppingham to North Luffenham and from Rutland Water south to the string of villages on or close to the A47. Braunston-in-Rutland and Brooke are unusual in that they are located close to the river in the bottom of the Gwash valley. Almost all other settlements in High Rutland are located:

a on or close to ridge tops eg Ayston, Bisbrooke, Glaston, Ridlington, Wardley and Wing (see figure 2(a)); or

b on high mounds / hills and spilling down the upper slopes eg Belton-in-Rutland, Morcott, North Luffenham and Preston (see figure 2(b)); or

c on a shoulder or crest of land high up the valley slope, but below the ridge top eg Lyndon, Pilton and Stoke Dry (see figure 2(c)).

Figure 2 Typical Locations of Villages High Rutland

4.27 The villages vary in form, most are compact and fit well into the landform although a few have had modern extensions in the form of one or more ribbons along the frontage of approach roads. The villages are generally:

a linear - along a single main street with little development in depth, and either with bends (figure 3) eg Lyndon, Pilton and Wardley, or quite straight (figure 4) eg Ayston, Brooke, Stoke Dry, Whissendine and Preston although the latter village has been modified by some frontage development along the realigned A6003 which by-passes the narrow main street;

Figure 3 Linear village with bends

Figure 4 Straight linear village

b quadrangular - developed around a square of four roads, sometimes of approximately equal length (figure 5) eg Glaston, sometimes elongated into a long rectangle (figure 6) eg Braunston-in-Rutland, Morcott, Ridlington which reflects the Saxon / Medieval historic layout of the main street and back lane with linking tracks or lanes; or

Figure 5
Quadrangular with 4 nearly equal roads

Figure 6
Quadrangular elongated rectangle

c complex nucleated - clustered around a more complex historic road pattern

which may be two rectangles or triangles (figure 7) eg Bisbrooke and Wing; or

Figure 7 Complex village core two rectangles or triangles

d complex extended - where the old village layout is still evident in a historic core but the form of the village has changed more markedly as a result of 19th and 20th century developments eg Belton-in-Rutland, North and South Luffenham and Whissendine which although still quite linear, has been substantially extended by modern developments.

4.28 All of the villages are very distinctive in their character, most are rural, quiet, historic villages that still exhibit a strong agricultural / estate village character eg Ayston, Braunston-in-Rutland, Bisbrooke, Brooke, Lyndon, Pilton and Stoke Dry but some experience the intrusion of traffic noise, where the village lies astride, or even close to, the main roads eg Glaston, Morcott, Preston and Wardley. Others have a rather busier ambience with a mix of farming and other rural businesses or a more obvious dependence of residents travelling to work in the nearby towns eg Belton-in-Rutland, Ridlington, North and South Luffenham, Whissendine and Wing.

4.29 Most villages are intimate and tightly enclosed, perhaps looking inwards to the street, a village green, open field or church (see figure 8) eg Ayston, Glaston, Lyndon, Morcott, Pilton Preston, Ridlington, South Luffenham (historic core), Wardley and Wing. Others are more open in character and / or outward looking from elevated positions eg Bisbrooke, Brooke, North Luffenham and Stoke Dry.

Figure 8 Orientation of Village Buildings

Inwards **Outwards**

4.30 The villages tend to fall into three types in relation to their building materials:

a in the west some are characterised by a dominance of buildings of coursed rubble ironstone sometimes with dressed / angled limestone quoins and usually with roofs of Collyweston or blue slate or thatch and few other materials eg Ayston, Bisbrooke, Brooke, Preston, Ridlington and Wardley;

b in the east some are characterised by limestone, some with ironstone, brick and render and roofs of slate with some thatch and tile eg Glaston, Lyndon and Morcott;

c other villages have a greater variety of materials but are nevertheless very harmonious despite a sometimes eclectic mix eg Belton-in-Rutland, Braunston-in-Rutland, North and South Luffenham and Whissendine.

4.31 Generally, farm buildings are located in the villages but those that are in the fields tend to be either relatively modern buildings in good condition (though some are no longer used and could decline), or buildings of some 30 + years old that are in highly variable condition, some in a state of collapse.

4.32 Radio telecommunication masts are located on several of the higher ridges and are conspicuous over large areas.

5. THE LANDSCAPE OF THE VALE OF CATMOSE

(Area B, Figure 1 and Maps 1 - 3, Photograph Sheet 2)

5.1 The Vale of Catmose lies mainly within the County of Rutland, with a small part of its northern area extending into Leicestershire where it abuts the Leicestershire Wolds and Wreake Valley landscape character areas. The Vale stretches down from the north west boundary of the county to the western shores of Rutland Water, south of Oakham. It comprises a broad, generally flat-bottomed valley basin surrounded by the higher land of High Rutland (to the west), the Wolds (to the north) and the Rutland Plateau (to the east). This contrast is at its most dramatic where Burley House overlooks the Vale and Rutland Water Basin from its commanding position on the edge of the Cottesmore Plateau. The Vale of Catmose lies in the Countryside Agency's "Leicestershire and Nottinghamshire Wolds" regional character area and English Nature's "Trent Valley and Rises" Natural Area. Its geology is principally ironstone and limestone overlain in part by glacial tills.

5.2 A key characteristic of much of the Vale is that of an open valley basin created by the edges, shoulders, ridges and slopes of the surrounding hills and plateaux, the skylines of which are frequently wooded. The Vale is typically distinguished by its lower lying land, absence of the dramatic series of ridges and dips of High Rutland and the characteristic enclosure of a vale contrasting sharply with the more exposed plateau to the east. The classic 'vale' landscape of meadows and fields gently rises in altitude towards the north from the outskirts of Oakham. In its northern extremity, the distinction in relief and character between the Vale and the Cottesmore Plateau is more subtle. Land within the Vale typically ranges from about 80m AOD in the lower areas to about 120m AOD on the tops of the rolling hills.

5.3 The Vale comprises a mix of arable land, which is located mainly on the slopes, and pasture, which is located mainly on the valley bottom. The Vale contributes significantly to the pastoral landscapes of west Rutland. There is relatively little tree cover and fields are generally quite regular in shape and relatively larger in size than in the High Rutland hills. Fields are bounded by low-cut, often gappy, hawthorn hedges with occasional ash trees forming noticeable features where they have survived in the open, arable fields.

5.4 Throughout the Vale there is evidence of field boundary loss, particularly where arable farming is prevalent. Elsewhere, hedgerow maintenance has declined or has been limited to cutting by mechanical flails, so hedgerows have become generally very low and gappy, often supplemented with post and rail fencing. The hedgerow trees are, in places, less frequent or over-mature. These characteristics are particularly noticeable along the Oakham Road, just north of the town and around Ashwell where there is also evidence of non-agricultural use of the land for horse grazing and stabling. However, this is not a uniform characteristic as there are pockets of land in the northern extremities of the Vale, where there is evidence of a better maintained agricultural landscape with more substantial, stock-proof hedges, although even here field sizes are still relatively large, showing some evidence of intensification of agriculture over recent decades.

5.5 There are a number of linear features in the Vale including the disused Oakham - Melton Mowbray canal, the Leicester - Melton - Oakham railway line and the A606 Melton -

Oakham Road. The Vale also contains a number of electricity transmission lines. The canal retains water in places and, along with its riparian vegetation, is a locally significant feature in both landscape and ecological terms. The railway line also has some ecologically interesting, linear features within its shallow cuttings and along its low embankments which appear to have been relatively unaffected by the intensive arable farming alongside. The railway, in places, foreshortens or restricts views across the Vale and locally creates a more enclosed landscape where it intersects with field boundaries. The road and railway introduce some noise and movement into an otherwise quiet, calm, rural landscape; but it is the jet aeroplanes flying overhead from RAF Cottesmore that are more disturbing to the character of the Vale.

5.6 The low-lying, flat or gently undulating land form of the Vale means that views across it are limited and settlements are not generally visually prominent from within the Vale, although they can be from the surrounding higher land. Roads across the Vale tend to be straight and narrow.

5.7 Other elements of landscape character include a series of small streams running generally west-east across the Vale and a significant network of small field ponds, particularly around Langham, although neither are visually pronounced. The Vale is crossed by a series of minor roads, tracks and other rights of way radiating from most of the villages and there is a sporadic distribution of fox coverts and farmsteads outside the villages.

Recommended Landscape Objectives for the Vale of Catmose

To conserve, enhance and, where necessary, restore the generally quiet, calm, rural, pastoral or mixed-agricultural vale character, with its compact stone and tile villages, regular field pattern across a broad, generally flat-bottomed valley basin surrounded by higher land and wooded skylines. To increase woodland cover throughout the Vale especially with small - medium sized, linear woodlands and belts of native broadleaved species which would strengthen the form and line of the landscape and link existing woodlands and other semi-natural habitats. To safeguard the landscape setting of Oakham.

Settlement Form and Pattern in the Vale of Catmose

5.8 The historic, market town of Oakham is the largest settlement in the County and lies towards the southern end of the Vale. It nestles in the narrowest part of the Vale between the slopes of Leighfield Forest on High Rutland to the west and the promontory of high land at Burley-on-the-Hill to the east projecting from the Rutland Plateau. The way that Oakham nestles in the gap between the surrounding hills is important to the setting of the town and gives it a strong relationship with the Vale landscape. The town takes a relatively compact form with well defined boundaries to the west, south and east, which to the east and west are influenced by the confining hills, providing a particularly strong relationship between the town and its landscape setting.

5.9 To the north the edge between the Vale and the town is less abrupt, and being characterised by industrial and rail related development, it consequently displays 'urban fringe' characteristics. To the south east of Oakham is Rutland Water reservoir - the flooded valley of the upper river Gwash.

5.10 Apart from Oakham, the settlements comprise small to moderately sized villages - Ashwell, Barleythorpe, Egleton, Langham and Teigh. Ashwell Prison lies between Langham and Burley and there are a number of farm farmsteads and occasional other buildings in the landscape. Except for Oakham, Barleythorpe and Langham, which are close together along the A606, the villages are well distributed and widely spaced across the Vale. They are of generally complex but nevertheless, compact form around a nucleus of historic lanes and are located on the banks of the small streams crossing the Vale. Only Langham has experienced significant 20th C expansion beyond its medieval layout but this is still clearly distinguishable in the series of narrow, parallel lanes. Ashwell, Egleton and Teigh in particular have retained much of their agricultural character with working farms within or close to their small historic cores. Barleythorpe is affected by the main A606 road which tends to divide the western part of the village, which contains Barleythorpe Hall and parkland, from the eastern part of the village, which contains the Barleythorpe Stud.

5.11 The building materials are varied, including ironstone, limestone, red brick and white render with roofs of Collyweston and blue slate, tiles and occasionally thatch.

6. THE LANDSCAPE OF RUTLAND WATER BASIN

(Area C, Figure 1 and Maps 2, 3, 6 and 7, Photograph Sheet 2)

6.1 This landscape character type is unique and dominated by Rutland Water. The middle valley of the River Gwash and its northern tributary, flowing from Oakham, were dammed and flooded to create a major new water storage reservoir, now owned and managed by Anglian Water. The flooded valley now has the character of a basin, with the flat expanse of water surrounded by generally low, gently sloping hills to skylines formed by the Rutland Plateau to the north and the High Rutland hills to the south. The Rutland Water Basin lies in the Countryside Agency's "Leicestershire and Nottinghamshire Wolds" regional character area and English Nature's "Trent Valley and Rises" Natural Area. Its geology is principally ironstone overlain by glacial till and alluvium.

6.2 For the most part, the reservoir is curiously unobtrusive from many of the surrounding roads essentially as a result of the undulating topography and high level of tree cover around its shores. The openness of this huge mass of water is also significantly softened by the presence of the Hambleton peninsular, a long finger of steeply rising land which protrudes deep into the reservoir from the western end. This important landscape feature helps the reservoir to retain a relatively intimate scale despite it being one of the largest man-made water bodies in Great Britain. The flowing landform, surrounding woodlands and the Hambleton peninsula reduce the visual impact of the water and the rawness of such a large artificial landscape feature. Only at the eastern end does the true scale of the reservoir, together with its dam and other infrastructure, become more apparent. The feeling of a large scale landscape is accentuated at the east of the reservoir by the contrast with the lower, enclosed valley below the dam and the exposed windswept conditions of the open water and dam top.

6.3 The landform immediately adjacent to the water varies, but most of the basin has a distinct profile, especially along its southern and northern shores, where the land dips sharply down to the water from a shoulder of high ground, effectively obscuring many views of the water below. Alternatively, along its western shores, the landform is characterised by a very gradual down-slope towards the waters edge, particularly around the village of Egleton. Consequently, for significant parts of the Vale of Catmose west of the reservoir the water is totally obscured by the built and vegetational cover, with vistas towards the Hambleton peninsular containing no visible water.

6.4 Established, pre-reservoir trees and woodland and subsequent planned landscaping, particularly around the recreational and interpretation centres at Whitwell and Edith Weston combine to provide a surprisingly detailed mosaic of pasture and woodland on the shores. Elsewhere, arable land sweeps down to the shores in large, geometric fields with low cut hedges. The shorelines of Rutland Water vary according to the water level but may include water lapping close to the field edges or noticeable patches or strips of mud between the fields and the water.

6.5 The water surface varies considerably in accordance with prevailing weather conditions. It is a flat, bright, reflective, light blue, almost glass-like surface with waterfowl dotted about and boats slowly moving on bright sunny days. In windy and cloudy conditions, storms can create substantial wave energy and the surface breaks up into a rough, dark, grey sea. Through most of the year the waterfowl and boating movements are important

elements in the landscape and the large bird populations and other wetland species have contributed to the national and international importance of the reservoir for wildlife, recognised by the notification of Rutland Water as a Site of Special Scientific Interest by English Nature, and Government designation as a Ramsar site and Special Protection Area for birds of international importance.

6.6 Generally, Rutland Water is a large-scale, open, exposed, busy, varied, colourful, modern landscape that is still maturing and evolving from a landscape and ecological point of view. Thus, the rawness of the large scale engineering works and the relatively artificial appearance of the vast water body are slowly changing.

Recommended Landscape Objectives Rutland Water Basin

To encourage the continued maturity and evolution of the modern reservoir landscape, to enhance its visual amenity and biodiversity and recreational potential and to conserve the best elements of a large-scale, sweeping, open, busy, varied, colourful and modern landscape. To accommodate any new water-related developments into the landform and woodland cover and to avoid inappropriately located or conspicuous developments that would detract from landscape character. To encourage the further establishment and improved management of woodlands, wetlands and other semi-natural habitats.

Settlement Form and Pattern in Rutland Water Basin

6.7 All four of the villages that lie within the basin are located around the 90 - 100m AOD contours, well above the reservoir level that always remains below the 85m AOD contour. Thus, Edith Weston, Upper Hambleton, Manton and Whitwell have an elevated waterside location, albeit the water is not always visible from the villages. Empingham lies beyond the eastern end of the basin, below the level of the dam, in the Rutland Plateau landscape type. All these settlements retain a high quality historic core and all have seen some later development, some of which has not been sympathetic to the traditional village character, although Upper Hambleton and Whitwell have been less affected in this way. The settlements have seen significant development pressure for residential, business, sport and recreational interests generated by the presence and proximity of the reservoir. The MoD barracks at Edith Weston on the Rutland Plateau have a particularly uncharacteristic and utilitarian appearance visible from the Basin.

7. THE LANDSCAPE OF THE RUTLAND PLATEAU

(Area D, Figure 1 and Maps 1, 2, 5, 6, 7, 9 and 10, Photograph Sheet 3)

7.1 The Rutland Plateau is the area of generally higher land which occupies the north east part of the County, extending from the Welland Valley in the south, and abutting the High Rutland, Rutland Water Basin and Vale of Catmose landscapes to the west. The plateau extends into Lincolnshire and Leicestershire at the northern County boundary. The Plateau dips gently from its highest point (149m AOD) on the ridge above and to the east of the Vale of Catmose, eastward to the lower lying areas around the villages of Ryhall and Essendine, close to the Lincolnshire border, where spot heights close to Ryhall are only 17m AOD.

7.2 Whilst the higher parts are generally characteristic of a relatively high, open plateau, the area is cut by significant river valleys, notably those of the River Gwash and the North Brook, above Empingham. The heavier clay soils overlying the limestone in the north-east have led to the retention of large woodlands. The Gwash Valley separates the higher land above Ketton from the main Rutland Plateau to its north. These differences form the basis of the four sub-areas of the plateau.

7.3 The plateau includes "The Kesteven Uplands" and part of the "Leicestershire and Nottinghamshire Wolds" regional landscape character types in the Countryside Agency's Map of England; and the western part of the "Leicestershire and Rutland Limestone" Natural Area of English Nature. The geology is predominantly Jurassic Limestone with parts overlain by a drift of glacial till and clays. The limestone has been worked for many years as a building stone, in cement manufacture and for general limestone uses. Consequently, several parts have been disturbed by old workings and are in differing stages of restoration eg east of Exton and Greetham villages.

7.4 The limestone geology strongly influences the landscape character, through its distinctive landforms (the plateau, scarp and dip slopes, shallow but quite narrow and steep-sided stream valleys), characteristic building materials, typical limestone ecology of semi-natural, species-rich calcareous grasslands and verges and the frequent occurrence of limestone dust on fields, verges and roads. At the Grange Top Quarry at Ketton, the Castle Cement Works represent a large scale modern quarry with a new extension recently permitted, older workings under restoration and an on-site cement manufacturing plant which is locally conspicuous.

7.5 More recently, the area has been important in military terms providing a flat and sparsely populated landscape suited to the establishment of airfields and associated barracks. At North Luffenham the military installations, including the barracks at Edith Weston and their associated high security fencing and military clutter are locally intrusive.

7.6 In the north of the Plateau is the more intrusive Cottesmore Air base, currently in full military use. The Cottesmore buildings and infrastructure, including those beyond its extensive enclosed area, dominate the surrounding arable agricultural landscape. The significant military housing estate is laid out in a uniform, utilitarian design and bears little resemblance to the character of surrounding historic settlements. The visual impacts of the military installations are experienced together with the noise of high speed, low flying, military aircraft.

7.7 The plateau landscape is dissected north to south-east by the A1 trunk road, which through Rutland, follows the line of the original Roman 'Ermine Street'. This intrusion on the character of the area varies in significance and intensity along the road, with some localities markedly affected by the road infrastructure itself and the noise and movement of traffic.

7.8 Whilst there are significant variations in the local character of the plateau landscape character type, it is generally distinguishable by its predominantly arable farming land use. Within the broad, geometric network of large, regular fields, enclosed by thorn hedges, is a well-treed and wooded landscape, interspersed with pasture, particularly close to the plateau settlements and within the river valleys of the Gwash and North Brook. The tree cover frequently restricts and encloses vistas out from, and into, the plateau.

7.9 Over many parts of the Rutland Plateau the intensification of arable farming has led to the loss or decline of drystone walls and hedgerows emphasising the open, windswept, exposed nature of the elevated plateau. Similarly, the loss of landscape features and the generally level or slightly rolling or dipping landform has resulted in a number of farmsteads becoming more exposed and prominent within the arable landscape, often appearing to be 'perched' on the landscape rather than integrated with it.

7.10 Inextricably linked with the plateau's tree cover and occasionally the road network, is the important influence of the parkland and sporting management of the Burley, Exton, Tickencote, and Clipsham estates. These important designed landscapes are particularly concentrated on the plateau north of Rutland Water in a belt extending north-east from the imposing Burley Estate, through Exton and on to Clipsham. Another distinctive feature is the single-sided, broad road verges of the network of lanes resulting from Enclosures Act provisions for specified highway widths. These give the traveller a feeling of openness even on lanes bounded by hedgerows and offer significant ecological interest where unaffected by the adjacent arable farming.

The Cottesmore Plateau (Sub-Area Di, Figure 1 and Maps 1, 2, 5 and 6)

7.11 The distinctive northern-most sub-area of the Rutland Plateau extends from the northern edge of the Rutland Water Basin, northwards, beyond the county boundary. The Cottesmore Plateau has the most typical plateau-like characteristics of the four sub-areas of the Rutland Plateau. It is predominantly of a level relief but, with the exception of land around Cottesmore air base, it rarely has the characteristic of being flat. Rather it has long, shallow, gradual undulations. Arable farming, with large geometric field patterns is the predominant land use, but this is interspersed with significant amounts of pasture and many trees, both in larger woods and in the distinctive network of hawthorn hedges. This extensive tree cover, typically of Ash within the hedgerows, and Beech, Lime and Sycamore within the plantations is most apparent in the southern section of the Cottesmore Plateau, and is particularly dominant as a landscape feature around the estate and parklands of Burley-on-the-Hill and Exton House.

7.12 The influence of the parks at Burley and Exton on tree cover is very significant locally, comprising large planned woodlands and visually stunning avenues and parkland boundaries. Barnsdale Avenue and the landscaped vistas to and from Burley-on-the-Hill are nationally important designed landscapes recognised through inclusion by English Heritage in the Register of Historic Parks and Gardens of Historic Interest. The parkland

ambience in the central part of this sub-area is emphasised by the rich heritage of the estate buildings. The landscape is consequently a rich tapestry of tree cover and farmland, a planned but mature landscape where longer vistas are interrupted by the patchwork of tree belts and woods rather than by the topography.

7.13 Elsewhere on the Cottesmore Plateau the landscape is of a simpler, more open nature, where large, open, arable fields and low cut thorn hedges allow a clearer reading of the landform. This is particularly characteristic of the northern area around Cottesmore airfield and along the sub area's southern boundary around Whitwell and Empingham Throughout the Cottesmore Plateau the condition of its characteristic field boundary hedges and hedgerow trees varies markedly, with evidence of hedgerow removal especially in the south and over-mature trees.

7.14 The soils of the northern and eastern parts of the sub area display clues to the underlying limestone geology, with evidence of limestone fragments within the surface of the otherwise reddish soil. Evidence of a heritage of drystone wall field boundaries is also evident in this area, although these have been poorly maintained and are not prominent in the landscape, being superseded with hedgerows or more recently post and wire fencing. Towards the northern and southern parts of the plateau, isolated farmsteads, often consisting of a complex of large modern agricultural buildings around a small core of traditional farm house and barns, stand prominently on the plateau, served by long linear tracks, devoid of effective landscaping to soften their effect.

7.15 Locally, the impact of the minerals extraction industry has interrupted the natural relief of the land. Whilst the land immediately east of Exton Village has generally been assimilated into the gentle undulation of this part of the plateau, it remains a recent landscape, devoid of mature landscape features such as hedgerows and larger trees suggesting a relatively recent, restored landscape.

7.16 The eastern fringe of the Cottesmore Plateau is defined by the valley and limestone scarp of the North Brook, signalling the transition to the Clay Woodlands sub-area. To the north of this transition, the A1 trunk road corridor dominates the landscape character with its physical infrastructure and the perception of constant movement and noise in the landscape. As the A1 veers away south eastward the transition is defined by a small area of the more intimate North Brook valley.

7.17 The north-south flowing stream of the North Brook lies within its tightly enclosed valley, a distinct incision marking the edge of the gentle dip of the Cottesmore Plateau. Views out of the valley are restricted by relief and the dominant woodlands and spinneys, particularly across its eastern ridge. The road and extensive public rights of way network rises and falls more steeply than elsewhere in the Cottesmore Plateau, allowing the traveller to suddenly encounter hidden development such as Horn Mill. Indeed, it is only off the metalled road network that some of the historical heritage of the plateau becomes accessible, for example, around the remains of the medieval village of Horn, and its hidden, dammed valley at Fort Henry where there is a more tranquil and enclosed ambience infrequently experienced elsewhere on the open Plateau.

7.18 By contrast, the northern part of the Cottesmore Plateau is dominated by the airfield and military complex. The hangars, control towers and mast network are prominent across the flatter landform, particularly from the west, where tree cover is less abundant and less effective in softening views of the barracks than from the south and from

Cottesmore village. Austere security fencing defines the perimeter of the airfield. The visible and physical influence of the airfield extends beyond its perimeter because runway approach lights extend eastward towards the A1, appearing as alien structures in the arable fields.

7.19 The main settlements on the Cottesmore Plateau are Burley, Cottesmore, Empingham, Exton, Greetham, Market Overton, and Thistleton.

Recommended Landscape Objectives Rutland Plateau - Cottesmore Plateau

To conserve and manage the parks, avenues and other designed landscapes and the historic mosaic of agriculture, parkland and woodland wherever it occurs and, elsewhere, the more open, elevated, mixed arable and pastoral agricultural plateau landscapes, restoring and reinstating distinctive features such as hedgerows, hedgerow trees, copses, spinneys, dry stone walls and woodlands especially where they would filter views of the airfields, military barracks and mineral and related industrial operations. To conserve and enhance and where possible extend the semi-natural habitats of species-rich, calcareous grasslands and typical limestone woodlands and to conserve historic landscape features.

The Clay Woodlands (Sub-area Dii, Figure 1 and Maps 5, 6, 9 and 10, Photograph Sheet 3)

7.20 The Clay Woodlands is an extensive area of gently undulating, predominantly arable countryside in the County east of the North Brook. The key characteristics of this landscape sub-area are the medium to large scale mixed broadleaved and coniferous woodlands within large farming estates such as Holywell, Clipsham, Empingham and Tickencote. These woodlands, predominantly ash and sycamore with oak and blackthorn, are conspicuous features in most views within or into this area. Close to, they enclose views whilst providing an extensive backdrop in most distant views across well maintained farmland.

7.21 Mature tree-lined roads are also a feature in the north, for example on the approach to Stocken Park and Clipsham Park. Together with the woodlands, these help to screen the prison at Stocken.

7.22 Woodlands are less extensive around the Gwash Valley, where trees are in small copses and where close trimmed hedges alongside large arable fields give a more open feeling to the landscape. This is particularly so in the extreme eastern corner of the County, between Ryhall and Essendine, where the railway line and its tall gantries, high voltage power cables and pylons, and modern housing are intrusive.

7.23 The central area of the clay woodlands is a transitional area between the settled estate woodlands to the north and west, and the more open, modern unsettled claylands to the east and south. Numerous outlying farms lie within the central area, such as Grange Farm, Ryhall Heath Farm, Walk Farm, Frith Farm and Taylors Farm. These lie on or close to quiet roads and tracks some of which which are former drove roads used by farmers to move stock to market.

7.24 Remnant dry stone walls made of local limestone are characteristic features in some parts of the clay woodlands, probably originating from one of the many small quarries around Clipsham.

7.25 The settlements in the Clay Woodlands sub-area are Clipsham, Essendine, Pickworth and Stretton.

Recommended Landscape Objectives Rutland Plateau - Clay Woodlands:
To conserve and enhance the large-scale, gently undulating, agricultural landscapes with substantial woodlands and avenues, to enhance the sustainable management of existing woodlands and to create new woodlands in the less wooded parts around the Gwash Valley, especially where they would create skyline features. To improve the edges of the settlements and integrate large structures and modern buildings into the landscape where necessary. To protect historic features such as earthworks and restore characteristic drystone walls.

The Gwash Valley (Sub-area Diii, Figure 1 and Maps 6 and 9 Photograph Sheet 3)

7.26 The Gwash Valley is a small but distinct landscape sub-area which dissects the Cottesmore and Ketton plateaux from the eastern end of Rutland water. The section of the valley west of the A1, between Rutland Water and Tickencote, is narrow, sinuous and generally well treed. Although, in parts, close to the busy A1 and A606 Empingham Road, the valley is not conspicuous. It is best appreciated on foot, along the numerous rights of way, including footpaths, bridleways and a section of the Hereward Way national trail.

7.27 The section of the valley east of the A1, between Great Casterton and Ryhall is also narrow, sinuous and well treed. However, this section is more noticeable in views down from Ryhall Road along its northern boundary and the minor road running along its southern edge, from Toll Bar to Belmesthorpe via Little Casterton and Ryhall. Here the valley vegetation contrasts sharply with the open arable fields alongside.

7.28 This sub-area of the Rutland Plateau contains the settlements of Belmesthorpe, Great Casterton, Little Casterton, Ryhall, Tickencote and Tolethorpe.

Recommended Landscape Objectives Rutland Plateau - Gwash Valley
To emphasise and reinforce the river corridor with appropriate planting where presently sparse. To conserve the small-scale, quiet, enclosed, sinuous, rural river valley with its narrow, well-defined valley bottom and gentle arable slopes. To conserve and enhance and where possible extend the semi-natural habitats of species-rich, calcareous grasslands and verges, wetlands and woodlands and to conserve historic landscape features.

The Ketton Plateau (Sub-area Div, Figure 1 and Maps 6 and 7)

7.29 The Ketton Plateau sub-area occupies the southern-most quadrant of the Rutland Plateau, lying south and south-east of Rutland Water. It displays many of the characteristics of the Cottesmore Plateau, and is distinguished more because of its physical separation from the former (by the incision of the Gwash Valley and the basin of Rutland Water), than its distinctly separate character. However, notably absent are the large designed landscapes of the Cottesmore Plateau. Although gently undulating, the Ketton Plateau also dips gently west to east, with more pronounced dips at its eastern and southern boundaries where it borders the Welland and Chater Valleys.

7.30 The plateau is dominated by two significant intrusions into the otherwise agricultural landscape, which like the Cottesmore Plateau is a patchwork of arable and pasture farmland, overlain with less widespread, but nevertheless important woodland cover.

These intrusions are the disused North Luffenham military airfield and the cement works and quarry at Ketton.

7.31 As with Cottesmore, the former airfield, which occupies the western extremity of the plateau, has a significant impact on the character of the area by way of its location on the highest part of the plateau, absence of agricultural features and the intrusion of its boundary fencing and military buildings. However, the absence of views into it from the slightly lower lying ground around, means that the dominance of this base is less than that of the larger Cottesmore base to the north. The impact is also softened by the absence of flying operations. The greater impact of the base is the visual intrusion of its barracks on the eastern fringe of Edith Weston, which itself falls within the Rutland Water Basin.

7.32 Despite the impact of the scale and contrast of the mineral and industrial operations at the Castle Cement Works on the immediate locality of Ketton (the village of which lies primarily in the Welland Valley,) it has a lower impact on the wider character of the plateau as a whole. This is due in part to the relatively few roads over the plateau. However, it is visible from a number of long distance viewpoints and from the Hereward and Macmillan Ways where the quarry becomes more obvious. Noise and dust from the works emphasise the impact of the industrialised complex on the Plateau and the Welland Valley, although existing woodland and tree belts across its western and northern boundaries reduce the effects on the upper plateau.

7.33 The southern boundary of the Ketton Plateau, with the Welland and Chater Valleys, displays an agricultural landscape with less well managed landscape features. Hedgerows are particularly gappy or absent. There are signs of farm diversification with significant Christmas tree plantations to the east of North Luffenham which contrast with the otherwise predominantly broadleaved, mature tree cover.

7.34 No settlements beyond the air base complex lie on the Ketton plateau, although there is a network of isolated farm farmsteads.

Recommended Landscape Objectives Rutland Plateau - Ketton Plateau

To conserve and manage the parks, avenues and other designed landscapes and the historic mosaic of agriculture, parkland and woodland wherever it occurs and, elsewhere, the more open, elevated, mixed arable and pastoral agricultural plateau landscapes, restoring and reinstating distinctive features such as hedgerows, hedgerow trees, copses, spinneys, dry stone walls and woodlands especially where they would filter views of the airfields, military barracks and mineral and related industrial operations. To conserve and enhance and where possible extend the semi-natural habitats of species-rich, calcareous grasslands and typical limestone woodlands and to conserve historic landscape features.

Settlement Form and Pattern on the Rutland Plateau

7.35 The settlements of the Rutland Plateau are concentrated in two main areas. Firstly, the

dense and regular pattern of villages across the Cottesmore Plateau and northern part of the Clay Woodlands, including Burley, Exton, Cottesmore, Greetham and Stretton, and the smaller settlements of Thistleton and Clipsham. Secondly, the string of settlements along the Gwash Valley which include Empingham, Great Casterton and Ryhall and, between them, the smaller settlements of Tickencote, Ingthorpe, Little Casterton and Belmesthorpe. The village of Essendine on the eastern fringe of the plateau is less well related to these other settlements along the Gwash, and is dominated by the industrial works which lie between its very small historic core and the railway which services the works.

7.36 The settlements of Whitwell and Empingham span the transition areas between the Plateau and the Rutland Water Basin, and the Plateau and the Gwash Valley respectively. Apart from isolated farms and the military and minerals industry complexes, settlement is generally absent from the Ketton Plateau sub-area.

7.37 The form and built character of the plateau settlements varies but they all exhibit some common characteristics, including the limestone building materials, which add to the distinctiveness of the Plateau landscape. Unsurprisingly, the villages on the Cottesmore Plateau are more elevated and exposed than those associated with the Gwash Valley.

7.38 Cottesmore, Greetham, Empingham and Thistleton display a distinct linear form, with development facing the main road, and with secondary roads joining the main streets at right angles. This linear form has been diluted where mainly twentieth century expansion has been carried out with little regard to historic settlement pattern. This is particularly prominent at the east and western ends of Cottesmore village where non-vernacular materials and housing design have resulted in a suburban character detracting from the main green-edged street along which harmonious historic buildings create a sense of place and focus for the village. This problem is less pronounced in the neighbouring settlement of Greetham, where later development has emphasised the dominant form, but where building design has also been less appropriate.

7.39 Exton has a complex street pattern around its historic core, dominated by the village green, fronted on all sides by historic buildings giving an intimate character with a harmonious mix of wall and roof materials. However, less sympathetic late twentieth century extension to the south east significantly interrupts its relationship with the surrounding landscape, strongly influenced by the tree cover of the estate.

7.40 The main settlements of the Gwash Valley, Great Casterton and Ryhall have been significantly influenced by 19th and 20th century expansion which has affected their historic cores. Ryhall in particular now exhibits a more suburban character, abruptly delineated to its eastern edge by the A6121. Great Casterton's historic form was of 17th and 18th century linear development along Ermine Street, at its crossing of the Gwash. This character, whilst still evident along the main road itself has been diminished by twentieth century expansion to its north.

7.41 The little hamlet of Tolethorpe lies towards the centre of this section of the valley, close to the village of Little Casterton. Belmesthorpe lies at the eastern end of the valley, where the river turns westwards and then southwards to join the River Welland south of Stamford. The small, quiet village of Pickworth has a Manor Farm, Church and estate

cottages. Numerous small roads, tracks and footpaths / bridleways radiate from it in all directions, including The Drift, an old drove road, to the east. The village of Tickencote and its estate, including Tickencote Hall Park and Tickencote Lodge Farm, lie within the Gwash Valley west of the A1. Mill Farm, Shacklewell Lodge and Cottage, and Wild's Lodge also lie within or close to this section of the Gwash Valley.

7.42 Where unaffected by ubiquitous, utilitarian twentieth century housing or industrial developments, the settlements of the Rutland Plateau display a strong degree of coherence and harmony of building materials. This emphasises their sense of place. Villages are generally a mix of limestone with some ironstone walls, although red brick and white render are also contributors to the mix of colour and texture. Collyweston slate, or later replacement or substitute materials prevail in the roofscape, although blue slate, red pantile (or substitutes) and thatch all play a significant role in village character.

8. THE LANDSCAPE OF THE WELLAND VALLEY

(Area E, Figure 1 and Maps 4, 7, 8 and 10, Photograph Sheet 1)

8.1 The Welland Valley landscape character type extends from near Husbands Bosworth in Leicestershire along the southern boundaries of the Counties of both Leicestershire and Rutland eastward to Stamford. By the time the slowly descending waters reach the west boundary of Rutland the valley has already reduced in width so the very extensive, flat-bottomed valley in Leicestershire forms the upper valley, whilst the Rutland sections form much of the middle valley. Beyond Stamford the Welland flows through its lower valley across the flat expanse of the Fens to the Wash. Untypically for a river valley, therefore, as it descends through Rutland, the Welland valley is narrowing rather than widening. The river also forms the County boundary with Northamptonshire so this part of the Welland Valley landscape character type lies partly in Rutland and partly in Northamptonshire.

8.2 The Welland Valley is partly in the Countryside Agency's "Northamptonshire Vales" regional landscape character type, partly in "High Leicestershire" and, in Northamptonshire, in the "Rockingham Forest" area. English Nature has classed the valley partly in the "West Anglian Plain" and again, in Northamptonshire, in the "Rockingham Forest" Natural Area. The geology is principally ironstone and clay, overlain by a drift of alluvium. Generally, the Welland Valley is a relatively busy, agricultural, modern landscape with many settlements and distinctive valley profiles. The river is not prominent but it has a series of exaggerated meanders. The sinuous landform, which contains the river, has caused large loops to be created in the line of the river (eg east of Barrowden and east of Tixover). It has also caused many smaller meanders both in the straighter lengths of river and even within the larger scale, looping meanders themselves.

The Middle Valley West (Caldecott - Seaton) (Area Ei, Figure 1 and Maps 4 and 8)

8.3 From Caldecott to Seaton the valley averages about two kilometres in width with the river running approximately down the centre. However, there is a pronounced northward extension created by a small almost insignificant stream running off the High Leicestershire ridge by Gypsy Hollow Lane, south of Uppingham. In this side valley the village of Lyddington has taken advantage of the sheltered location nestling between the Uppingham Road ridge to the west and Prestley Hill to the east. This western part of the Valley in Rutland is typical of much of the Valley to the west, having a flat bottom, created by the alluvial plain. Here, the river would have flooded more widely before levees and other engineering structures, such as railway embankments and roads, contained the floodplain to a narrower margin along the river edge. The slopes are very regular, of even gradient and slightly concave form running up from the valley floor to distinct shoulders at the edge of the High Rutland hills, on the Rutland side, and a prominent, even, very straight and linear ridge that forms a distinctive skyline on the Northamptonshire side.

8.4 This part of the Valley is predominantly pasture with extensive ridge and furrow in fields grazed by sheep and cattle. The field boundaries are almost entirely hawthorn, well trimmed and neatly maintained although containing few hedgerow trees. There are no significant woodlands and only occasional groups of trees in a field corner or by the river. Together with the width of the valley it creates a relatively open, large scale, sweeping, pastoral, valley landscape with few buildings on the valley floor.

8.5 Although the river itself is, for the most part, inconspicuous, there are other more noticeable linear features the most obvious of which is the stunning Welland Viaduct which sweeps the railway across the Valley, between Harringworth and Seaton, on a spectacular series of seemingly endless and innumerable arches. Another, now dismantled railway runs along the whole length of this part of the valley. The roads are also more noticeable in this generally open landscape and they tend to form very straight lines for long distances interrupted by sharp, angular bends.

8.6 The settlements are Caldecott, Lydington and Thorpe-by-the-Water.

Recommended Landscape Objectives Middle Welland Valley West

To conserve, enhance and, where necessary restore, the flat, open valley floodplain landscape and valley slopes, to protect and enhance both natural and historic man-made river features, including the bridges, viaduct and wetland habitats and to protect the form and landscape setting of the villages whilst ensuring that they do not encroach onto or along the valley floor.

The Middle Valley East (Seaton - Tinwell) (Sub-area Eii, Figure 1 and Maps 7, 8 and 10)

8.7 Eastward from the Welland Viaduct the valley changes. It becomes narrower, with steeper, less regular and locally slightly higher slopes. There is significantly more woodland and trees generally, but particularly so on the Northamptonshire side where the valley forms the edge of Rockingham Forest and the skyline is almost continuously wooded from Laxton to Collyweston (both Northants). There are more roadside trees, occasional avenues, willows by the river and copses adding to the more enclosed, smaller scale landscape of this part of the valley. Here, arable land prevails, some field boundaries have been removed and other hedges have not been so well maintained, although some are now being layed, gapped-up and restored.

8.8 The river is still not prominent even in this smaller scale valley landscape but views are seen from the various bridges such as the fine, six-arched stone Collyweston Bridge and the Turtle Bridge below Morcott. The Jurassic Way crosses the river at the Turtle Bridge, runs along the valley to Barrowden and then recrosses to Northamptonshire at Wakerley, rejoining the Rutland side below Duddington.

8.9 Settlements are Barrowden, Tixover, Ketton and Tinwell.

Recommended Landscape Objectives Middle Welland Valley East

To conserve and enhance the more enclosed, wooded, sheltered valley landscape, to protect and enhance both natural and historic man-made river features, including the bridges and wetland habitats and to protect the form and landscape setting of the riverside villages so they do not become more intrusive in the valley.

Settlement Form and Pattern in the Welland Valley

8.10 Settlements are more widely spaced in the western part of the Middle Valley. The villages of Caldecott, Lyddington and Seaton are well back from the river on the foot of the slopes above the historic floodplain. Thorpe-by-the-Water is very close to, but still

elevated above, the river on a distinct mound which gives the settlement a rather commanding position in the middle valley.

8.11 In the Middle Valley East, there are few farmsteads or other buildings in the valley, outside the villages, Tixover Grange being a noticeable exception with a substantial group of buildings quite close to the river. The density of settlement is higher in this part of the Valley. By contrast with the Middle Valley West, in this part all the settlements except Ketton lie very close to or even on the banks of the river, including Barrowden, Duddington (Northants), Tinwell and Tixover, but all stand above the floodplain on mounds, or running along the edge of elevated banks. At Geeston the village of Ketton has spilled into the valley from the lower slopes.

8.12 Caldecott is a busy, rather noisy village with heavy traffic passing through on the A6003. It is a complex, but quite compact, shape with extensions around the historic core where there is a more enclosed inward-looking character. It has modern infill and extensions creating a varied mix of styles and materials ranging from traditional ironstone cottages to modern brick houses. Lyddington, by contrast, is a relatively quiet, rural, enclosed, sheltered village with a distinctive, rather linear shape, village green, many important historic features and a prevalence of stone and slate in buildings of vernacular style.

8.13 Ketton and Barrowden have particularly large and complex historic cores, contrasting with the simple, linear form of Tixover and (apart from the ribbon to the north) of Tinwell. Despite the modern extensions most of the villages have retained a typical Rutland historic character with a predominance of limestone and slate.

LANDSCAPE CHARACTER TYPES:

	A	HIGH RUTLAND
	B	VALE OF CATMOSE
	C	RUTLAND WATER BASIN
	D	RUTLAND PLATEAU
	E	WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i) LEIGHFIELD FOREST
A(ii) RIDGES AND VALLEYS
A(iii) EYEBROOK VALLEY
A(iv) CHATER VALLEY

D(i) COTTESMORE PLATEAU
D(ii) CLAY WOODLANDS
D(iii) GWASH VALLEY
D(iv) KETTON PLATEAU

E(i) MIDDLE VALLEY WEST
E(ii) MIDDLE VALLEY EAST

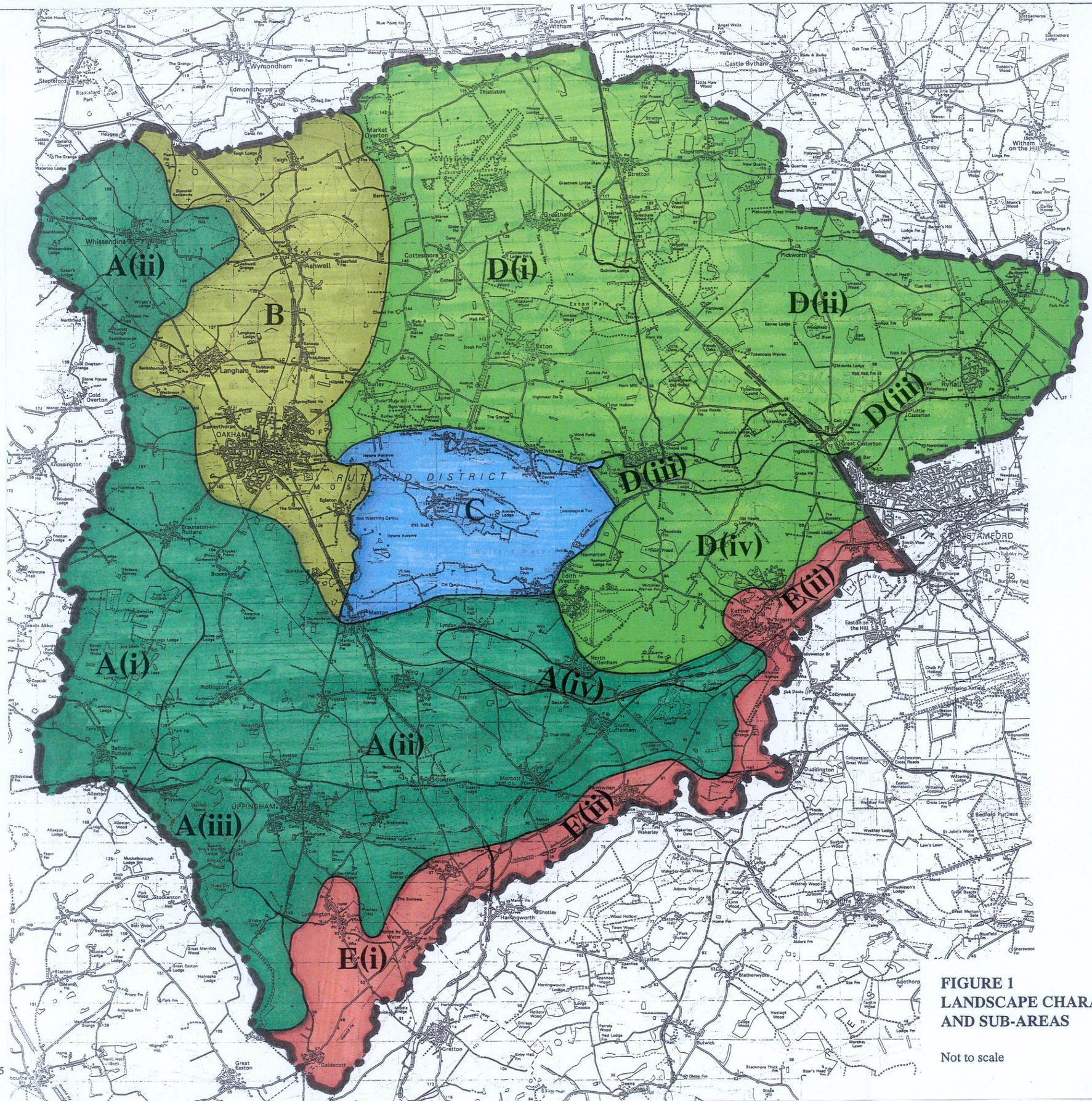


FIGURE 1
LANDSCAPE CHARACTER TYPES AND SUB-AREAS

Not to scale

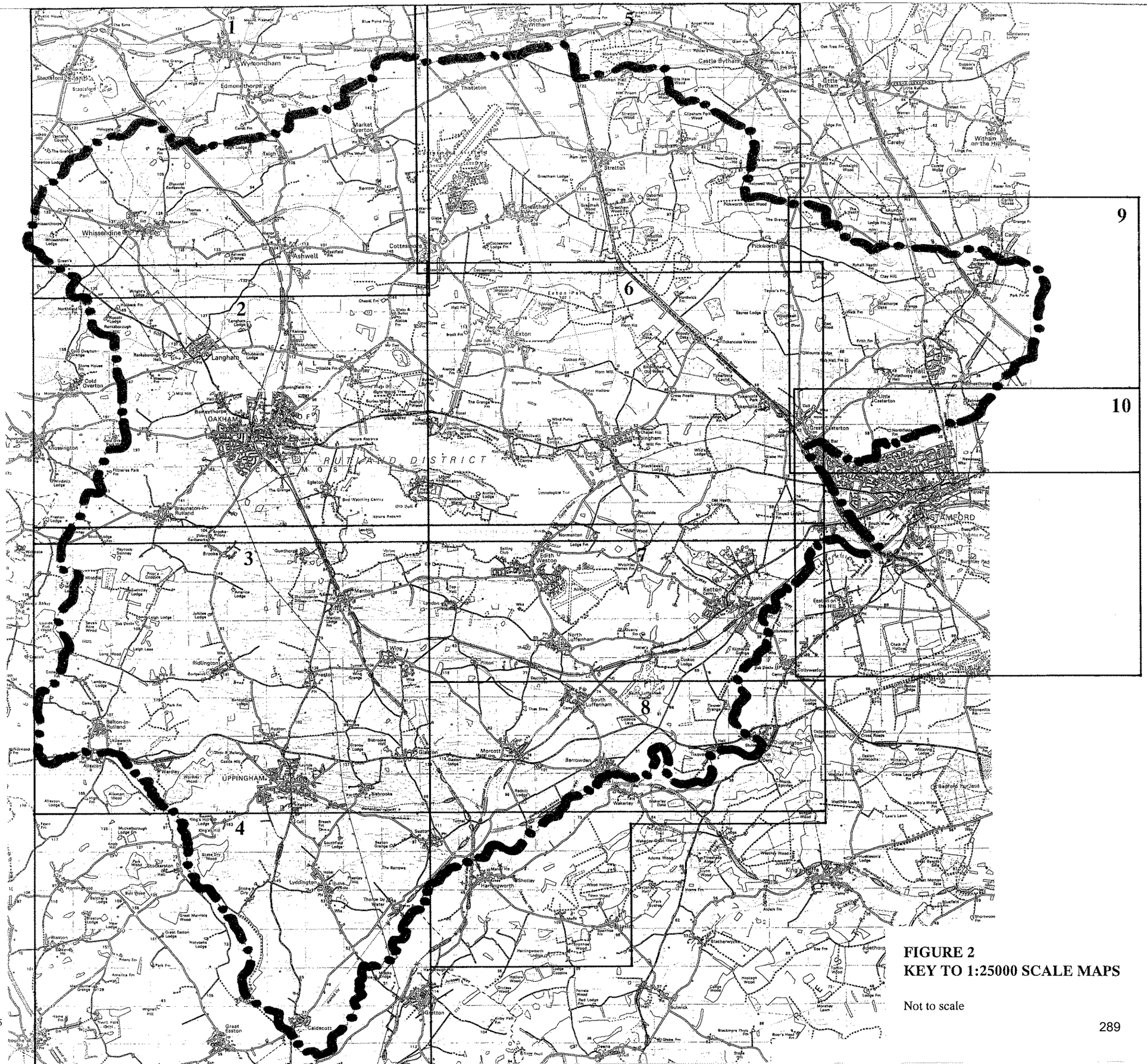


FIGURE 2
KEY TO 1:25000 SCALE MAPS

Not to scale

LANDSCAPE CHARACTER TYPES:

A HIGH RUTLAND
B VALE OF CATMOSE
C RUTLAND WATER BASIN
D RUTLAND PLATEAU
E WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i) LEIGHFIELD FOREST
A(ii) RIDGES AND VALLEYS
A(iii) EYEBROOK VALLEY
A(iv) CHATER VALLEY

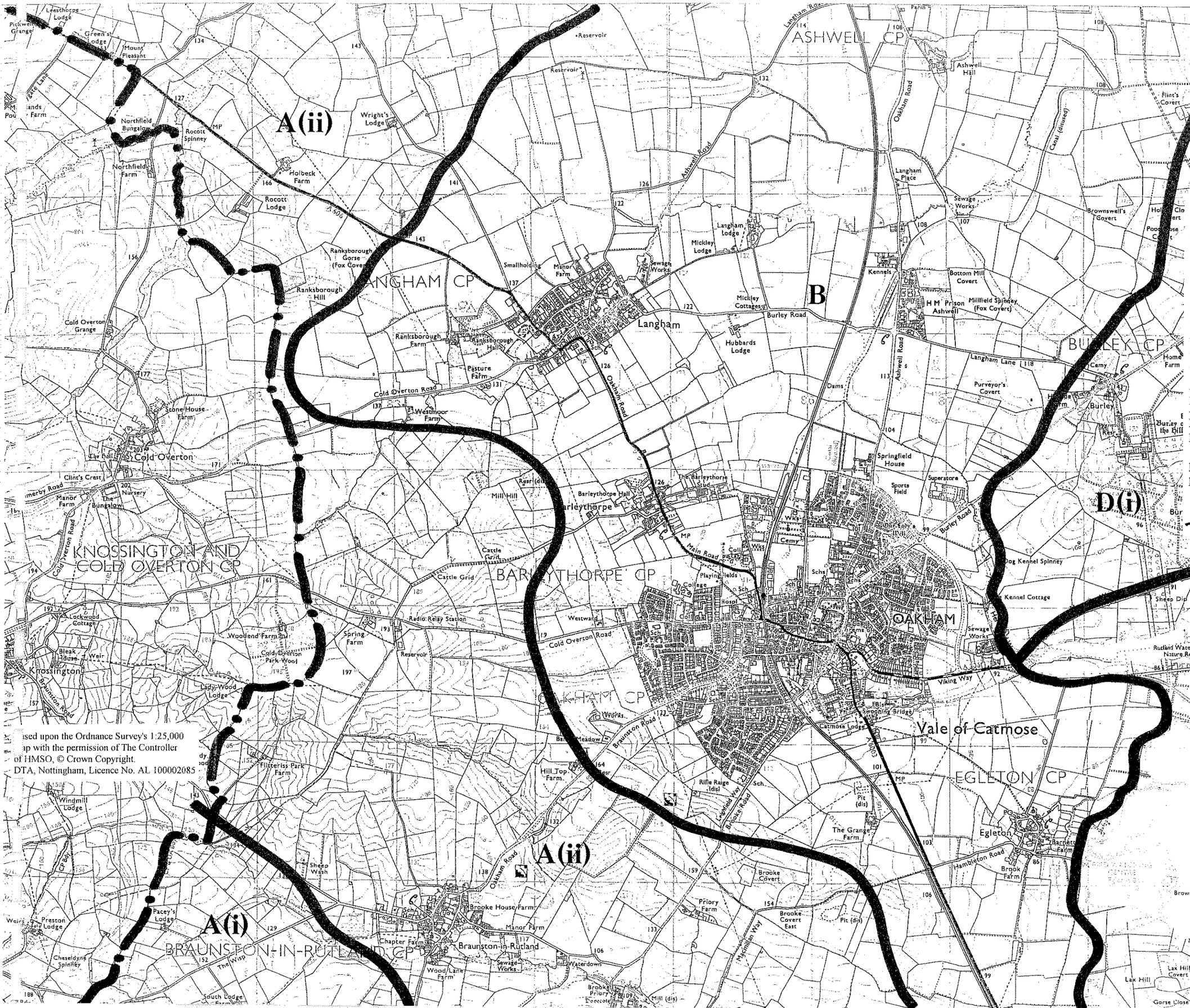
D(i) COTTESMORE PLATEAU
D(ii) CLAY WOODLANDS
D(iii) GWASH VALLEY
D(iv) KETTON PLATEAU

E(i) MIDDLE VALLEY WEST
E(ii) MIDDLE VALLEY EAST

County Boundary

A(i)
A(ii)
A(iii)
A(iv)
B
D(i)
D(ii)
D(iii)
D(iv)
E(i)
E(ii)

MAP 1
1:25000 SCALE



LANDSCAPE CHARACTER TYPES:

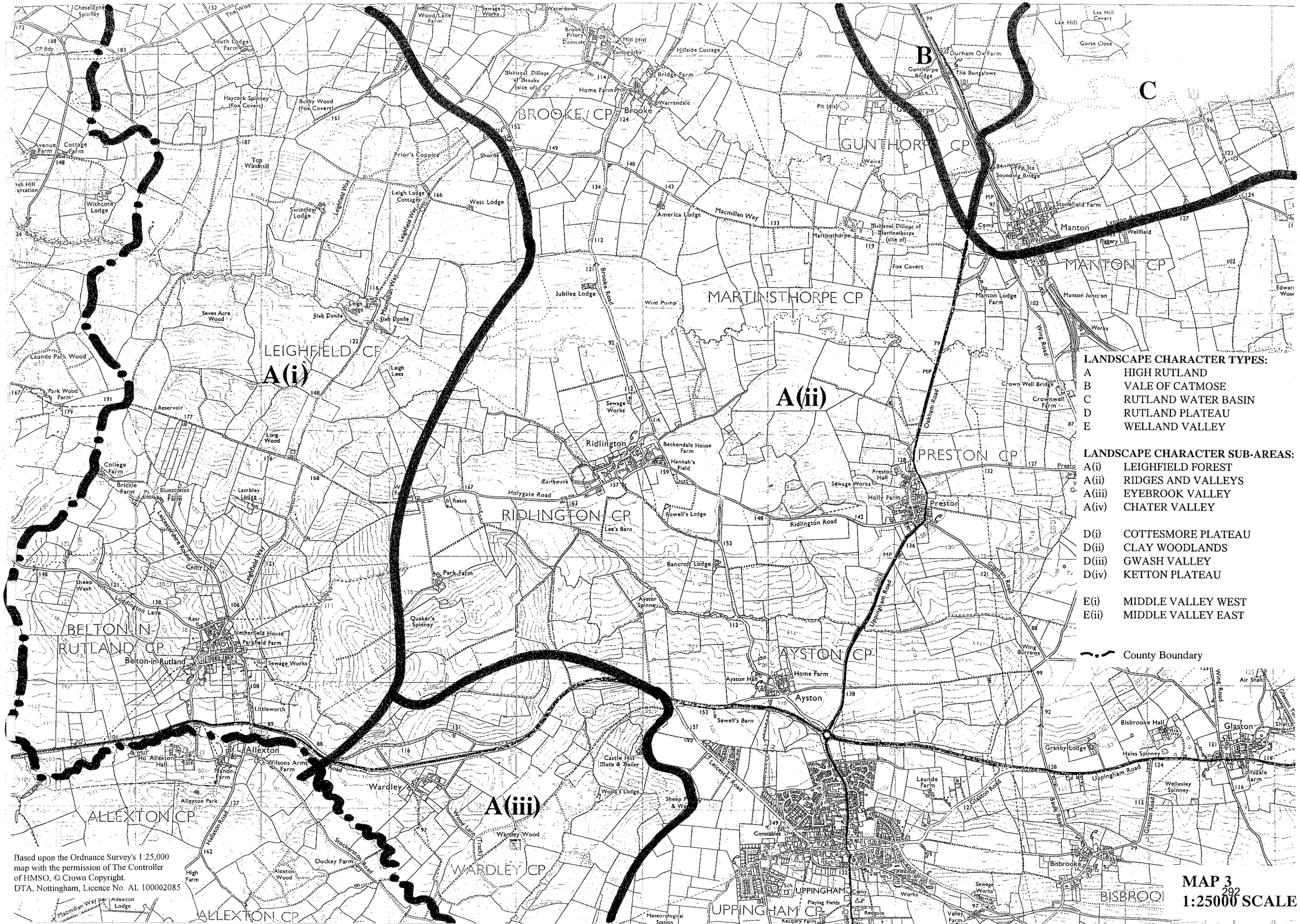
A	HIGH RUTLAND
B	VALE OF CATMOSE
C	RUTLAND WATER BASIN
D	RUTLAND PLATEAU
E	WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i)	LEIGHFIELD FOREST
A(ii)	RIDGES AND VALLEYS
A(iii)	EYEBROOK VALLEY
A(iv)	CHATER VALLEY
D(i)	COTTESMORE PLATEAU
D(ii)	CLAY WOODLANDS
D(iii)	GWASH VALLEY
D(iv)	KETTON PLATEAU
E(i)	MIDDLE VALLEY WEST
E(ii)	MIDDLE VALLEY EAST

County Boundary

MAP 2
1:25000 SCALE



LANDSCAPE CHARACTER TYPES:

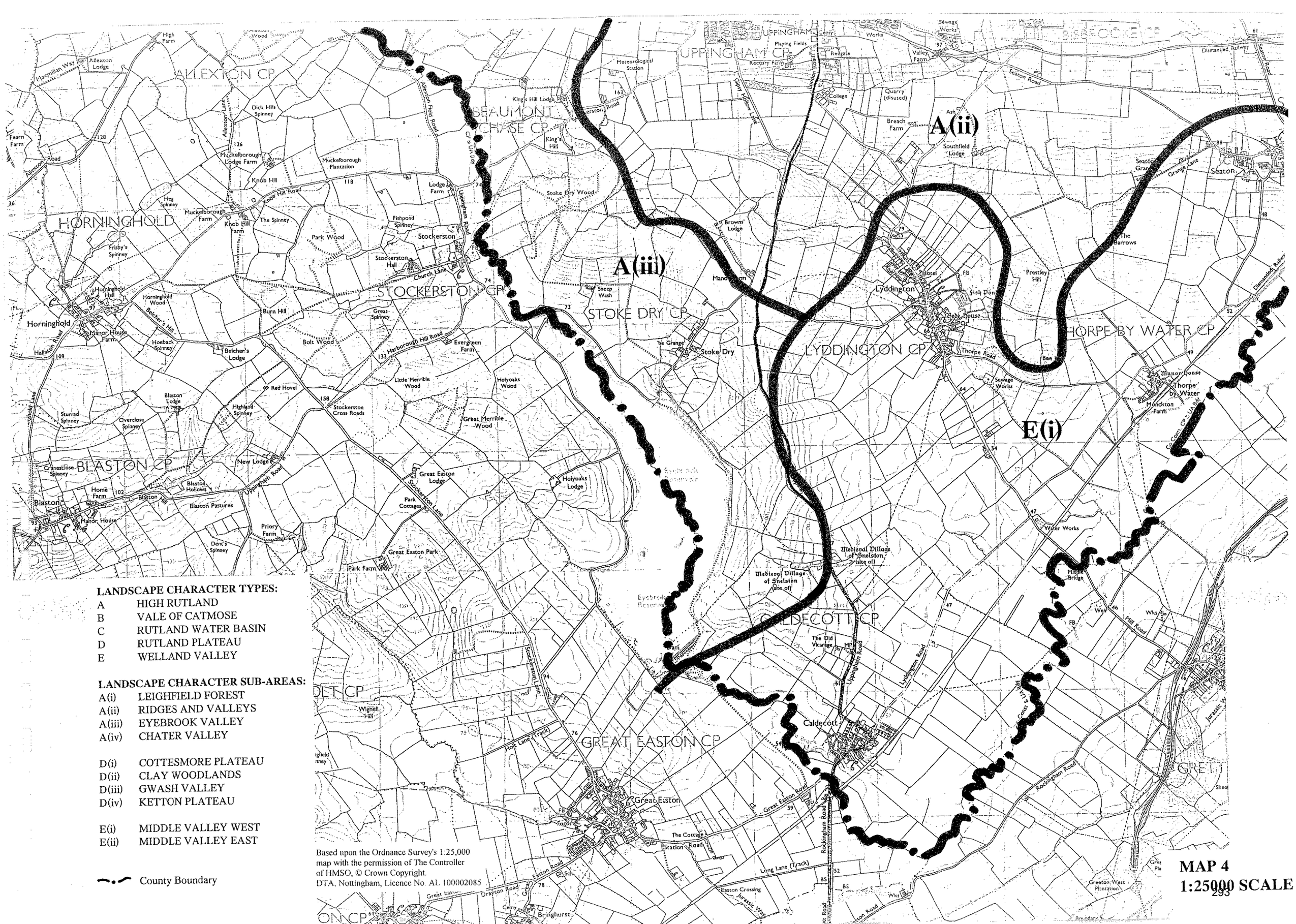
A	HIGH RUTLAND
B	VALE OF CATMOSE
C	RUTLAND WATER BASIN
D	RUTLAND PLATEAU
E	WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i)	LEIGHFIELD FOREST
A(ii)	RIDGES AND VALLEYS
A(iii)	EYEBROOK VALLEY
A(iv)	CHATER VALLEY
D(i)	COTTESMORE PLATEAU
D(ii)	CLAY WOODLANDS
D(iii)	GWASH VALLEY
D(iv)	KETTON PLATEAU
E(i)	MIDDLE VALLEY WEST
E(ii)	MIDDLE VALLEY EAST

County Boundary

MAP 3
1:25000 SCALE



LANDSCAPE CHARACTER TYPES:

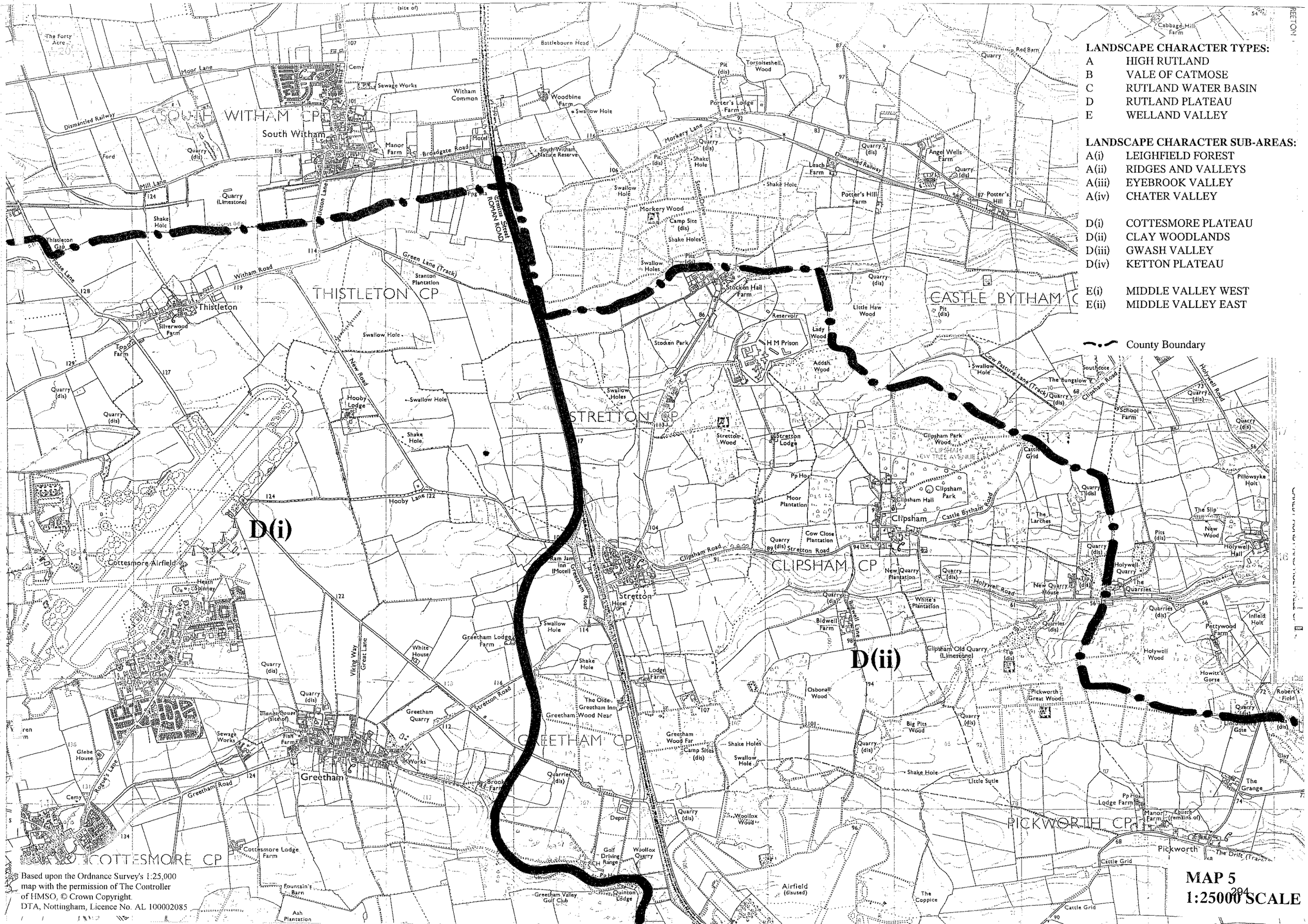
A	HIGH RUTLAND
B	VALE OF CATMOSE
C	RUTLAND WATER BASIN
D	RUTLAND PLATEAU
E	WELLAND VALLEY

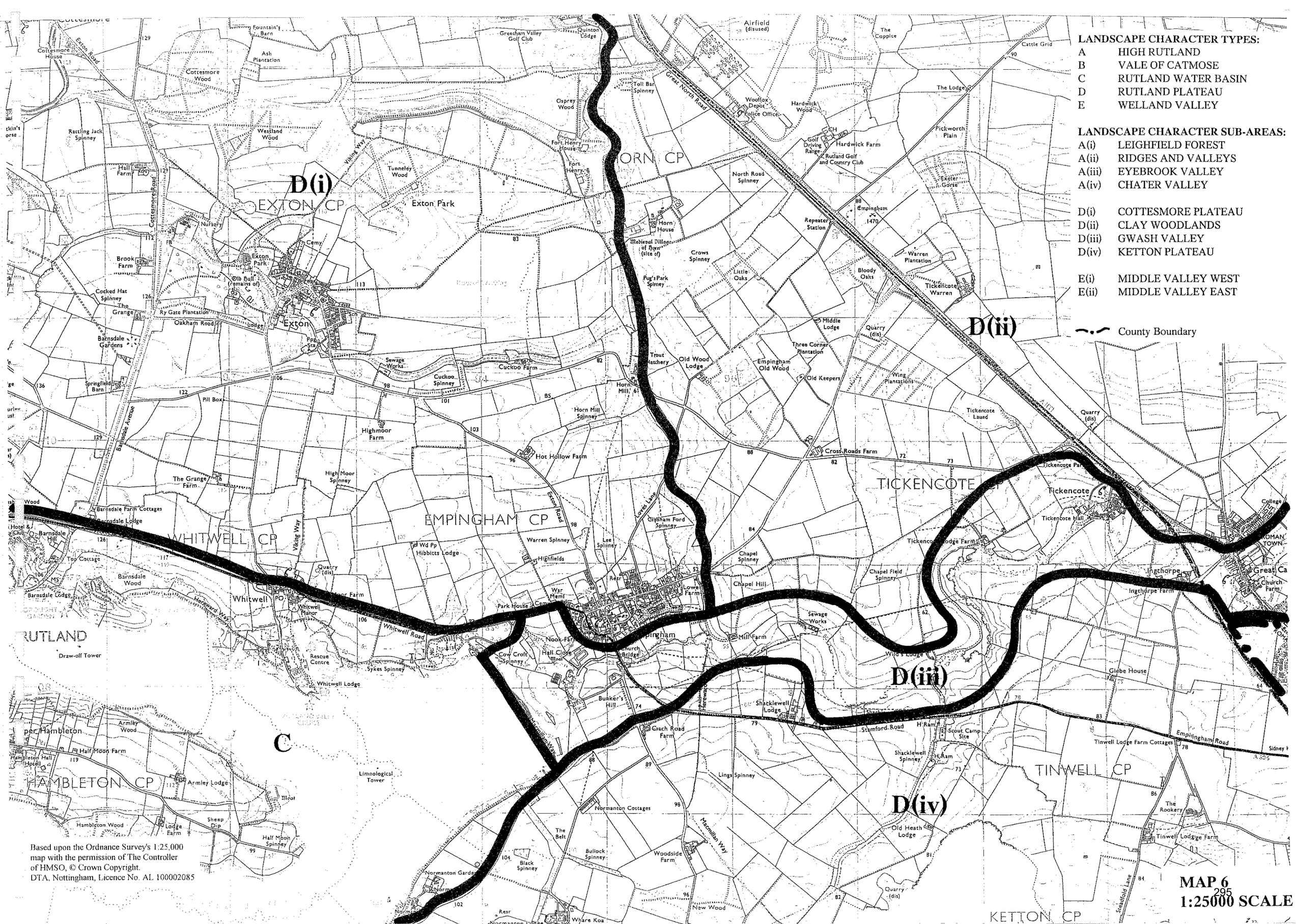
LANDSCAPE CHARACTER SUB-AREAS:

A(i)	LEIGHFIELD FOREST
A(ii)	RIDGES AND VALLEYS
A(iii)	EYEBROOK VALLEY
A(iv)	CHATER VALLEY
D(i)	COTTESMORE PLATEAU
D(ii)	CLAY WOODLANDS
D(iii)	GWASH VALLEY
D(iv)	KETTON PLATEAU
E(i)	MIDDLE VALLEY WEST
E(ii)	MIDDLE VALLEY EAST

County Boundary

MAP 4
1:25000 SCALE


LANDSCAPE CHARACTER TYPES:
A HIGH RUTLAND
B VALE OF CATMOSE
C RUTLAND WATER BASIN
D RUTLAND PLATEAU
E WELLAND VALLEY
LANDSCAPE CHARACTER SUB-AREAS:
A(i) LEIGHFIELD FOREST
A(ii) RIDGES AND VALLEYS
A(iii) EYEBROOK VALLEY
A(iv) CHATER VALLEY
D(i) COTTESMORE PLATEAU
D(ii) CLAY WOODLANDS
D(iii) GWASH VALLEY
D(iv) KETTON PLATEAU
E(i) MIDDLE VALLEY WEST
E(ii) MIDDLE VALLEY EAST
County Boundary
SOUTH WITHAM CP
THISTLETON CP
STRETTON CP
CASTLE BYTHAM CP
GREETHAM CP
CLIPSHAM CP
PICKWORTH CP
COTTESMORE CP
D(i)
D(ii)
Based upon the Ordnance Survey's 1:25,000 map with the permission of The Controller of HMSO, © Crown Copyright. DTA, Nottingham, Licence No. AL 100002085
MAP 5
1:25000 SCALE


LANDSCAPE CHARACTER TYPES:
A HIGH RUTLAND
B VALE OF CATMOSE
C RUTLAND WATER BASIN
D RUTLAND PLATEAU
E WELLAND VALLEY
LANDSCAPE CHARACTER SUB-AREAS:
A(i) LEIGHFIELD FOREST
A(ii) RIDGES AND VALLEYS
A(iii) EYEBROOK VALLEY
A(iv) CHATER VALLEY
D(i) COTTESMORE PLATEAU
D(ii) CLAY WOODLANDS
D(iii) GWASH VALLEY
D(iv) KETTON PLATEAU
E(i) MIDDLE VALLEY WEST
E(ii) MIDDLE VALLEY EAST
County Boundary
D(i)
D(ii)
D(iii)
D(iv)
C
EXTON CP
EMPINGHAM CP
WHITWELL CP
TICKENCOTE CP
TINWELL CP
KETTON CP
HAMBLETON CP
RUTLAND
Based upon the Ordnance Survey's 1:25,000 map with the permission of The Controller of HMSO, © Crown Copyright. DTA, Nottingham, Licence No. AL 100002085
MAP 6
1:25000 SCALE

LANDSCAPE CHARACTER TYPES:

A HIGH RUTLAND
B VALE OF CATMOSE
C RUTLAND WATER BASIN
D RUTLAND PLATEAU
E WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i) LEIGHFIELD FOREST
A(ii) RIDGES AND VALLEYS
A(iii) EYEBROOK VALLEY
A(iv) CHATER VALLEY

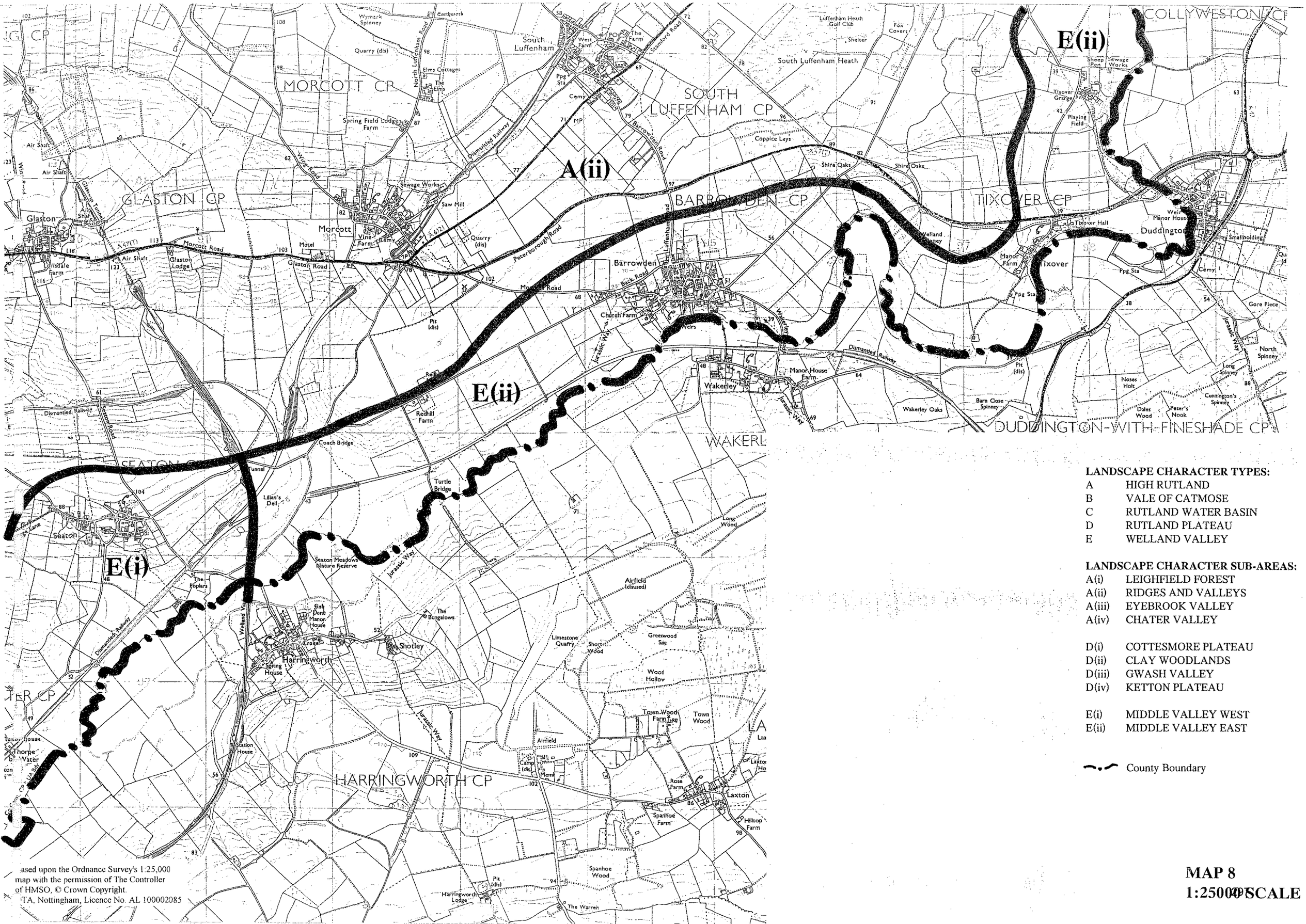
D(i) COTTESMORE PLATEAU
D(ii) CLAY WOODLANDS
D(iii) GWASH VALLEY
D(iv) KETTON PLATEAU

E(i) MIDDLE VALLEY WEST
E(ii) MIDDLE VALLEY EAST

County Boundary

C
A(ii)
A(iv)
D(iv)
E(ii)
E(ii)
A(ii)
E(ii)

MAP 7
1:25000 SCALE



LANDSCAPE CHARACTER TYPES:

A	HIGH RUTLAND
B	VALE OF CATMOSE
C	RUTLAND WATER BASIN
D	RUTLAND PLATEAU
E	WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i)	LEIGHFIELD FOREST
A(ii)	RIDGES AND VALLEYS
A(iii)	EYEBROOK VALLEY
A(iv)	CHATER VALLEY
D(i)	COTTESMORE PLATEAU
D(ii)	CLAY WOODLANDS
D(iii)	GWASH VALLEY
D(iv)	KETTON PLATEAU
E(i)	MIDDLE VALLEY WEST
E(ii)	MIDDLE VALLEY EAST

County Boundary

MAP 8
1:25000 SCALE

LANDSCAPE CHARACTER TYPES:

A	HIGH RUTLAND
B	VALE OF CATMOSE
C	RUTLAND WATER BASIN
D	RUTLAND PLATEAU
E	WELLAND VALLEY

LANDSCAPE CHARACTER SUB-AREAS:

A(i)	LEIGHFIELD FOREST
A(ii)	RIDGES AND VALLEYS
A(iii)	EYEBROOK VALLEY
A(iv)	CHATER VALLEY
D(i)	COTTESMORE PLATEAU
D(ii)	CLAY WOODLANDS
D(iii)	GWASH VALLEY
D(iv)	KETTON PLATEAU
E(i)	MIDDLE VALLEY WEST
E(ii)	MIDDLE VALLEY EAST

County Boundary

D(ii)

D(iii)

MAP 9
1:25000 SCALE

HIGH RUTLAND
Excellent example of good countryside management, Oakham Road,Braunston in Rutland. Hedge layed,hedgerow trees retained, pond cleaned and retained, field trees protected by fencing from sheep grazing on the pastures where ridge and furrow has been retained.

HIGH RUTLAND
Horse keeping can lead to substantial accumulations of buildings, vehicles and ancillary equipment and storage prominent in the steeply rolling countryside.

HIGH RUTLAND
Stoke Dry village looks conspicuous as it runs down the slopes overlooking Eye Brook Reservoir and associated woodlands

WELLAND VALLEY
The spectacular Welland Viaduct marks the distinction between the Middle Valley East and Middle Valley West sub-areas.

VALE OF CATMOSE
The Vale north of Oakham illustrating rough pasture with remnant ridge and furrow, hedgerow loss, and neglect emphasised by the characteristic over-mature hedgerow of ash and oak. This pastoral landscape is dominated by its treescape, although continued management is essential to its future well-being

VALE OF CATMOSE
Historic town of Oakham dominated by the prominent church nestles in the narrowest part of the Vale overlooked by the hills of High Rutland.

RUTLAND WATER BASIN
The Rutland Water reservoir is unique and dominates this landscape character type.

RUTLAND PLATEAU
The raised east slope of the North Brook valley displays the subtle transitional change from the Cottismore Plateau on to the Clay Woodlands sub-area. Arable and pastoral land use mixes with both deciduous and coniferous plantation which becomes more prevalent on the Woodlands. Field boundary management has suffered.

RUTLAND PLATEAU
Parkland characteristics such as treed avenues influence the agricultural landscape on the Clay Woodlands sub-area near to Clipsham.

RUTLAND PLATEAU
The lower Gwash valley where its sinuous river is tightly bounded by mature deciduous tree cover and pasture is displaced by a wholly arable farmed landscape. The resultant reduction in enclosure serves to emphasise the impact of the electricity pylon network.

Leicestershire County Council

The Leicestershire, Leicester and Rutland

Historic Landscape Characterisation Project

The Leicestershire, Leicester and Rutland Historic Landscape Characterisation Programme was carried out between 2006 and 2009 by John Robinson for Leicestershire County Council with support from English Heritage.

Historic and Natural Environment Team
Planning, Historic and Natural Environment Group
Chief Executive's Department
Leicestershire County Council
County Hall
Glenfield
Leicestershire
LE3 8RA

Contents

Section 3

Section 4

Section 5

Section 6

Section 7

Section 8

Section 9

Section 10

Section 11

Figures

List of Abbreviations

DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and Sport
DEFRA	Department for the Environment Food and Rural Affairs
EAFRD	European Agricultural Fund for Rural Development
EUS	Extensive Urban Survey
EWGS	English Woodland Grant Scheme
GOEM	Government Office for the East Midlands
HER	Historic Environment Record
HLC	Historic Landscape Characterisation
HNET	Historic and Natural Environment Team
LCA	Landscape Character Assessment
LDF	Local Development Framework
OD	Ordnance Datum
PPG	Planning Policy Guidance Note
PPS	Planning Policy Statement
RCC	Rural Community Council
RDPE	Rural Development Programme for England
RSS	Regional Spatial Strategy
SPD	Supplementary Planning Document

Acknowledgements

The Leicestershire, Leicester and Rutland Historic Landscape Characterisation Project (LLR HLC) was carried out by staff working for the Planning, Historic and Natural Environment Group of the Chief Executive's Department at Leicestershire County Council. The project was carried out in partnership and with funding from English Heritage.

Leicestershire County Council would like to gratefully acknowledge the advice and assistance provided by English Heritage's Characterisation Team, especially Graham Fairclough, Peter Herring and Dave Went. Thanks must also go both to Lesley Eddleston and Tony Squires for their comments corrections and advice.

Section 1

1 Project Outline and Background

1.1 Introduction

1.1.1 The use of Historic Landscape Characterisation (HLC), with the active promotion and guidance of English Heritage, has increasingly come to be recognised as an essential tool aiding heritage professionals to manage change within the historic environment and it is particularly relevant when working at a landscape scale. Concepts of 'character' have their roots in the 1960s and were articulated within the 1967 Conservation Area legislation. The Government white paper 'This Common Inheritance' published in 1991 proposed that a register of historic landscapes should be drawn up by English Heritage and in 1992 the Historic Landscape Project began; this involved English Heritage developing of a methodology for landscape assessment and identified the need for a broad integrated and holistic approach to landscape issues. The recognition of the importance is now embedded into the planning process through the guidance formerly in PPG15 (*Planning and the Historic Environment*), PPS7 (*Sustainable Development in Rural Areas*) and features prominently in PPS5 (*Planning for the Historic Environment*) which replaced PPGs 15 and 16 in March 2010.

1.1.2 Across a range of disciplines current thinking generally accepts the principal that it is not desirable and, moreover, neither is it possible to prevent landscape change. For the landscape to continue to have cultural relevance it is important to recognise its dynamic nature. What is important is that those people making policy or commenting upon proposals need to be adequately informed when determining what scale and type of change is most appropriate. HLC provides much of the necessary information for developing an understanding of the historic dimension of the contemporary landscape which will inform appropriate and effective management strategies. That said it is important to recognise that HLC must be regarded as only one data source and is an interpretation which focuses upon the Historic Environment. Our understanding of the landscape is best enhanced when all available sources of information are consulted and taken into consideration. These can include consultation of the Historic Environment Record, documentary sources, photographic evidence, landscape character assessments at various levels and site visits.

1.1.3 The methodology for HLC was pioneered in Cornwall during the mid 1990s and has been developed under the guidance of English Heritage, typically working in partnership with local authorities, as the programme has been rolled out nationally. Whilst the methodology has evolved to reflect improving technology (most notably the widespread availability of Geographic Information Systems).and local requirements the core principles remain the same. These core principles are concerned with;

> mapping the historic dimension of today's rural and urban landscapes, and are about being comprehensive, not selective (leaving no 'grey areas'), and viewing areas rather than individual sites. HLC is concerned with the commonplace and the locally distinctive and, through identifying and analysing time-depth, it expresses the dynamic nature of towns and countryside (Clark, J. Darlington, J. and Fairclough, G. 2004)

1.1.4 The Leicestershire, Leicester and Rutland Historic Landscape Characterisation (LLR HLC) Project commenced in April 2006 and has been a partnership initiative hosted by Leicestershire County Council, supervised and funded by English Heritage. The project area comprises the areas administered by Leicestershire County Council and the unitary authorities of Leicester City Council and Rutland County Council.

1.1.5 This report has several objectives; these include providing a context to the project which will involve an examination of the geology, topography ecology and archaeology of the project area. In addition this report will provide an explanation of the project aims and attempt to illustrate how it sits alongside other local, regional and national characterisation programmes. An outline of the methodology employed for the main data capture phase of the project will also be included. The bulk of the report will be given over to an analysis and discussion of some of the findings generated by the project. The report will further go on to examine the role envisaged for HLC including its key function as a data set for use by the Historic Environment Team, the potential contribution of HLC to both local and regional development frameworks and how HLC fits into wider national planning policy guidance and international commitments.

1.2 The Project Study Area

1.2.1 The Leicestershire, Leicester and Rutland Historic Landscape Characterisation Project covers an area of 2,606 sq. km and takes in the modern county of Leicestershire (2083 sq. km) and the unitary authorities of Leicester City (73 sq. km) and Rutland (450 sq. km). The project area is landlocked and may be considered to be a fairly typical slice of the English Midlands.

Figure 1 Project Area

Figure.2 The Regional Context

1.2.2 The project area is set within the East Midlands Region and borders Derbyshire, Nottinghamshire, Lincolnshire, Peterborough, Northamptonshire, Warwickshire and Staffordshire. Within Leicestershire itself there are seven local authorities North West Leicestershire District Council, Charnwood Borough Council, Melton Borough Council, Harborough District Council, Oadby and Wigston Borough Council, Blaby District Council and Hinckley and Bosworth Borough Council.

1.2.3 The project area has a population approaching 1,000,000 people (Leicestershire: 641,000; Leicester; c. 292,600; Rutland; 38,400 (Office for National Statistics, Mid 2007 to Mid 2008 Population Estimates)). In terms of area the largest district is Harborough (593 sq. km) which contrasts with Oadby and Wigston which has an area of only 24 sq. km. Oadby and Wigston, however, is the most heavily populated with 56, 800 persons and has a population density of 2,333 persons per sq. km. Melton (47,900 persons) is the most sparsely-populated district with only 100 persons per sq. km.

Figure 3 Local Authority Boundaries Within the Project Area

1.2.4 With the exception of Leicester the study area is predominantly rural however it does have a number of sizable market towns and urban areas. The largest towns are Loughborough (57,560 persons), Hinckley (38,620 persons), Coalville (32,030 persons), Melton Mowbray (25,890 persons), Wigston (25,610). The remaining urban areas and market towns each have populations which do not exceed 25,000 (Leicestershire County Council).

Figure 4 Main Settlements in the Project Area

1.3 Landscape Character Assessment

1.3.1 At a national level HLC may be seen to sit within the context of The Character of England Landscape, Wildlife and Cultural Features Map produced in 2005 by Natural England with support from English Heritage. This is a revision of the 1996 Countryside Character Map which itself was a joint Countryside Commission/English Heritage/English Nature project. This map subdivides England into 159 National Character Areas (NCAs) and provides a picture of the differences in landscape character on a national scale. Leicestershire and Rutland are divided into 13 NCAs. However only two of these National Character Area lie wholly within the project area (Charnwood and High Leicestershire), with a further nine lying partly within it (Kesteven Uplands, Leicestershire and Nottinghamshire Wolds, Leicestershire and South Derbyshire Coalfield, Leicestershire Vales, Mease/Sence Lowlands, Melbourne Parklands, Northamptonshire Uplands, Northamptonshire Vales, Trent and Belvoir Vales and Trent Valley Washlands). In addition a very small fragment of Rockingham Forest lies within south east Rutland.

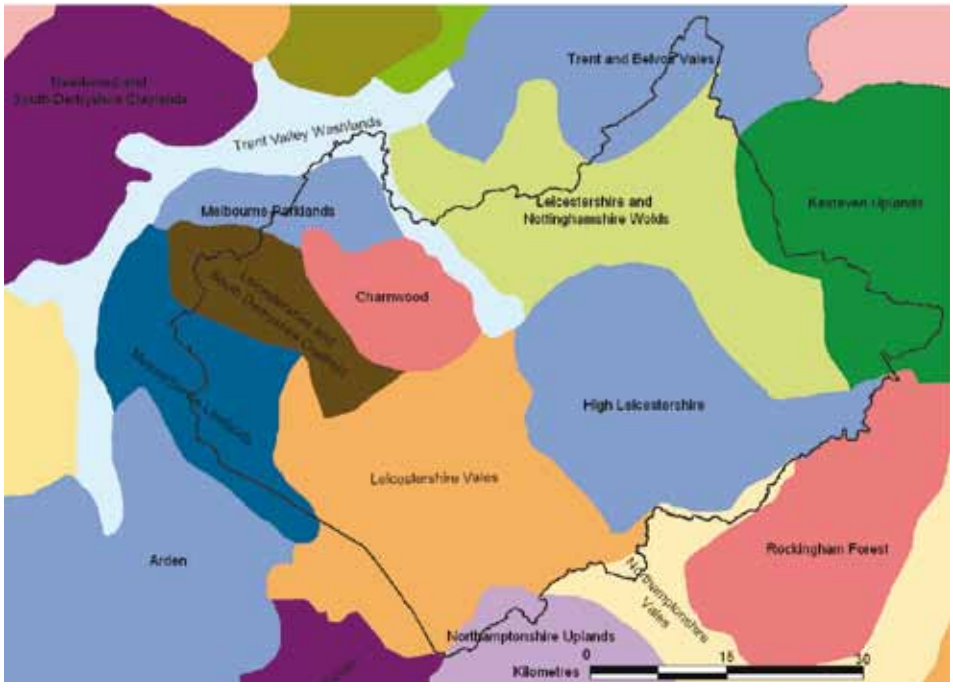


Figure 5 National Character Areas

1.3.2 In 2001 The *Leicester, Leicestershire and Rutland Landscape and Woodland Strategy* was published by Leicestershire County Council in partnership with Leicester City Council and Rutland County Council. The Strategy was designed to sit within the context of the Leicester, Leicestershire and Rutland Structure Plan and is informed by a landscape character appraisal. This appraisal was carried out at a similar level to the one informing The Character of England Landscape, Wildlife and Cultural Features Map. However whilst there is a broad correlation between the two studies the Leicester, Leicestershire and Rutland assessment is less coarse and identifies eighteen character areas and is an attempt to focus on character areas which are seen as significant at the finer county level.

1.3.3 The primary focus of the Landscape and Woodland Strategy was to focus upon the visual character of the countryside and, in line with the landscape character assessment guidelines current at the time, did not specifically address the built environment. The guidelines contained within the Strategy concentrated on landscape and woodland issues whilst at the same time recognising that there was a need to produce guidance on the built and historic environment. It is envisaged that HLC should be one of the tools used to inform such guidance in the future.

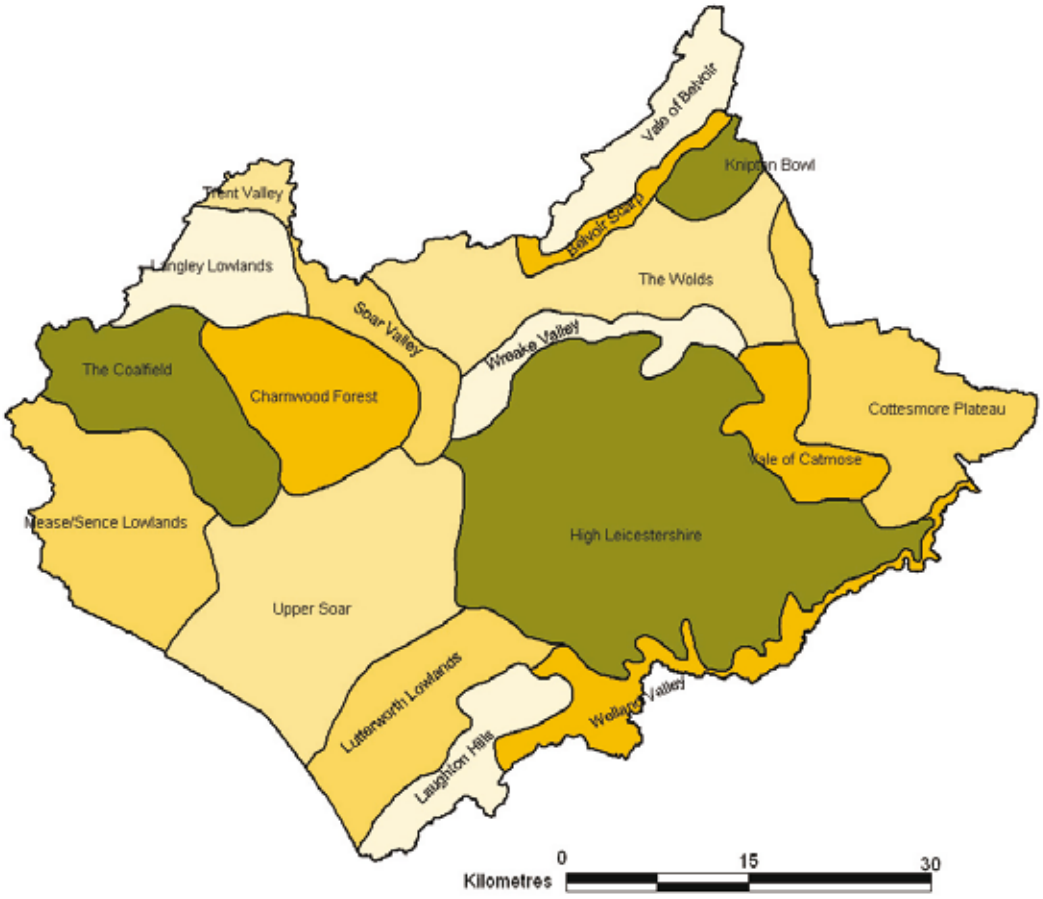


Figure 6 Leicester, Leicestershire and Rutland Landscape Character Areas

1.4 Rural Settlement in England

1.4.1 English Heritage's *Atlas of Rural Settlement in England* (Roberts and Wrathmell, 2000), provides a mapped definition of rural settlement patterns and illustrates the wide regional variation indicative of a diverse physical, social, economic and political history.

1.4.2 Leicestershire, Leicester and Rutland fall within the 'Central Province' as defined by Roberts and Wrathmell (ibid, p 45). This is a zone characterised by the presence of large nucleated settlements. The 'Central Province' contains a number of sub-provinces; these include the 'Vale of Trent', the 'Inner Midlands' and the 'East Midlands'.

1.4.3 The River Trent dominates the 'Trent Valley Vale of Trent' sub province (CTRNT) and defines the north-western fringe of Leicestershire, culminating at the Trent-Soar confluence and also includes the Vale of Belvoir. The area comprises nucleated villages and hamlets. Low densities of dispersion dominate throughout the area reflecting the dominance of the townfield system.

1.4.4 The 'Inner Midlands' covers a large proportion of the west of Leicestershire, including Charnwood and spreading down to Hinckley and Lutterworth in the south. The strong influence of the prevailing scarp and vale topography has been noted by Roberts and Wrathmell who also remark that this is the largest area wholly dominated by nucleations in the country. This is a pattern documented in the Domesday Book and further evidenced by the significant number of deserted settlements.

1.4.5 The Wolds, High Leicestershire, Wreake/Eye and Wellland valleys and the County of Rutland are contained within the 'East Midlands' sub-province. Again this is a scarp and vale landscape, where limestone ridges are interlaced with the watersheds of the Wreake and Welland. Ancient woodland is a notable feature of the area and the former extent of these woodlands is likely to have had a significant effect upon landuse and settlement. The sub-province is dominated by villages and hamlets with low and very low dispersion densities as well as later patterns of dispersed farmsteads associated with 18th century enclosure. In common with the 'Inner Midlands' sub-province the 'East Midlands' contains a significant number of deserted medieval settlements.

1.5 Geology

1.5.1 Most of the geological ages represented within the British Isles can be observed within the scope of the project area. What is more, the geology of Leicestershire and Rutland can be shown to have played a significant role in influencing the industrial and cultural development of the two counties. The many rock types present date from a range of geological epochs and many form prominent features over the study area. However a substantial proportion of this bedrock geology lies below unconsolidated sediments such as boulder clays. Along the Soar valley, and to a lesser extent the along the Welland, Wreake and Trent, there are superficial deposits of sands and gravels and the working of these has had a significant effect upon the present day landscape.

1.5.2 The Pre-Cambrian sedimentary rocks of Charnwood Forest are amongst the oldest in England and Wales. These rocks, which have been folded by subsequent earth movements, are of special geological interest and make a particular contribution to the distinctiveness and character of the Charnwood Forest area. Around the edges of Charnwood Forest younger igneous rock deposits occur which have been extensively quarried for roadstone.

1.5.3 Western Leicestershire's geology consists of layers of younger Carboniferous and Triassic rocks which include sandstones and Carboniferous Limestone. At Breedon Hill and Cloud Hill outcrops of Carboniferous, Magnesian Limestone are quarried at such a scale that it has a significant impact upon the character of the area. The landscape of much of the north-western part of Leicestershire has been significantly impacted upon by the working of extensive Coal Measures with coal seams in the Measham and Heather area suitable for open-cast mining techniques as seen, for example, at Ravenstone. The coal measures of north-western Leicestershire are very variable and include layers of fireclays and brick clays, both of which have been worked extensively. The Triassic Mercian Mudstone Group (Keuper Marl) whick underlies much of western Leicestershire can be up to 300m thick and has given rise to a moderately undulating landscape.

1.5.4 The rocks to the east of the River Soar comprise more recent Jurassic clays, ironstones and limestones. Here the thick clay formations alternate with thinner layers of ironstones and harder bands of limestones which typically stand out as small ridges. The highest parts of Leicestershire, including the Belvoir Scarp and the Laughton Hills, consist of Marlstone which caps the clays. These rocks have all been quarried. Older workings have mostly been on a fairly modest scale with relatively limited impact upon the character of the landscape. Until the early 1970s opencast ironstone working operations were carried out around Eastwell and Easton and near to Harston, Sproxton and Buckminster. These workings have, for the most part, been restored to agricultural use.

1.5.6 In Rutland and the extreme east of Leicestershire the bedrock geology is younger; Jurassic limestones such as the pale stone quarried at Ketton predominate and have been used as sources for building stone and cement.

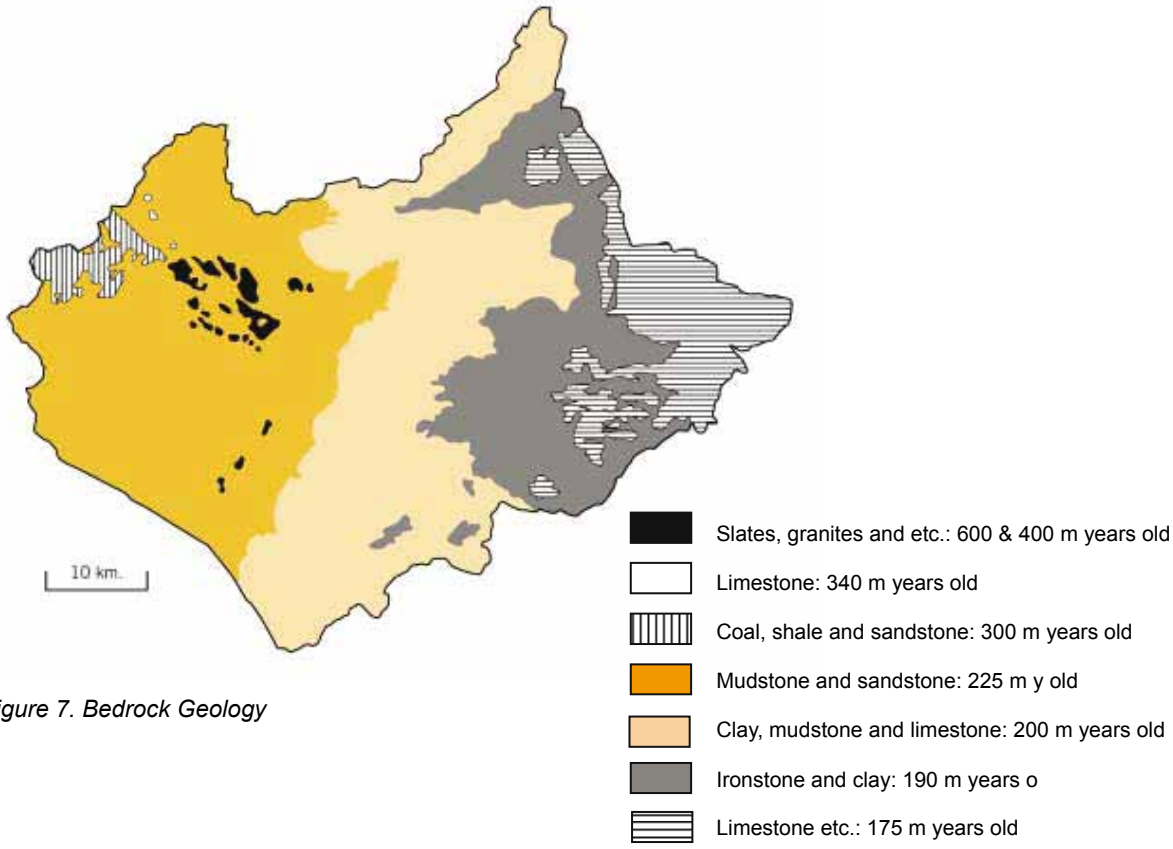


Figure 7. Bedrock Geology

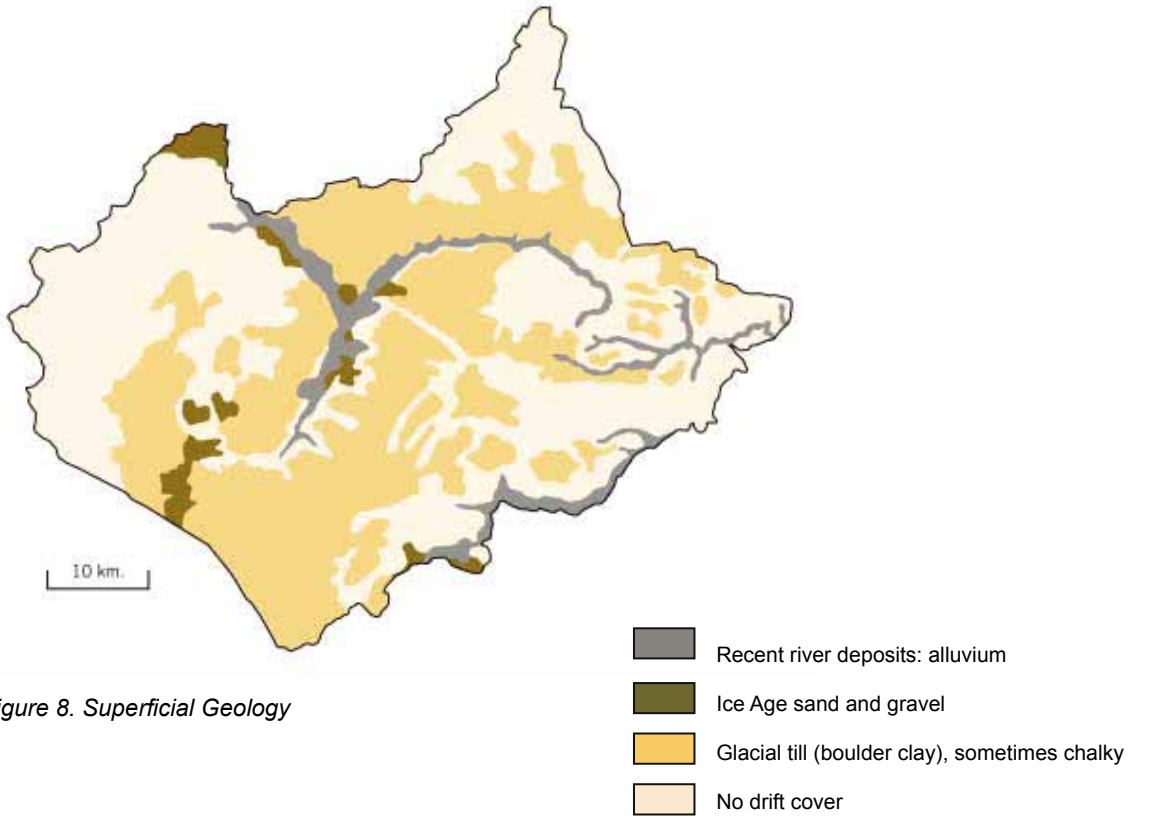


Figure 8. Superficial Geology

The Succession of Rock Formations in the Leicestershire Area (after Ford)

Era		Period	Date	Rock Formations
MESOZOIC		Middle Jurassic	*c.*167-178 Ma	Lincolnshire Limestone
				Lower Estuarine Series
				Northamptonshire Ironstone
		Lower Jurassic	*c.*178-195 Ma	Upper Lias Clays
				Middle Lias Marstone Rock Bed (Ironstone) and Silts
				Lower Lias Clays and Hydraulic Limestones
		Triassic	*c.*195-225 Ma	Rhaetic-White Lias Limestone and Black Shales with Bone Bed
				Keuper Marl (with gypsum) and local Upper Sandstone
				Keuper Sandstone (including 'Waterstones')
				Bunter Sandstone and Pebble Beds
PALAEOZOIC	LATE	Permian	*c.*225-290 Ma	Whitwick dolerite and local 'Permo-Triassic' marls, breccias, etc.
		Carboniferous	*c.*290-345 Ma	Upper 'Barren' Coal Measures
				Middle and Lower Coal Measures
				Millstone Grit Series
				Carboniferous Limestone Series
		Devonian	*c.*345-355 Ma	Upper Old Red Sandstone
	EARLY	Silurian (Caledonian)	*c.*400 Ma	Mountsorrel Granodiorite
				South-west Leicestershire Diorites
		Ordovician (Lower)	*c.*500-515 Ma	Merevale Shales
		Cambrian	*c.*515-570 Ma	Stockingford Shales
				Hartshill Quartzite
NEOPROTOZOIC		Precambrian	> 684 Ma	Charnian Intrusives (markfieldite and other diorites)
				Charnian Sediments – probably more than 10,000ft thick
				Caldecote Volcanics of Nuneaton 400ft

6 Landform and Drainage

1.6.1 Leicestershire and Rutland would seem, upon first impressions, to possess an undramatic landscape consisting of gently rolling countryside, relatively small rivers (Charter, Gwash, Jordan, Sence, Soar, Welland and Eye/Wreake), tilled farmland and market towns. The project area may be considered to have a relatively moderate elevation lying between 60 and 180 metres above sea level. The lowest point in the two counties is near to the confluence of the Soar and Trent below Kegworth (27m). Bardon Hill in Charnwood Forest (278 m) is the highest point.

1.6.2 The study area is roughly divided east/west by the River Soar's broad floodplain, for which the only major tributary is the River Wreake. The Soar itself flows northwards to join the River Trent, which forms a short section of Leicestershire's northern boundary. Much of Leicestershire drains into the Trent through either the Soar or the Mease.

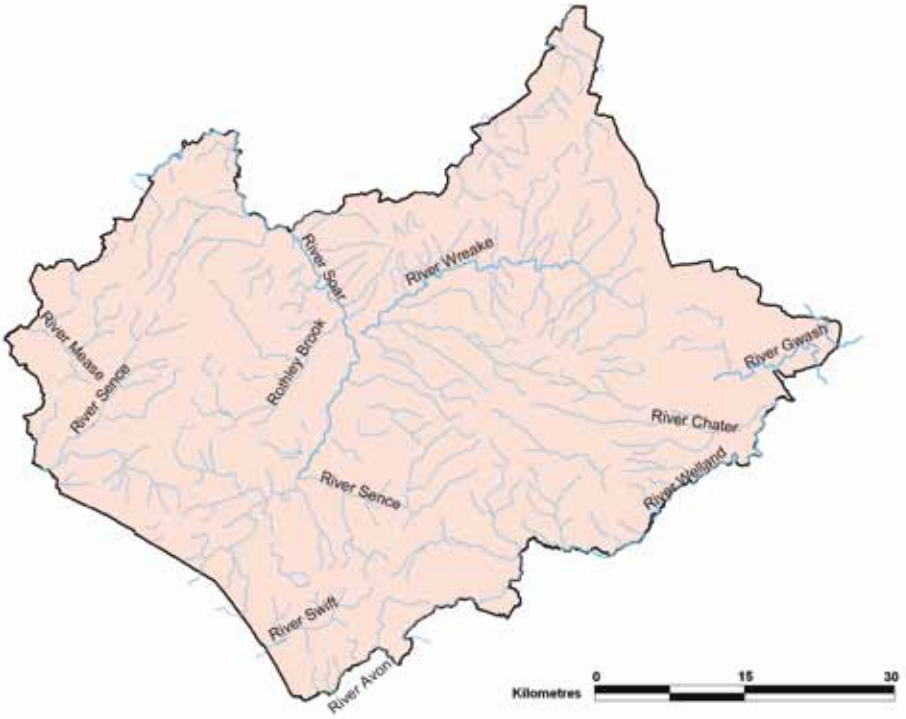


Figure 9. Rivers and Watercourses

1.6.3 To the west of the Soar Charnwood Forest's Pre-Cambrian rocks form an isolated and distinctive area of high relief. The outcrops here, which have been created through a process of tilting, folding and erosion, contribute significantly to the character of the landscape. Many swift flowing streams run off this high area north and east into the Soar and south-west into the Sence. From Charnwood Forest westwards to the county boundary and beyond there is a band of moderately high land. Much of the rest of western Leicestershire typically consists of gently rolling landforms with little in terms of major contrasts in relief.

1.6.4 The area lying to the east of the Soar and south of the Wreake is one

where the erosion of Jurassic Lias Clays has contributed to the forming of a landscape characterised by a high, dissected plateau with numerous small stream valleys with clay floors and marlstone slopes. These streams flow either west or north into the Wreake or directly into the Soar, or south and east into the Welland and eastern River Sence.

1.6.5 East of this plateau is the Vale of Catmose, a broad shallow valley which drains to the Wreake in the north and the Welland in the south. East of the Vale of Catmose lies another plateau area which rises steeply from the Vale at its northern end. The southern part of the plateau has been cut by rivers running into the Welland to form a gently rolling landscape that has within it a number of shallow but sometimes steep-sided valleys separated by broad ridges.

1.6.6 Moderately high land extends in a band roughly from Market Harborough in the east to Lutterworth in the west. The land here drains to the Avon and the Swift.

1.6.7 The north-eastern part of the study area, essentially land north of the River Wreake, consists of undulating uplands. These are abruptly terminated by the Marlstone escarpment of the Belvoir Scarp which dramatically falls to the flat claylands of the Vale of Belvoir to the north-west.

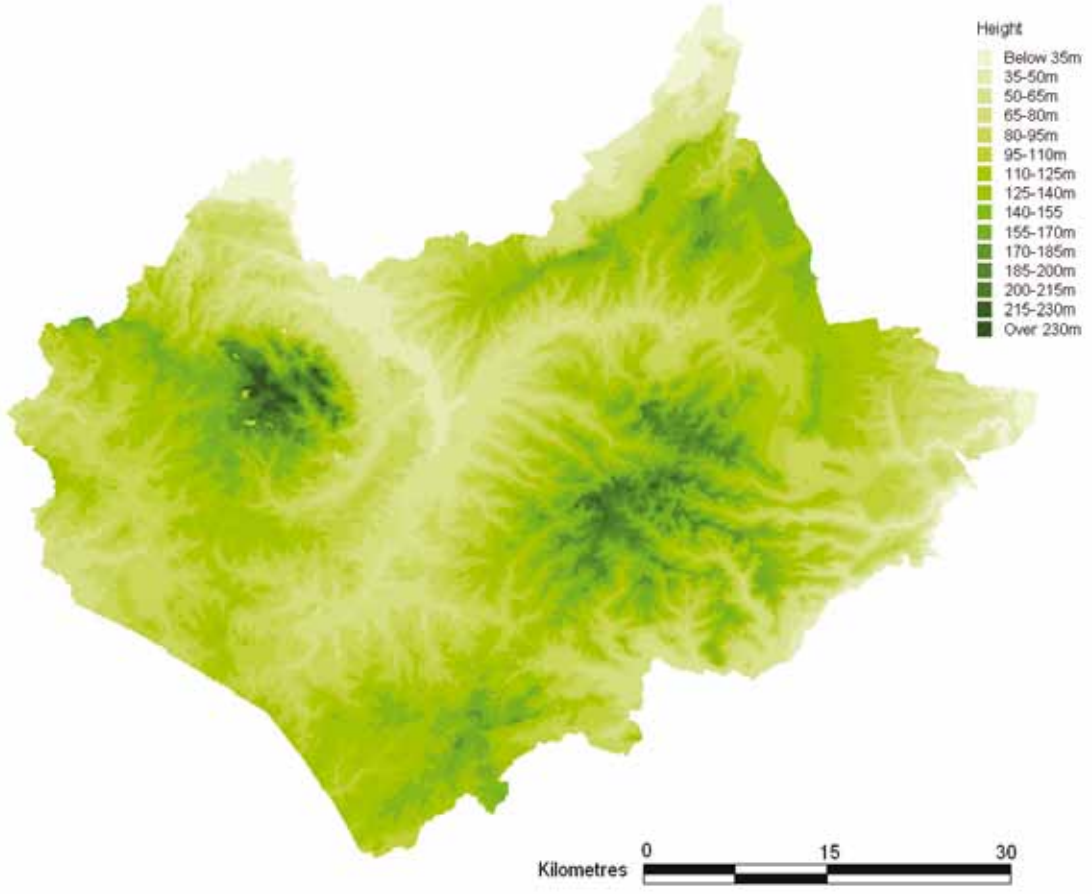


Figure 10. Relief

1.7 Soils

1.7.1 The soil types and their distribution within the study area are of a fairly broad mix and generally reflect drainage patterns and the underlying parent materials. On the western side of Leicestershire the soils deriving from the rocks of Charnwood Forest are very often thin, stony and acidic. Further west the soils of the Coal Measures are generally sandy and of a poor quality. Soils elsewhere in the western parts of Leicestershire tend to be neutral clay loams.

1.7.2 On the eastern side of Leicestershire and in Rutland the clay soils also predominate although here they are more variable in character than on the western side of the study area. Where the Lias Clays form the underlying geology they give rise to clay soils that are difficult to work and which are traditionally under pasture. Arable usage tends to be located on the limestones and ironstones which produce soils that are lighter and more loamy in character. The most easily worked soils, on the Marlstone, tend to have a calcareous and loamy or marl make-up.

1.8 Archaeology

1.8.1 The Palaeolithic

1.8.1.1 The Palaeolithic, literally meaning 'Old Stone Age' is a division in prehistory which spans the emergence of the first tool-using humans to the retreat of the glacial ice in the northern hemisphere. In Britain, the Palaeolithic covers the period from around 700, 000 years ago to about 10,000 years ago (ya) and is itself conventionally divided into three periods; the Lower Palaeolithic (700,000-250,000 ya), the Middle Palaeolithic (250,000-40,000 ya) and the Upper Palaeolithic (40,000-10,000 ya). This division has been based largely upon the types of artefacts found from this period. In recent years archaeologists, in recognising the huge time span, and the varying climactic and geographic conditions involved, have acknowledged that that this classificatory approach is, at the very least, problematic. That said however this framework continues to prove useful when trying to achieve a basic understanding of the period.

1.8.1.2 Throughout the Palaeolithic sea levels were considerably lower than they are today and Britain was connected to mainland Europe through the land mass now referred to as Doggerland. The Palaeolithic spans a period of some 690,000 years and during this time there were significant climactic fluctuations. During those periods when the climate was at its coldest humans seem to have been driven south and away from Britain.

1.8.1.3 For the Lower Palaeolithic evidence for the first hominins in western Europe is restricted to two sites in Spain and is likely to date to about 780,000 ya.

1.8.1.4 At the internationally important site of Pakefield Cliff in Gisleham, Suffolk, excavation of interglacial deposits revealed struck flints, plant and animal fossils in the Cromer Forest-bed Formation, which comprise the earliest evidence for human activity in northern Europe (c. 700,000 ya).

1.8.1.5 The Happisburgh project, Norfolk, was set up after flint artefacts (including a handaxe) and butchered bone were discovered in the organic muds that underlie the rapidly eroding coastal cliffs. In 2004 Happisburgh I was excavated, revealing flint tools, bone, wood and other plant materials, which lay at the marshy edges of a large river. The discovery of the extinct water vole (*Arvicola cantiana*) suggests that this site dates to about 500,000 to 600,000 ya. Two further sites were discovered, Happisburgh II and III; at the latter a gravel river channel also revealed flint tools, bone and plant materials and this has been dated to at least 700,000 years BP. If it is older than this date, then this would make it the earliest human site in northern Europe. The evidence from Happisburgh III has huge implications for our understanding of the earliest colonization of Europe and the types of environment in which early humans could survive (Ashton 2007).

1.8.1.6 At Boxgrove, West Sussex, an early human presence (c. 500,000 ya) was revealed through the discovery of remains of the hominin species *Homo heidelbergensis.* Boxgrove also produced important evidence for the

manufacturing of biface and other lithic tools along with associated faunal material. More recent discoveries for East Anglia include cut-marked animal bones and stone tools which have been taken from deposits dating possibly from as early as 600,000-700,00 ya. It is these East Anglian discoveries which may have important implications for the way we understand the Palaeolithic in the East Midlands since deposits of this period also occur within our region (Cooper, 2004).

1.8.1.7 Our understanding of the Palaeolithic in the region has developed significantly since the 1950s and the identification of a major pre-Anglian river channel. Known as the Bytham River this is now seen as having been a major river during the Lower Palaeolithic, or Cromerian, period. The channel has been has been traced across the Midlands flowing north-east past Coventry, into Leicestershire (along the later Soar Valley) via Leicester and Melton and on into East Anglia (Graf, 2002). In addition many of the known artefacts from this period in Leicestershire are in or close to the 'Brooksby' sand and gravel deposits which themselves underlie the Bytham deposits. Organic remains recovered from a borehole at Brooksby contained 7-8m of water-laid sand and gravel and included plant macrofossils (leaves, bud scales and seed), pollen and other remains. This material has been dated to 480,000 ya (Graf, 2002) and suggests relatively mild conditions (Rice, 1991). A lower deposit included evidence of pine, fir, birch,hazel and oak woodland. The potential importance of the Bytham River deposits could prove to be significant in developing our understanding of the earliest humans in the British Isles and in fact the comparative lack of pre-Anglian archaeology associated with the other major river, the Thames, gives rise to the possibility that the Bytham was the earliest colonisation route for Britain (Cooper, 2002). The Bytham was blocked *c.* 470,000 ya during the Anglian glaciation resulting in the formation of 'Lake Harrison'; this ice-dammed lake would have dominated much of south-west Leicestershire and probably all of Warwickshire, and although no archaeological deposits have been recovered from the clay and silt lake deposits there is a potential for lakeside occupation occurring during warmer phases.

1.8.1.8 A sizable collection of artefacts including handaxes, choppers and flake tools has been gathered from around the Warwickshire and Leicestershire border almost entirely by a single fieldworker, Ron Waite. The material is predominantly quartzite all showing varying degrees of rolling. It has been suggested that these finds were originally deposited further north and transported into the area by glaciers although is should be noted that this is a sizable collection not solely restricted to the sand and gravels but occurs on a variety of geologies and suggests a significant human presence during the Lower Palaeolithic.

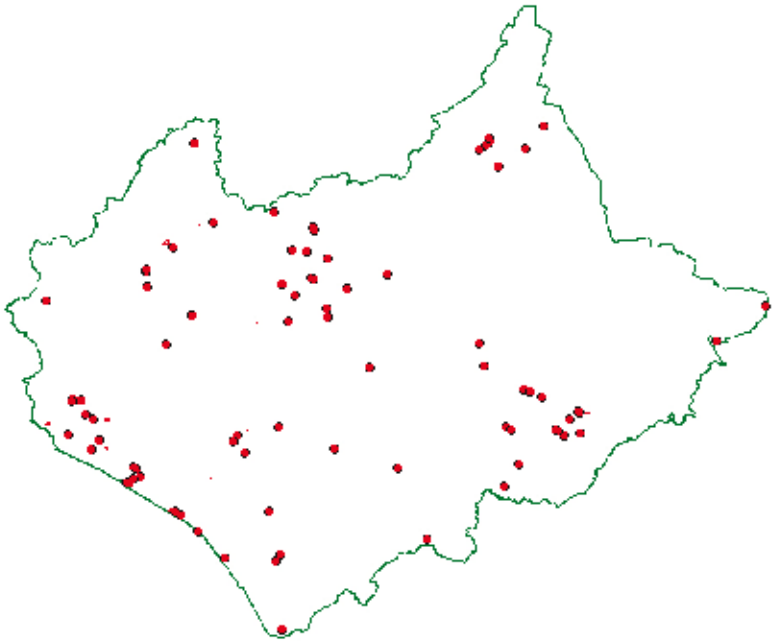


Figure 11. Palaeolithic Sites and Find Spots Recorded in the Historic Environment Record

1.8.1.9 Evidence of human occupation within the study area is scarce for the Middle Palaeolithic which covers the period *c*. 250-30,000 ya. This is a period that sees gradual changes in the population from *Homo heidelbergensis* to humans displaying more modern traits. As the climate became colder hominins around 160,000 ya seem to have abandoned Britain in favour of the warmer regions to the south and it is not until *c.* 58,000 ya that Neanderthals begin to colonise Britain. Very few artefacts have been found from this period within the study area but include a possible side scraper found at Blackbird Road, Leicester and probable handaxes from Stanton-under-Bardon and Aylestone

1.8.1.10 The Upper Palaeolithic which covers the period *c.* 30-10,000 ya sees anatomically modern humans moving into north-west Europe. These newcomers appear to exhibit different behaviours and employ different technologies to Neanderthals whose presence may be suggested from the evidence of material including a flint leaf point recovered from an Early Upper Palaeolithic hyena den at Glaston in Rutland (McNabb, J. 2006). Evidence across Europe suggests the emergence of symbolic expression on artefacts and cave walls and also the formal burial of the deceased. In neighbouring Nottinghamshire at Cresswell Crags evidence for increasingly sophisticated forms of artistic and symbolic expression comes in the form of rock art depicting images of bison, deer, bears and birds. These are the only known examples of Palaeolithic cave art in the UK and their northerly location adds to their significance. New stone tool technology based upon the controlled production of blades which may have been used unmodified or served as blanks for tools such as projectile points, knives, scrapers, burins and piercers is also developing at this time.

1.8.1.11 On the Leicestershire /Rutland border at Launde a dense scatter of around 3,000 blades, blade cores and possible hammerstones was recovered during an excavation in advance of the laying of a pipeline. Of the flints recovered 57% were recorded sealed in a thin silty clay layer thought to be a weathered surface horizon of the boulder clay. The site is on a commanding hilltop with views to the north, south and east.

1.8.1.12 At Glaston in Rutland excavations revealed a scatter of semi-fossilised animal bones, including woolly rhinoceros, wolverine, early horse (*Equus Ferus*), mountain hare and reindeer. Evidence for human activity came from the discovery of a small assemblage of flint tools, including a leaf point, and knapping debris. Most of the horse bones did not appear to have been affected by hyena gnawing, however a number of long bones appear to have been deliberately smashed to extract the marrow.

1.8.1.13 The Leicestershire Historic Environment Record contains 100 sites recorded as having a Palaeolithic date, the distribution of which is shown in Figure 11.

1.8.2 The Mesolithic

1.8.2.1 The Mesolithic or 'Middle Stone Age' is the period spanning *c.* 10,000-6,000 ya and in Britain is often equated with a period of rapid environmental change as the end of the last ice age saw a rapid warming of the climate and widespread changes in vegetation pattern. The open late glacial environments were replaced by pioneer forests of birch and pine which, as temperatures continued to rise, gave way to species such as elm and lime (Myers, 2006). There was also a change in the fauna as species more suited to the postglacial forests such as red deer, roe deer, auroch, boar and elk replaced horse, arctic hare and reindeer. The combination of the warming in climate and the retreat of the glacial ice sheets together with a rise in sea levels culminated in Britain being separated from the continent.

1.8.2.2 By around 10,000 ya evidence for new technologies began to appear across much of Britain. These include assemblages containing distinctive small sharp blades called microliths. Technology changes would seem to indicate changes in hunting techniques which themselves may reflect developing economic strategies and social territories (Cooper, 2004).

1.8.2.3 Several surveys have produced evidence, mainly in the form of lithic scatters, for a Mesolithic presence in the study area. This includes sites at Medbourne, Brooksby, Grace Dieu Priory and around Misterton. Stratified flints have also been found at Croft below the alluvium next to a palaeochannel along with further work revealing a number of sub-alluvial features including partial ring slots. Stratified deposits were also found at Ridlington where a pit was found to contain 50 flints including a microlith. Most recently in 2009 over 5,000 worked flints were found below the ploughsoil at Asfordby during archaeological work carried out in advance of a residential development. Worked flint from the site included flint cores, blades, flakes, scrapers and piercers. Targeted investigation also revealed a

charcoal rich former hearth and several postholes and arcs of stones, suggesting the possible position of tent-like structures. The material recovered suggests that people occupying this site were making and repairing flint weapons and tools on a large scale and it is probable that the range of activities identified from the site will have been associated with subsistence hunting.

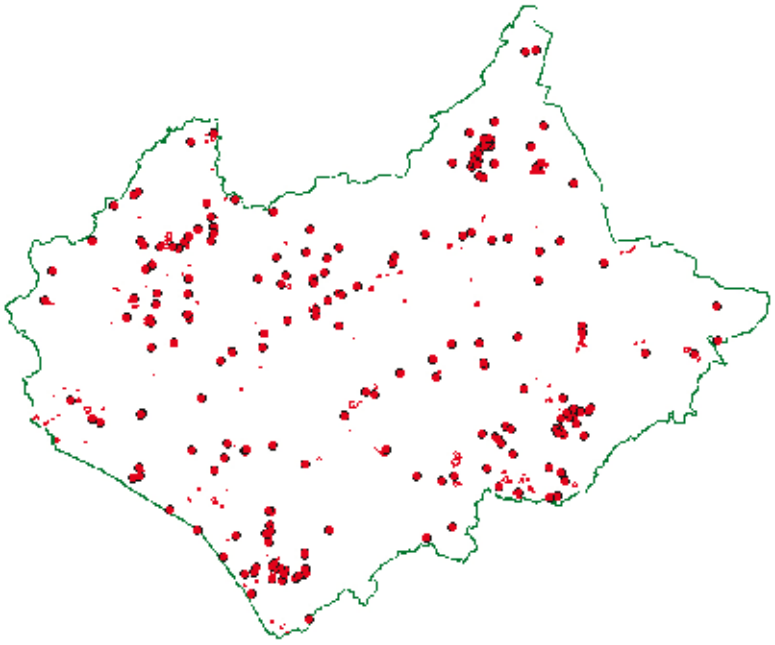


Figure 12. Mesolithic Sites and Find Spots Recorded on the Historic Environment Record

1.8.2.4 The Leicestershire Historic Environment Record contains 380 sites recorded as having a Mesolithic date, the distribution of which is shown in Figure 12.

1.8.3 The Neolithic

1.8.3.1 The Neolithic, or New Stone Age, is often characterised as being a period that witnesses major societal changes from hunting and gathering lifestyles to a more sedentary subsistence economy based upon domesticated animals and cereal production. However, it has become apparent in recent years that this is an over simplified picture and that the Neolithic, spanning the period from *c.* 6,000-4,500/4,200 ya, offers both continuities and contrasts with the periods that came before and after (Whittle, 1999). Further to this the Neolithic may be split into Early (*c.* 6000-54/5300 ya), Middle (*c.* 54/5300-50/4900 ya) and Late (*c.* 5000/4900-45/4200 ya) phases. Alternatively a split of Earlier Neolithic (*c.* 6000-4800 ya) and Later Neolithic/earlier Bronze Age (*c.* 4800-3500 ya) is often used.

1.8.3.2 Geographically the East Midlands is an incredibly diverse region, this diversity of landscapes encompassing highland and lowland zones and including fenland and coastal areas. This diversity will be reflected in the archaeology as Neolithic communities will have employed a variety of techniques designed to exploit a range of contrasting environments (Clay, P. 2006).

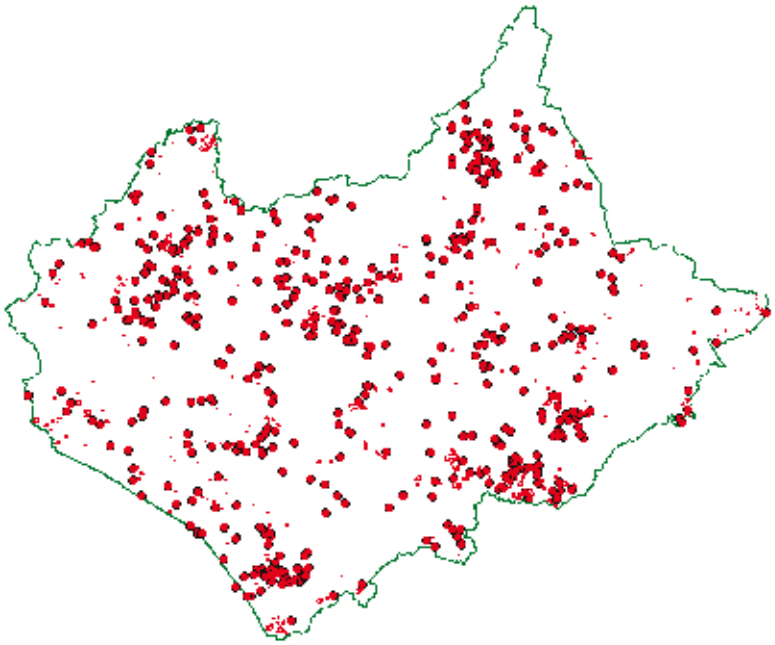


Figure 13. Neolithic sites and Find Spots Recorded on the Historic Environment Record

1.8.3.3 It is often difficult to separate evidence from the Late Mesolithic and Early Neolithic since many of the same areas were exploited and there would appear to be a slow and gradual change in the technologies employed and cultural traditions. Much of the evidence for the Earlier Neolithic in Leicestershire and Rutland comes in the form of lithic material and cropmarks. The lithic evidence is most common and comes in the form of surface scatters of flint and stone artefacts including cores, flakes, blades, scrapers, knives and arrowheads. Surface finds of this kind however, only provide an indication of the distribution of recently disturbed sites. Analysis of the lithic data for Leicestershire and Rutland identified seventeen Early Neolithic 'core

areas' occurring on sands and gravel, Northampton Sand and Liassic Clays but with most from boulder clay substrata at an average height of 111m OD (Clay, 1999).

1.8.3.4 Possibly the earliest recorded evidence for this period comes from Croft close to the confluence of the Thurlaston Brook and the River Soar. Excavations here revealed small circular or sub-circular structures tentatively dated on nearby lithics to the Late Mesolithic or Early Neolithic (Beamish, 2004).

8.3.5 No clearly recognisable Early Neolithic monuments had been identified within the study area until relatively recently with the discovery of two opposed Long or Mortuary enclosures at Eye Kettleby, Melton Mowbray which have been dated to this period by form and an associated pit containing Early Neolithic pottery.

1.8.3.6 Prior to development geophysical survey at Husbands Bosworth identified a causewayed enclosure which bears similarities with relatively close neighbours at Barholm in Lincolnshire and Briar Hill, Northamptonshire. A limited excavation of the site produced decorated pottery with an early Neolithic date.

1.8.3.7 For the Later Neolithic twenty five 'core area' were identified by Clay (1999) from the evidence of lithic scatters. These were again located mostly on boulder clay though at a slightly lower average height of 104.3m OD.

1.8.3.8 The contribution of developer-led archaeological investigation to the research agendas for this period can be seen in the recovery and identification of Neolithic ceramics; Late Neolithic Grooved Ware pottery has been recovered from sites at Rothley Lodge, Thurmaston, Syston and Wanlip, whilst Impressed Wares have been excavated at Lockington, Enderby, Husbands Bosworth, Oakham and Braunstone.

1.8.3.9 It seems likely that the landscape across much of the British Midlands remained one dominated by woodland. However, it has also been suggested that as the Neolithic progressed woodland cover was significantly denuded as new technologies combined with the immigration of people introducing cereal crops and domestic animals cleared and developed their capacity to manage woodland (Rackham, O. 1989, 2003). There is pollen data from Hemington, near the confluence of the Rivers Trent and Derwent, for cereal production dating to 2880-2475BC. Elsewhere within the study area, such evidence may be regarded as scant and it has been suggested that many groups remained woodland and not field dwellers (Beamish, 2004). In support of this, environmental information, including pollen and insect fauna for the Early Neolithic derived from palaeochannel deposits near at Croft and from Kirby Muxloe, indicate a landscape of undisturbed mixed woodland.

1.8.3.10 It is likely that the Neolithic would have been a period during which many different groups of people would have been employing a variety of subsistence strategies including the herding of animals, limited cultivation along with hunting and gathering and the exploitation of resources which

would probably have required a level of seasonal mobility.

1.8.3.11 Communication links and pathways to aid access to food and other resources would have been vital. Streams and rivers would have provided the most obvious permanent communication and boundary network making the confluences and heads of rivers important. It may be that the confluence of the Soar and Wreake had local significance as did Husbands Bosworth at the watershed for the Avon, Welland and Soar.

1.8.3.12 Across the study area there are 1035 sites or find spots recorded in the Historic Environment Record which fall either entirely or partly within the Neolithic the distribution of which is shown in Figure 13.

1.8.4 The Bronze Age

1.8.4.1 The Bronze Age in Britain, which conventionally spans the period *c.*2000-800BC, can be characterised by the introduction of new metal working technologies and the introduction of new techniques for the production of flint tools. The introduction of new pottery designs during this period is also regarded as significant.

1.8.4.2 The archaeology from the Early Bronze Age (*c.* 2,000-1,500BC) indicates strong continuities with the Late Neolithic despite the introduction of metal working as communities continue to employ traditional subsistence strategies including herding and cereal cultivation.

1.8.4.3 Across Leicestershire and Rutland, in common with the other areas of the country, the most frequently occurring monument type is the round barrow and although some ring ditches may be small ceremonial enclosures many are more likely to be the remains of ploughed out barrows (Clay, 2004). Excavations of barrows and ring ditches have been carried out at Cossington, Eaton, Lockington, Melton Mowbray, Oakham, Sproxton, Tixover, and most recently at Earl Shilton. Whilst there are wide variations in funerary practices during this period the general trend seems to be a movement away from communal burials towards some acknowledgement of the individual. The building of round barrows will have served a function other than funerary; the role of the dead was shifting from being commemorated as ancestral guardians of the land to one where their monuments provided markers denoting a group's historic control and rights over a territory (Parker Pearson, 1999).

1.8.4.4 Pottery with an Early Bronze Age date has been found at several locations in Leicestershire and Rutland including examples of Beaker, Collared urn and food vessel.

1.8.4.5 Although settlement evidence has proved to be elusive, inference from known burials suggests that by the Early Bronze Age there was some expansion onto land that had been previously unexploited.

1.8.4.6 For the Middle Bronze Age, spanning the period *c.* 1,500BC-1,000BC, there are no known settlement sites within the project area although there is

the possibility that some areas identified from surface scatters as later Neolithic to earlier Bronze Age may have continued into the Middle Bronze Age. Woodland clearance seems to continue into the Middle Bronze Age. Environmental evidence recovered from an old river channel, or palaeochannel, at Castle Donington suggests that during this period the landscape of this area contained limited woodland and an increase in meadowland and pastureland species. At Lockington crop production may also be inferred from spelt wheat recovered among charred remains found in a pit cluster.

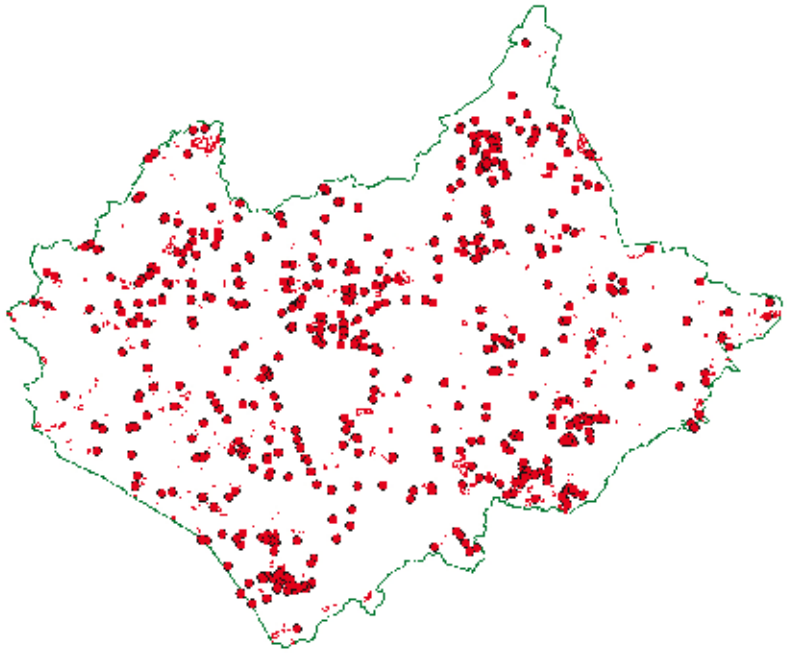


Figure 14. Bronze Age Sites and Find Spots Recorded on the Historic Environment Record

1.8.4.7 Across the study area, although relatively rare, there is some settlement evidence which may be attributed to the Late Bronze Age (*c.* 1,000-800BC) with sites at Glen Parva, Kirby Muxloe, Melton Mowbray, Eye Kettleby and Ridlington in Rutland. The Late Bronze Age is a period of climatic deterioration with lower temperatures and increased rainfall. By the Late Bronze Age an increased use and availability of metal tools enabled more efficient and rapid woodland clearance and more intensive management of the land. Evidence points to management of the landscape, notably with the formation of extensive field and boundary systems, at Eye Kettleby. Pit alignments, for example which, may have functioned as boundary markers, could well have been also associated with the settlement pattern.

1.8.4.8 Across Leicestershire and Rutland there are1311 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the Bronze Age, the distribution of which is shown in Figure 14.

1.8.5 The Iron Age

1.8.5.1 The Iron Age across most of Britain is generally taken to cover the period 800 BC-AD 43 with the end of the period being marked by the Roman invasion. As with other periods in prehistory there is no single horizon that clearly marks the transition from the Late Bronze Age. The Iron Age is typically defined by a number of attributes including the construction of hillforts and development of new domestic pottery types, both of which have been shown to have origins in the Late Bronze Age. The Iron Age also sees the gradual introduction of iron technology and by the end of the period major social and economic changes were occurring (Haselgrove, C. 1999).

1.8.5.2 By the earlier part of the period settlement appears to be well organised with small settlements and farmsteads being most common. Animal husbandry was becoming increasingly important and this would have been complemented by the cultivation of grains and legumes and the hunting and gathering of some wild foods.

1.8.5.3 Some of the more permanent Early Iron Age settlements, Beacon Hill, Burrough Hill, Breedon Hill and Buddon Wood for example, within the study area are located on hilltops and ridge tops surrounded by defensive ditches and ramparts. The defensive nature of these settlements may be an indicator of an increasing pressure on the land, a need to establish territories and consequent conflict between neighbouring groups or tribes (Clay, P. 2004).

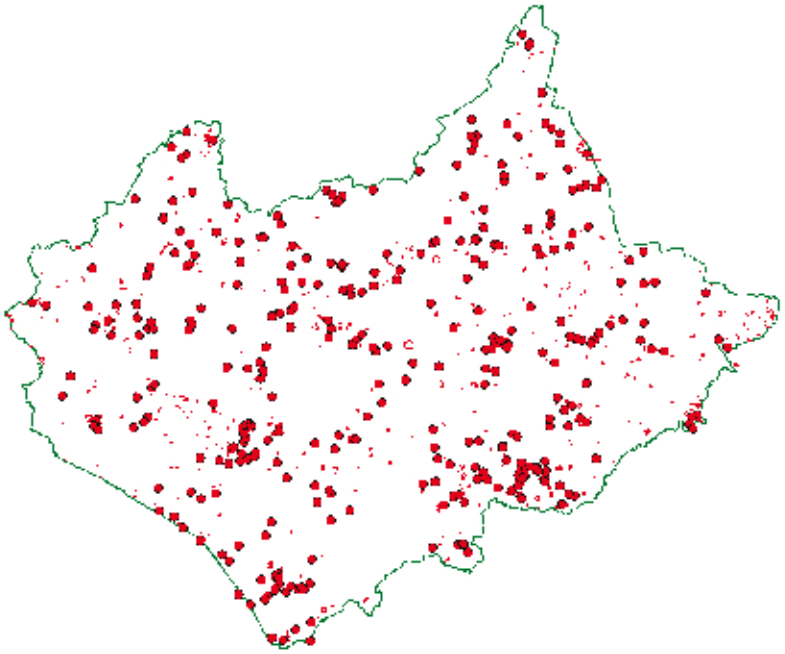


Figure 15. Iron Age Sites and Find Spots Recorded on the Historic Environment Record

1.8.5.4 By the Late Iron Age there is increasing evidence for settlement in Leicestershire and Rutland much of which has been identified from cropmark evidence. Most settlement continues to have been in the form of small farmsteads; however it is during the latter part of the Iron Age that larger, agglomerated settlements with significantly larger populations begin to appear (e.g. Humberstone, Beaumont Leys and Lockington). The Late Iron Age for

Leicestershire and Rutland was a period of significant change which might be characterised by a rapidly increasing population, the establishment of larger scale settlements, including Leicester which by the time of the Roman invasion was manufacturing coins and had trading links with the continent. The major settlement at Leicester which was within the southern extent of the area occupied by the *Corieltavi* may have been the tribal capital.

1.8.5.5 Across the study area there are 1098 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the Iron Age, the distribution of which is shown in Fig. 15.

1.8.6 Roman

1.8.6.1 The Roman invasion of AD43 and subsequent pacification of the indigenous tribes brought Britain into much closer contact with the Mediterranean world. The archaeological evidence for the Roman occupation may be placed into four broad categories. First, there is the evidence relating to the military occupation, secondly, that relating to urbanisation, thirdly, the spread of Roman cultural influence beyond the urban centres and finally the evidence for what was happening in the countryside.

1.8.6.2 It seems likely that it was the scale of the initial victory of the Roman military under the command of Aulus Plautius over the British which was to prompt Claudius into deciding to create a British province (Jones, B. and Mattingly, D. 1990). The following years between AD 43 and 60 are generally regarded as a period of conquest during which the Roman forces established control over most of Britain. Within four years of the invasion the south-east, areas of the south-west and the Midlands were under Roman rule.

1.8.6.3 Within the study area there is very little known evidence for the military campaign. The conquest period fortress at Mancetter on Watling Street is located just over the border in Warwickshire and evidence for an early fort at Leicester is not conclusive (Taylor, 2006). The only other evidence for a military presence comes from Great Casterton in Rutland and two other possible locations; one at Wigston Parva in south-west Leicestershire and one at Sawley in the extreme north-west of the county.

1.8.6.4 Three of Roman Britain's most important roads: Watling Street, Fosse Way and Ermine Street pass through the study area. In addition the Gartree Road, linking Leicester to Colchester, has also been shown to continue its path north-west in the direction of Chester. Other known roads within the study area include routes from Leicester south-west to Mancetter; one partially known from Leicester to Tripontium; the Salt Way linking Ermine Street and the Fosse Way and continuing into Charnwood; King Street Lane linking Thistleton and Goadby Marwood (possibly continuing to *Margidunum* near Bingham, Nottinghamshire); Sawgate Lane along the southern side of the Wreake/Eye Valley linking Thistleton with the Fosse. This communication network clearly illustrates that Leicester was an important hub. There is, however, a need to think beyond the simple mapping of roads and consider how individual routes would have been influenced by a Roman reading of the

landscape and how their construction may have facilitated political control over an area (Taylor, J. 2006).

1.8.6.5 Leicester (*Ratae Corieltavorum*) is one of two major urban settlements in the East Midlands, the other being Lincoln (*Lindum Colonia*). Although evidence for a conquest period fort is still a matter of some speculation, what is clear is that Leicester developed on the site of an important Late Iron Age settlement located on the east bank of the River Soar. The formal laying out of the town did not occur until the end of the 1st and beginning of the 2nd century, possibly coinciding with the town's formal appointment as a *civitas* capital. The main phase of public building did not begin until the end of Hadrian's reign (AD 117-138) reign and into that of Antoninus Pius (AD138-161); Leicester in terms of its municipal buildings does appear to be a late starter when considering the provincial context (Cooper, N. J. and Buckley, R. 2004). Archaeological work in the city has identified the forum, bathhouse, a temple and market place (*macellum*).

1.8.6.6 Beyond *Ratae Corieltavorum* there is evidence for at least twelve Roman small towns across the study area; Witherley/Mancetter (*Manduessedum*) bisected by Watling Street and lying both in Leicestershire and Warwickshire, High Cross (*Venonae*), Caves Inn Farm (*Tripontium*), Market Harborough, Medbourne, Great Casterton, Thistleton/Market Overton, Goadby Marwood, Frisby/Kirby Bellars, Willoughby on the Wolds/ Wymeswold (*Vernemtum*), Barrow-on-Soar/Quorndon and Ravenstone/Ibstock. These small towns are fairly evenly spaced across the study area and appear to have been nucleated, with all definite sites on known Roman roads and possibly all at or near road junctions. Most are also close to river or stream crossings. Other typical characteristics of these sites include a significant number of coin finds, no more than one larger stone building with other buildings being mostly timber or stone strip constructions, evidence of late Iron Age settlement, evidence of industry and/or a religious complex and often an apparent significant relationship with a villa.

1.8.6.7 Pottery and tile production and metal-working are the two most archaeologically visible industries with evidence for both in urban and rural contexts. Large-scale pottery production was being carried out at Mancetter with production also at Ravenstone, Market Overton, Great Casterton and Leicester. Fieldwalking in west Leicestershire has revealed a number of pottery production sites notably around the margins of the medieval extent of Leicester Forest and the southern margin of Charnwood (Liddle, P. 1999). Large scale iron working is known at Goadby Marwood, Thistleton, Medbourne and Great Casterton. At Ridlington, Clipsham, Whitwell and Eaton evidence has been found for iron working within a rural context. Other industries such as leather processing, brewing and baking would no doubt have been common but are less easy to find (Liddle, P. 2004).

1.8.6.8 Agriculture would have represented the largest single form of land use and most settlements in the countryside are likely to have been involved in some form of farming activity. A crude distinction may be made between those buildings termed either as villas or farmsteads. The former would typically have been stone and tile buildings, whilst the latter were, in all

probability, timber and thatch constructions. Leicestershire and Rutland's countryside during the Roman period would have been, for the most part, a well developed agricultural landscape with significant cereal production and processing. There were three extensive areas of woodland during the medieval period at Leicester Forest, Charnwood Forest and Leighfield Forest; fieldwork in these areas suggests that they may have already been in existence during the Roman period (Liddle, P. 2004).

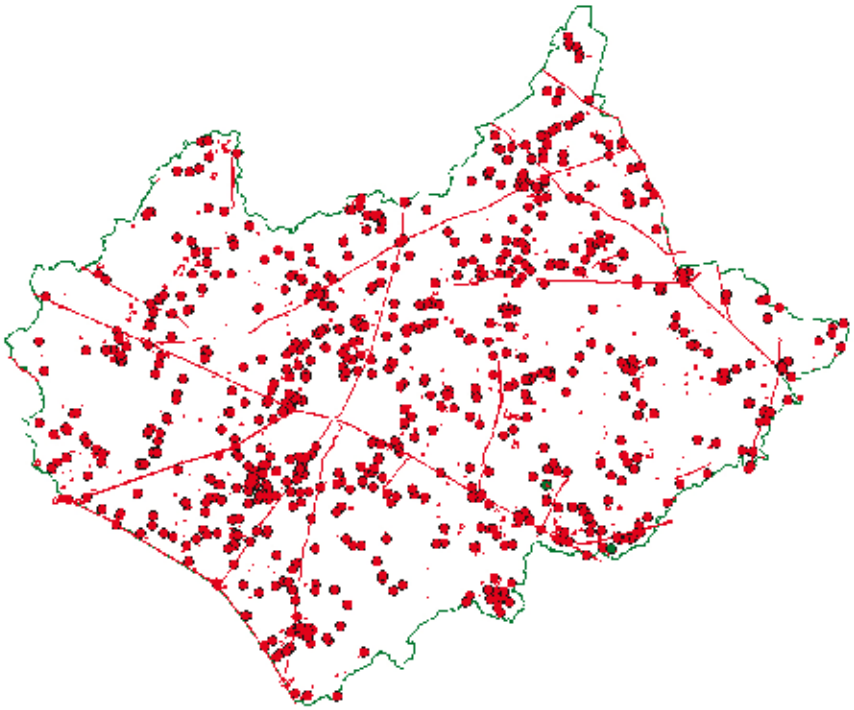


Figure 16. Roman Sites and Find Spots Recorded on the Historic Environment Record

1.8.6.9 Across the study area there are 1578 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the Roman period, the distribution of which is shown in Fig. 16.

1.8.7 Anglo Saxon

1.8.7.1 Following the departure of Roman forces in the early part of the 5th century central power in Britain disintegrated as numerous warring groups under the leadership of indigenous and invading tribal leaders vied for control of territories. By the 7th century however a number of larger kingdoms were beginning to emerge. In England these kingdoms were Northumbria, Mercia, East Anglia, Kent and Wessex. For a period it seemed as though the Midlands kingdom of Mercia under Offer might form the core of a consolidated English kingdom. Mercia however was under considerable pressure from Viking attack during the 9th century and instead it was the kings of Wessex who expanded from their West Saxon kingdom south of the Thames to eventually conquer the rest of England during the 10th century (Hills, C. 1999).

1.8.7.2 Until relatively recently evidence for Anglo-Saxon Leicestershire and Rutland was largely confined to the results gained from extensive fieldwalking

programmes and the recovery of Saxon cemeteries from small scale quarrying during the 18th and 19th centuries. However modern, largely developer led, excavations have significantly improved our knowledge of the period (Liddle, P. 1999).

1.8.7.3 There is a direct association between Saxon cemeteries and burials and the Roman towns at Leicester, Medbourne, Great Casterton, Barrow/Quorn, Kirby Bellars, Wymeswold/ Willoughby and Mancetter. At Ibstock/Ravenstone a timber hall has been excavated with an Anglo-Saxon date attributed, as has been the case with material recovered from Goadby Marwood. The only known Roman settlements not to have reported Anglo-Saxon material are High Cross, Caves Inn and Thistleton although for the last two cemeteries have been found less than a mile away. This might suggest that towns retained some significance into the Anglo-Saxon period. However there is little evidence that they retained an urban character or continued to perform an economic function. Urbanism appears to have been alien to Saxon traditions and the general picture, particularly during the earlier phase of this period, would seem to suggest that across the study area much settlement would have been characterised as dispersed and impermanent farmsteads. Relatively large sites such as Eye Kettleby with perhaps as many as ten buildings and which included a hall at some point could have had some form of administrative function associated with them (Knox, R. 2004).

1.8.7.4 With the departure of the Romans there appears to have been a significant decline in the population which combined with political and economic instability may have contributed to an apparent increase in woodland cover (Muir, R. 2000). However this is a view for which there is not universal agreement and there may indeed have been little fluctuation in levels of woodland from the Iron Age into the Anglo-Saxon period (Squires, T. pers. comm)

1.8.7.5 Between the 7th and 9th centuries across large parts of central England, including Leicestershire and Rutland, the farmsteads were abandoned in favour of nucleated settlements that were to take the form of villages and towns. This concentration of the population can be associated with significant changes to the agricultural regime. The enclosed landscapes of the Roman and early Saxon period were replaced by the open field system probably around the end of the 9th or beginning of the 10th century although precise origins are unclear. The open fields would have been sizable areas of land subdivided into a large number of narrow strips called lands which were further grouped into blocks called furlongs. These furlongs were further grouped into larger areas called fields which were hedgeless and occupied virtually all of the available land; the strips of each farmer would be distributed over the fields. There was a communal element to this system since all the farmers would grow the same crops in a field which would be left fallow every second or third year and resources such as the oxen team would be pooled.

1.8.7.6 It is clear that major landscape changes were taking place across the study area during the Anglo-Saxon period and these changes are reflected in the modern landscape of Leicestershire and Rutland, most particularly the nucleated nature of the bulk of the settlement. Ridge and furrow earthworks

have long been a significant feature of the landscape of the area. These features have, particularly since the second half of the 20th century, come under considerable threat from modern agricultural practices. Substantial areas of ridge and furrow have been lost to ploughing denuding the integrity of important heritage assets which have long been considered as being a defining characteristic of Leicestershire and Rutland's rural landscape.

1.8.7.7 By the 870s much of the East Midlands had come under Danish control with Leicester becoming an important fortified town or burh. Although it is unclear as to what the extent of Danish immigration and settlement was the distribution of Viking names is particularly remarkable in north-east Leicestershire along the Wreake Valley and its tributaries where almost three quarters of the place-names are either wholly or partly Viking in origin. It has, however, been noted by Bourne (2003) that the persistence of a significant number of Anglo-Saxon place-names would suggest that the colonisers did not totally displace the existing population and that geological evidence might also indicate that much Scandinavian settlement was located on the less desirable soils.

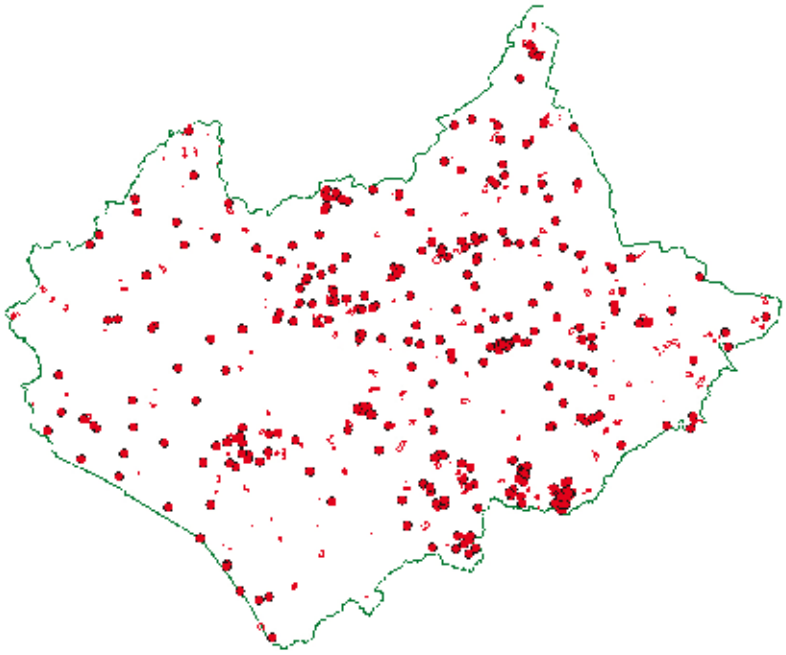


Figure 17. Anglo-Saxon Sites and Find Spots Recorded on the Historic Environment Record

1.8.7.8 Across the study area there are 716 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the Anglo-Saxon period, the distribution of which is shown in Fig. 17.

1.8.8 Medieval

1.8.8.1 The period AD 1050-1500 in Britain may be divided into three successive phases the first of which from 1050 to 1300 was a period of growth both in the towns and the countryside. There then followed a period of crises during the early and mid 14th century which included the Black Death. Finally there was a period of mixed fortunes from around 1350 to 1500 during which, in England, London became increasingly dominant whilst across the

rest of the country some towns prospered while others went into decline (Schofield, J. 1999).

1.8.8.2 By the time of the Norman Conquest Leicester was already established as a town and retained its position throughout the medieval period at the top of the settlement hierarchy across the study area. Leicester's status is reflected by the fact that it had several (specialist) market places, a large castle, several parish churches and religious houses and, from early on, a mint. Commerce and industry also played a significant role for Leicester with cloth manufacture and wool and leather working being important for the town's prosperity. In addition Leicester also had an important administrative function and would have exercised a considerable influence politically, commercially and socially across much of the rest of the project area.

1.8.8.3 Below Leicester in the settlement hierarchy sat the market towns of Ashby-de-la-Zouch, Castle Donington, Hallaton, Hinckley, Loughborough, Lutterworth, Market Bosworth, Market Harborough, Melton Mowbray and in Rutland, Oakham and Uppingham. All of these have market places with several (Ashby-de-la-Zouch, Castle Donington, Hallaton, Oakham and Hinckley) having castles. Several market towns also contain minor religious houses (Castle Donington, Hinckley, Loughborough, Lutterworth and Melton Mowbray) along with inns and large churches.

1.8.8.4 The relationship between towns and the countryside during the medieval period is one that does not seem to be fully understood. It has, however, been suggested that the relatively high number of deserted settlements close to the larger market towns of the study area may be corroboration for the theory that the high mortality rate in urban areas was offset by immigration from the surrounding countryside (Lewis, C. 2006).

1.8.8.5 Across the study area, beyond the larger towns, the predominant settlement type is one of nucleated villages. Some villages have market charters and/or market places. Almost all villages have a parish church or chapel; many would also include a manorial complex, moated sites, fishponds and dovecotes. Most villages seem to have been established during or soon after the 9th century and are closely associated with the reorganisation and establishment of the open field system.

1.8.8.6 Woodland was an important resource throughout the medieval period and needed to be carefully managed. Despite the aim to achieve a regime of sustainable management between 850 and 1500 clearances, which may be attested by documents and place-names, may have resulted in reduced woodland cover in places. However such reductions in cover may not have been significant and it doesn't appear to be the case that there were clearances in Leicester Forest or Leighfield Forest.

1.8.8.7 Hunting parks were introduced into England by the Normans and although the Domesday Book records thirty-six being in existence by 1086 none appear in Leicestershire or Rutland (Cantor, L. and Squires, A. 1997). It is possible that many of these could represent some continuity with the late Anglo-Saxon 'multiple estates' that would each have formed part of a larger

royal administrative unit, or *regio.* Possible Anglo-Saxon estates have been suggested for The Langtons, Hallaton, Claybrooke, Market Bosworth and Lyddington (Bourne, J. 1986). Hunting was very popular amongst Norman nobility and the establishment of Royal Forests placed severe restrictions upon those living there. Over time higher nobles were granted land and many established their own hunting areas called Chases which were administered under less oppressive common law. As trees and deer became more scarce and many Royal Forests and Chases contracted, carefully managed hunting parks developed as a way of maintaining the supply of game. These hunting parks were often well wooded and would typically occur on the edge of a lord's manor. The perimeter of the area would be marked by a deep ditch and bank and a fence would be erected to contain the deer. At least fifty-five hunting parks are known to have existed in Leicester and eleven in Rutland (Cantor, L. and Squires, A. 1997) with woodland being the most important factor accounting for their distribution across the two counties. The incorporation of woodland into deer parks is often the most significant factor accounting for its survival into the early modern period and, in some cases, into the present. Most woodland, particularly within the study area, is located in areas that prove to be difficult for agriculture and the Royal Forests of Leicestershire and Rutland were both on heavy clays. It is also perhaps important to note that parks were established for a variety of reasons of which hunting would have been just one. Parks also played an important social and economic function within local communities. The shallow, stony and infertile soils of Charnwood Forest made it an ideal location for the ten parks that ring the area. There are also large concentrations of parks on the uplands of south-west Leicestershire and in the north-west on the border with Derbyshire.

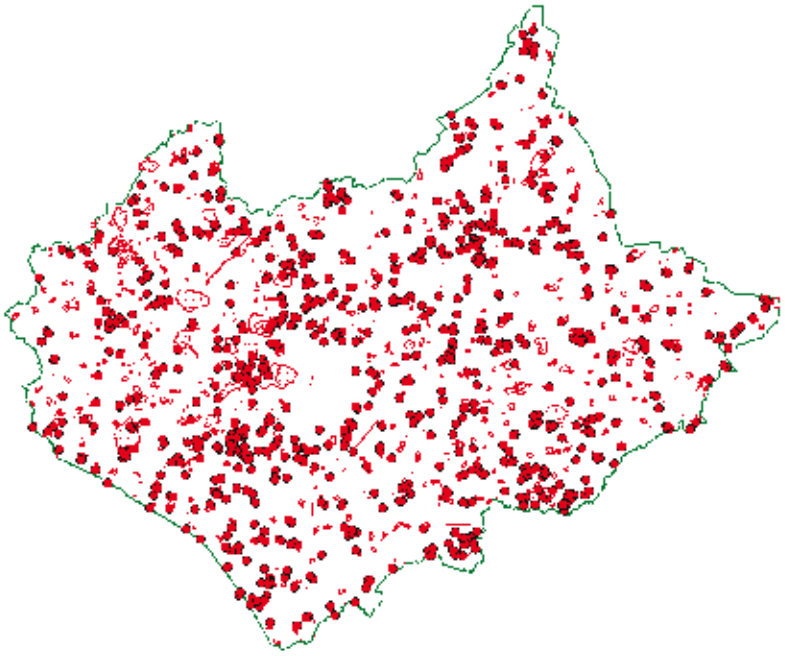


Figure 18. Medieval Sites and Find Spots Recorded on the Historic Environment Record

1.8.8.8 Across the study area there are 3,873 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the medieval period, the distribution of which is shown in Fig.17.

1.8.9 Post-medieval

1.8.9.1 The post-medieval period spanning the early 16th to the end of the 19th centuries is generally seen as a period of transition between the medieval or feudal world and the birth of modern capitalism (Courtney, P. 2006). The period differs from earlier ones in so far as many buildings and landscape features figure significantly within the modern landscape.

1.8.9.2 In terms of landscape development one of the dominate themes of this period is the process of enclosure. The ridge and furrow arable of the open field system is replaced with enclosed pasture. At the same time many landscape parks and gardens were created often on the sites of former villages.

1.8.9.3 The earlier part of this period, 1500-1750, sees gradual changes in the agrarian economy and landscape with enclosure having a major impact upon local communities. Society was becoming increasingly stratified at the bottom of which was a growing landless class. The process of enclosure seems to have had a depopulating effect in the countryside and many cottagers or smallholders would have been severely affected by the loss of common rights entailed with Parliamentary enclosure. Early enclosure dating from the mid 15th to the mid 18th centuries tended to be by agreement and was piecemeal in nature and within the project area was predominant in the south-west and central eastern parts. Early enclosure may be traced in the modern landscape where field boundaries follow the line of the ridge and furrow producing hedge lines with a characteristic reverse S or dog-leg morphology.

1.8.9.4 Agricultural improvements accelerated during the 18th century which included new scientific systems for the breeding of cattle and sheep and new approaches to crop rotation and drainage (Campion, G. 2006). New planned farms began to develop away from the nucleated villages. The enclosure patterns also became more planned in appearance from the late 18th century with many boundaries being redrawn and laid out formally by surveyors. This reorganisation had a dramatic impact both upon the landscape and people; with a growth of larger holdings employing a growing range of mechanised agricultural innovations, coupled with a continued shift in emphasis away from arable towards pasture, all contributed towards population movements. Prior to enclosure, the majority of the population was located on the eastern side of the project area; the less fertile and shallower soils over a significant parts of western Leicestershire had resulted in a far lower density of population. This picture was changing dramatically by the late 18th century and can be linked not only to changes in the predominant agricultural regime but also to the move towards industrialisation occurring in the western half of the project area.

1.8.9.5 The continued decline in woodland cover across the project area is another important theme with, during the early 17th century, the complete disafforestation of Leicester Forest and a significant reduction in the number of trees across what was the traditionally well wooded area of Charnwood (Hartley, R. F. 2000). This process of disafforestation would also appear to be

occurring with Leighfield Forest.

1.8.9.6 For the earlier part of the post-medieval period the major industries of the project area continued to be farming and the wool and leather trades. Slate quarrying was important in the Swithland and Groby areas and arounf Coleorton by 1500 coal mining had become a well-organised industry. The hosiery industry also became established during this period with the first reference to a stocking-frame coming from Hinckley in 1640. By 1812 there were over 13,000 frames in workshops mainly in the western part of Leicestershire. By the end of the 18th century power spinning of wool and worsted using steam power had been introduced into Leicestershire and despite initial resistance to mechanisation a large number of mills were built during the first decades of the 19th century. Associated industries also developed in the western parts of Leicestershire including dyeing and finishing works and elastic web manufacture, incorporating a rubber thread into knitted fabric.

1.8.9.7 Boot and shoe manufacturing was another major manufacturing industry and by the late 19th century had developed into an industry producing footwear for markets beyond the local area. By the end of the 19th century and the beginning of the 20th a large number of multi-storey boot and shoe factories had been built, many specialising in ladies and children's footwear, both in Leicester and the fast developing suburbs such as North Evington and Humberstone (Neaverson, P. 2000).

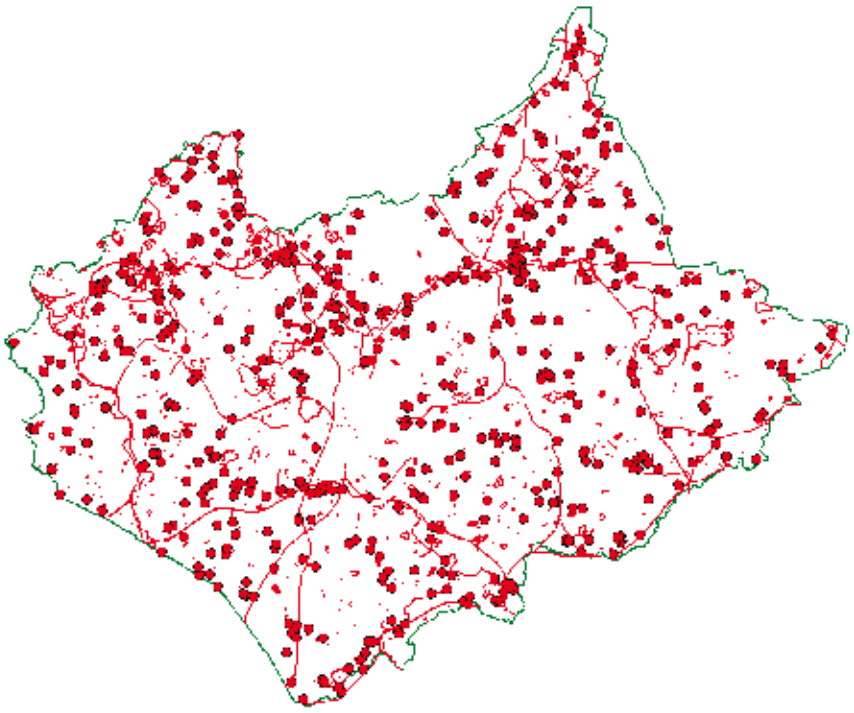


Figure 19. Post-medieval Sites and Find Spots Recorded on the Historic Environment Record

1.8.9.8 As they became more mechanised both the textile and the boot and shoe industries required support trades, prompting many blacksmiths to start making needles for knitting machines and nails and rivets for shoe making. Millwrights became machine makers and a number of general engineering companies were established in Leicester and also Loughborough, many of

which were specialist businesses such as The Brush Company with its core business in electrical engineering and transport.

1.8.9.9 Extractive industries increased in importance during the 19th century and again these were concentrated on the western side of Leicestershire; deep coal mining was underway early on during the 19th century. In both the north-west, central (Barrow Upon Soar) and east of Leicestershire limestone was burnt to produce lime for mortar and cement and used for agricultural improvement. Limestone was also extensively quarried in Rutland and the even grained stone taken from the quarry at Ketton was particularly suited to the 17th and 18th century fashion for a smooth ashlar finish on buildings (Stocker, D. 2006).

1.8.9.10 Also to become, and remaining, important was the quarrying of stone, sand and gravel. Coal and mineral resources are concentrated in western Leicestershire and their presence is responsible for industries which as well as having a dramatic, if localised, effect upon the landscape have stimulated urban growth in this part of the county.

1.8.9.11 The transport infrastructure has been to some extent linked to industrial growth and urban expansion. Several routes across the study area follow the routes of Roman roads and by the beginning of the 19th century almost 300 miles of road had been turnpiked. During the late 18th century improvements opened the River Soar for navigation first as far as Loughborough and then later to Leicester to form part of the Grand Union Canal, the construction of which was driven by the need to move coal and stone.

1.8.9.12 Railways also played a significant role in facilitating the growth of Leicestershire's fast developing industrial base. The Leicester and Swannington line opened in 1832 in order to bring coal into Leicester and throughout the rest of the 19th century the rail network continued to expand across the county.

1.8.9.13 The growth of industry and large scale coal and mineral extraction in Leicester and western parts of the county coupled with improved transport links impacted upon the settlement pattern. In Leicester, along the River Soar and in the coalfield of the north-west of the county, urban expansion was rapid, whilst at the same time in the east of the project area the population was in decline.

1.8.9.14 Across the study area there are 6,373 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the early post-medieval period, the distribution of which is shown in Fig. 19.

1.8.10 Modern

1.8.10.1 The period from 1900 to the present day has seen dramatic and rapid changes in the character of the landscape both locally and on a national level. In the countryside particularly since the Second World War, agriculture has become increasingly mechanised and intensive. Large scale field boundary loss has during this period occurred right across the study area with the highest levels of hedge removals most apparent in east Leicestershire and Rutland. There has also been a significant loss of ridge and furrow earthworks across the study area. The price of grain and other crops can be subject to dramatic variations; when spikes in the market make it economically viable new areas of ridge and furrow are ploughed and crops sown; as a consequence landscape scale features with origins in the Anglo-Saxon period are lost for what is often a very short-term economic gain. In recent years some attempt has been made to halt this process through programmes such as the Higher Level Stewardship Scheme administered by Natural England. These can offer farmers financial incentives for sympathetic maintenance of important historic or archaeological features and landscapes.

1.8.10.2 The management of woodland has over the course of this period also become more industrialised and the requirements for timber during both the First and Second World Wars considerably affected levels of broadleaved tree cover. One significant development during the second half of the 20th century saw the replanting of ancient woodlands with conifers. This has had a radical effect upon the native flora and consequently fauna of those areas which changes to accommodate the new conditions. This is a practice which has in recent years been halted with recent initiatives aimed at encouraging woodland regeneration with native broad leaved species. The establishment of the National Forest has also been a significant development which has dramatically increased levels of woodland cover in areas of north-west Leicestershire.

1.8.10.3 Improvements to the transportation network have included the building of major roads and motorways such as the M1 and M69 across the study area. Improved transport infrastructure has facilitated the growth of industries providing a stimulus to urban expansion. The road network itself can also be seen as a significant landscape element influencing greatly the character of an area.

1.8.10.4 Over the course of the 20th century the urban centres, most notably Leicester and the towns in western Leicestershire, have expanded considerably. This sits in contrast with the eastern parts of the project area where beyond the larger market towns, which have experienced some growth, population densities remain much lower. Eastern Leicestershire and Rutland remains characterised, to a large extent, by nucleated villages which have experienced relatively little growth during the 20th century.

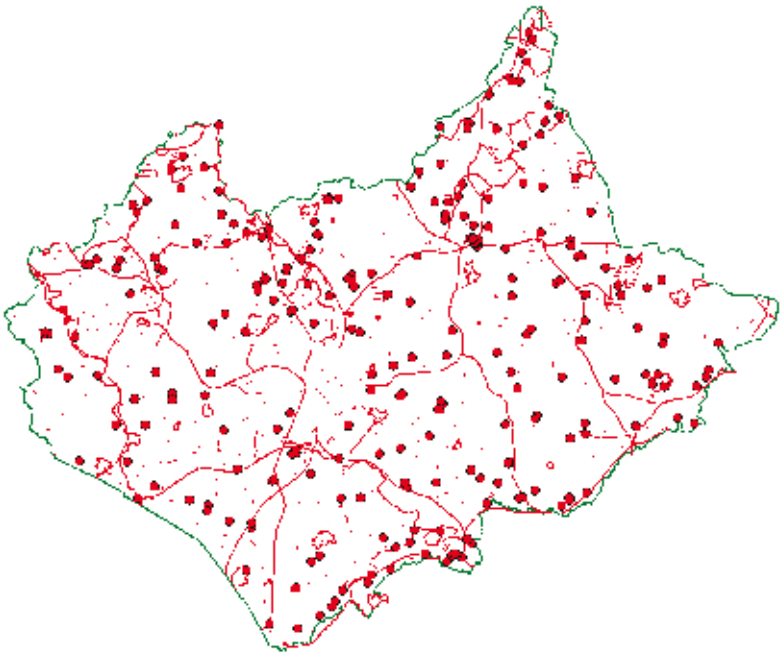


Figure 20. Modern Sites and Find Spots Recorded on the Historic Environment Record

1.8.10.5 Across the study area there are 3,216 sites or find spots recorded on the Historic Environment Record which fall either entirely or partly within the modern period, the distribution of which is shown in Fig. 20.

1.9 Methodology

1.9.1 Defining Polygons

1.9.1.1 The project was predominantly a desk based exercise drawing from a variety of data sources. The data gathering process was followed by analysis where the landscape of the project area was defined firstly by its Broad Character Type; then, at a more refined level, by its Historic Landscape Character Type. This was carried out through the mapping of areas, utilising the County Council's Geographic Information System (GIS) package, MapInfo. The process of characterisation is one which is relatively straightforward. Areas sharing predefined attributes are mapped as polygons within MapInfo each covering a discrete geographical area. It is these polygons which through the analysis of HLC attributes can be assigned a single historic landscape character type. These form the basic building blocks for HLC.

1.9.1.2 The mapping process for the LLR HLC can be viewed as being relatively mechanistic. The method uses attempts to draw out the broad patterns which can be identified at a landscape level. Each of the HLC polygons is defined on the basis that most of the area included can be interpreted as belonging to the same attribute group or HLC Broad Type, for example woodland or enclosed land. Within each of these polygons a common set of attributes is dominant so, for example, if an area is defined as belonging to the Enclosed Land attribute group then all of the enclosures should have common characteristics. To illustrate, a group of enclosures that are predominantly large, rectilinear and have straight boundaries will probably be defined as belonging to the Planned Enclosure HLC Type. Most of the area within a polygon will also be interpreted as having the same previous landscape character. So, for example, a polygon may contain evidence of medieval strip, perhaps through the presence of ridge and furrow earthworks, this will allow a Previous Character Type of Strip Fields to be assigned to the polygon.

1.9.2.3 Generally, in rural areas, the minimum size for LLR HLC polygons was 1ha since it becomes more difficult to determine landscape character for areas smaller than this. Within an urban context it is possible to define areas at a smaller size. These were generally small areas of growth or redevelopment within or around the fringes of settlements. However, for the purposes of the project, where possible, an effort was made to avoid small polygon sizes.

1.9.2.4 The methodological approach adopted for the LLR HLC is, for the most part, an attribute based one; meaning descriptive criteria and the use of field morphology are employed to determine current HLC Types. This attribute led approach, in which a series of rules are applied to each polygon helps to maintain a level of objectivity and consistency throughout the characterisation process.

1.9.2. Data Structure and Capture

1.9.2.1 Each of the polygons created through the mapping process has data attached. The structure of the LLR HLC data is largely determined by the HLC module of the exeGesIS HBSMR database. However the Broad Types, HLC Types and associated attributes are tailored to meet the requirements of the study area. These attributes are analysed in order to create the final Historic Landscape Character Types.

1.9.2.2 Each of the landscape units within the database and associated GIS polygons are assigned to a basic classification category. These basic classifications are known as Broad Types. For the LLR HLC there are to twelve Broad Types which are listed below.

Character Code	**Broad Attribute Types**
UNE	Unenclosed Land
FIE	Fields and Enclosed Land
ORC	Orchards and Allotments
WDL	Woodland
IND	Industrial
EXT	Extractive
MIL	Military
OPR	Ornamental, Parkland and Recreational
SET	Settlement
CAM	Civic and Commercial
TRA	Transportation
WVF	Water and Valley Floor

1.9.2.3 Each of these Broad Types is further divided into more specific Historic Landscape Character Types (e.g. Piecemeal Enclosure, Small Assarts, etc.). Each landscape unit must be assigned a Broad Type, and different attributes are defined for the HLC polygon, depending on which Broad Type it has been assigned. Other data is also recorded for the HLC polygon, including Period and multiple Previous HLC Types. This system allows each landscape unit to be allocated a specific HLC Type through analysis of the data collected, to ensure a measure of objectivity and a standardised approach to the HLC process.

1.9.2.4 The first level of data capture is set out in the upper section of the HLC data form (Figure 21). Each time a new record is created a unique identifying number is assigned to it. Key information is then entered.

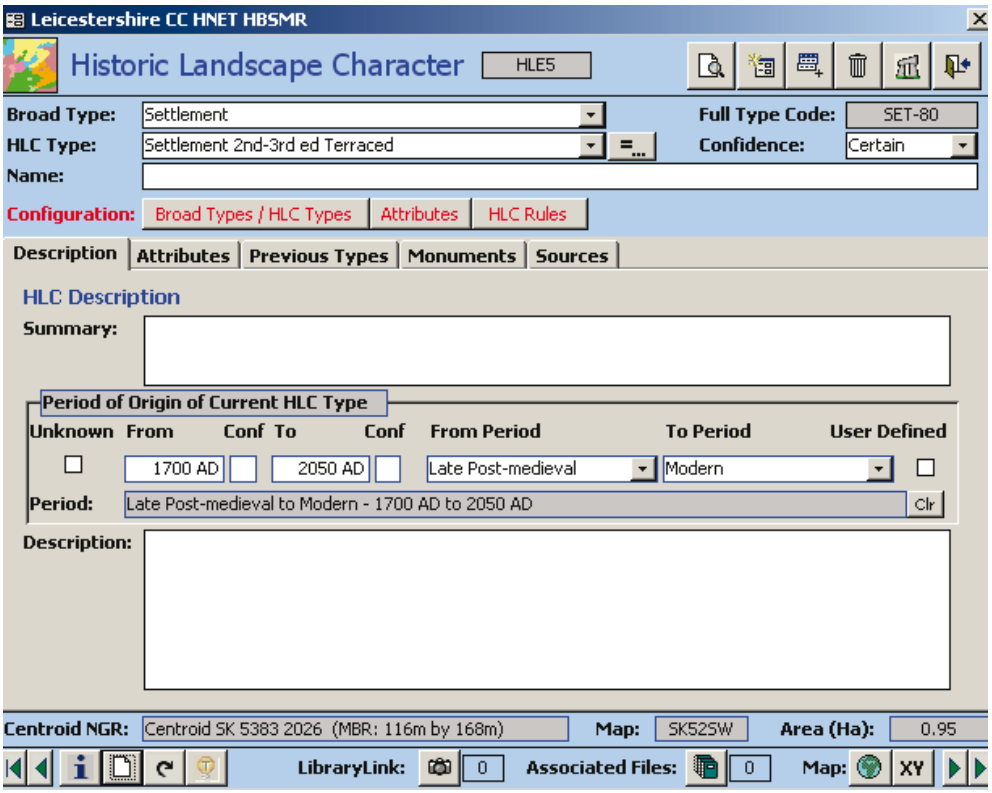


Figure 21. Historic Landscape Character Detail Form

• ***Broad Type*** – this is chosen from the previously configured picklist of Broad Attribute Types already outlined. This field is compulsory and other data may not be entered until a Broad Type has been assigned.

• ***HLC Type*** – this is the sub-classification of the Broad Type and can be either chosen from a previously configured picklist or allocated on the basis of pre-configured rules by clicking the 'Determine Type' button. HLC Types are listed below.

• ***Full Type Code*** - this field consists of the Broad Type code, followed by the HLC Type code, with a hyphen separating the two. The codes for each type are created by the system administrator during configuration, and the appropriate code for a record is generated automatically by the system when the types are allocated to a record.

• ***Confidence*** - The interpretation of a landscape unit's character as determined. For the purposes of the LLR HLC confidence will be classified as either 'Certain' (indicating that there is no doubt about the interpretation), 'Probable' (suggesting that the interpretation is highly probable i.e. over 80% chance) or 'Possible' (suggesting that an interpretation is possible but not certain i.e. over 50% chance).

• ***Name*** – this is a free text box which in most cases will not be used except in situations where a landscape unit also forms an identifiable and named site such as a landscape park.

• ***Configuration*** – this is available for system administrators only. By clicking on one of the configuration buttons the system administrator is taken to the relevant configuration screen. The HLC module will allow for the configuration of new HLC Types with associated attribute rules whilst characterisation is in progress.

1.9.3 Rule-Based Determination of HLC Types

1.9.3.1 HLC Types can be allocated to an HLC record on the basis of a set of pre-defined rules. Within the HBSMR HLC module these rules consist of defined parameters against which each HLC record is tested. If the data collected for an HLC record matches these defined parameters, the user can choose to assign to the record the resulting HLC Type specified by the rule to which the record conforms. Once a Broad Type and any other relevant data has been entered into an HLC record, clicking the 'Determine Type' button will display the Matching HLC Types dialog box, showing the ID number of the rule to which the record conforms, and the resulting HLC Type attached to that rule (Figure 22).

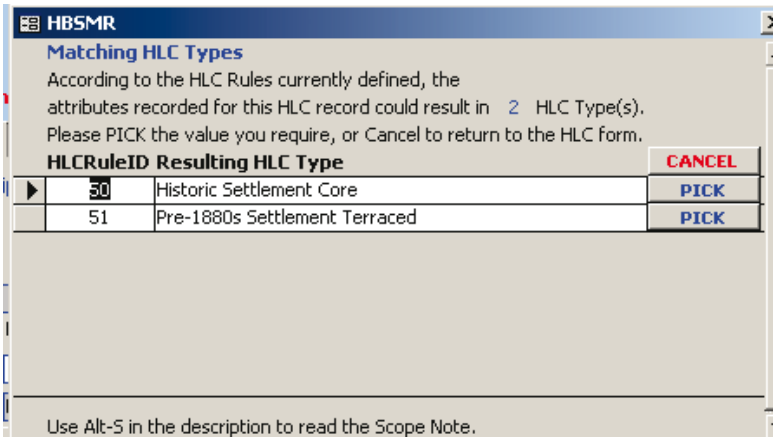


Figure 22. Historic Landscape Character Matching Types Form

1.9.3.2 Records may conform to more than one rule. When this happens a list of all the rules to which the record conforms is displayed. It is possible at this stage to either choose to pick an HLC Type, in which case the dialog box closes and the resulting HLC Type is stored in the HLC Type field, or cancel the operation, in which case the dialog box closes and no changes are made to the data. HLC Types may also be allocated manually by selecting one from the pull-down list instead of using the 'Determine Type' button.

1.9.4 The Main Form

1.9.4.1 The main form of the HBSMR HLC module consists of a series of tabs. The first of these is the Description Tab (see Figure 21). This has two free text fields for a Summary and Description, both of which are optional. Also to be filled in under this tab is a Period of Origin for the Current HLC Type. The Period of Origin of the current HLC Type is entered and stored in the same way as the Period information is entered elsewhere in the HBSMR, and uses the same look-up table.

1.9.4.2 Each of the Broad Types can be associated with up to eight attributes. This helps to maintain objectivity and consistency when it comes to assigning HLC Character Types. Attributes first need to be configured through the administrator's Attribute Type configuration form and associated with a broad Type. When a Broad Type is now chosen the attributes will appear on the Attributes Tab (Figure 23) with each attribute field having a pull-down list of values.

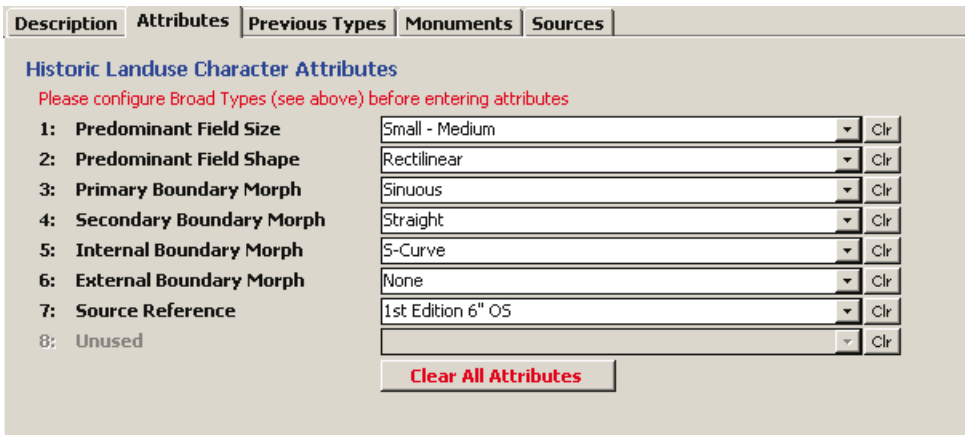


Figure 23. Historic Landscape Character Attributes Tab

1.9.4.3 Attribute groups will have attributes attached; these are defined when a polygon is assigned to a group. Attributes are determined by reference to a variety of source data. Below is a summary of the attribute groups.

Attribute Group	Attribute
Unimproved Land	Enclosed (Yes/No)
	Elevation (higher ground [≥ 244m], lower ground [< 244m]
	Ground Type (heathland, rough pasture, other common)
Fields and Enclosed Land	Predominant Field Size (small, small-medium, medium-large, large-very large)*
	Predominant Field Shape (irregular, rectilinear)
	Predominant Boundary Morphology (straight, sinuous, curvilinear)
	Secondary Boundary Morphology (straight, sinuous, curvilinear, none)
	Other Internal Boundary Morphology
	Other External Boundary Morphology (sinuous, settlement edge, line of communication [e.g. road, canal, railway], woodland, none)
	Percentage of fields lost since 1st Ed 6" OS
	Interpretation of previous character
Orchards and Allotments	Present on 1st ED 6" OS (yes, no)
	Orchards/Allotments (orchard, allotment)
Woodland	Ancient Semi-Natural Woodland (yes, no)
	Forestry Commission Designation (Broadleaved, Coniferous, Felled, Mixed, Shrub, Young Trees, None)
	Present on 1st Ed OS Map (yes, no)
	Predominant Boundary Morphology (straight, sinuous, curvilinear)
Industrial	Source Reference
Extractive	Type of Extraction (Stone, Sand and gravel, Open cast coal, Deep coal, Clay, Gypsum)
	Active / Inactive
Military	Type of Installation (Airfield, Barracks, Depot)
	Current Use (Abandoned, Active but used for other purposes, Still used by the military)
Ornamental, Parkland and Recreational	Type (Garden or designed landscape, Golf course, Race course, Sports ground/fields, Other parkland
Settlement	Type (Historic Settlement Core, Pre-1880s Settlement Terraced, Pre-1880s Settlement Semi Detached, Pre-1880s Settlement Detached, Settlement 1st-2nd ed Terraced, Settlement 1st-2nd ed Semi Detached, Settlement 1st-2nd ed Detached, Settlement 2nd-3rd ed Terraced, Settlement 2nd-3rd ed Semi Detached, Settlement 2nd-3rd ed Detached, Settlement 3rd-4th ed Terraced, Settlement 3rd-4th ed Semi Detached, Settlement 3rd-4th ed Detached, Settlement Pre-1970s Terraced, Settlement Pre-1970s Semi Detached, Settlement Pre-1970s Detached, Settlement Post-1970s Residential Development, Country House, Farm Complex.
Civic and Commercial	Type (Municipal and civic, Educational, Hospitals, Commercial and retail)
Transportation	Type (Major road junction, Train station/sidings, Canal lock/basin, Service station, Civil airports/airfields.
Water and Valley Floor	Type (Marsh, Open water, Raised bog/ moss, Floodplain)
	Natural Open Water (Yes, No)
	Artificial Water Body (Lake or pond, marl pits, reservoir)

* For the purposes of the LLR HLC field size is defined as follows.
Small Fields =<2ha
Small-Medium Fields = 2.1-4ha
Medium-Large Fields = 4.1-8ha
Large-Very Large Fields = >8.1ha

1.9.5 Previous Character Types

1.9.5.1 The HBSMR HLC module allows for the entry of multiple Previous Broad and HLC Types (Figure 24) to be recorded for each of the landscape areas. Previous Types have to be configured by the administrator which may then be selected using pull-down lists. Determination of the Previous HLC Type may be seen as perhaps less objective than for the Current Type since this is determined by the HLC officer's own analysis of the map data and not determined through rule based criteria. However so long as the officer is aware of these criteria and bears them in mind when ascribing a Previous Type to a polygon an adequate level of consistency can be maintained. The date of origin for an HLC polygon can be entered in the Period box. A Confidence box provides a field in which it is possible to measure the degree of certainty about the interpretation of a polygon's previous landscape character. Free text notes may also be entered within the Previous Types Tab to record any other relevant information.

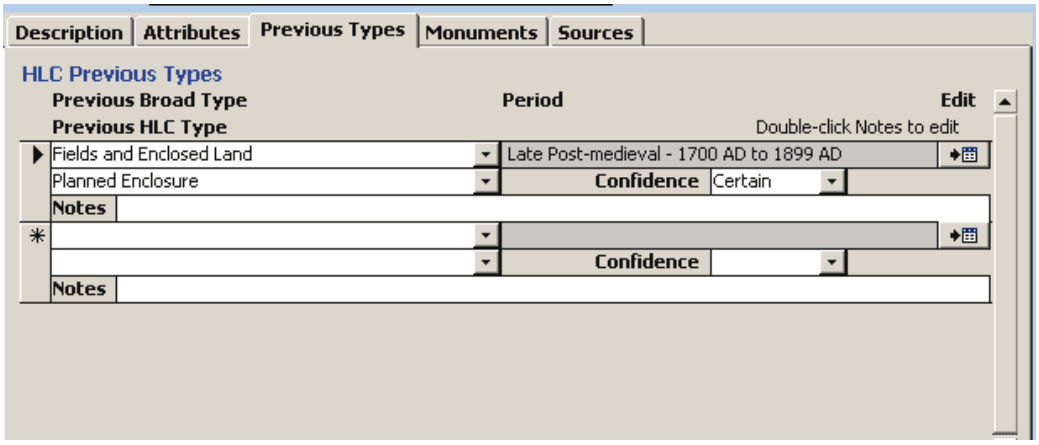


Figure 24. Historic Landscape Character Previous Types Tab

1.9.5.2 The two remaining tabs on the Main form are the Monuments Tab and the Sources Tab. The first of these allows the user to record any associated monuments linked to an HLC area. The second allows for sources directly related to an HLC record to be recorded.

1.9.6 Current Historic Landscape Character Type Definitions

1.9.6.1 Each of the polygons created through the HLC process will be assigned a current historic landscape character type. These character types along with their definitions are listed below.

Unenclosed Land

Historic Landscape Character Type	HLC Code	Description and Interpretation
Heathland	UNE-1	Generally below 244m OD this category distinguishes areas of heathland as identified by English Nature's Lowland Heathland Inventory.
Other Commons	UNE-2	This includes areas of common land which do not fall into the above category this includes areas of low lying ground which may have been used for communal grazing but which on the basis of place name evidence do not appear to have been heathlands.

Enclosed Land

Historic Landscape Character Type	HLC Code	Description and Interpretation
Irregular Squatter Enclosure	FIE-3	Field systems characterised by small irregular fields with boundaries dominated with a sinuous or curvilinear morphology. Often associated with networks of lanes, access tracks or small cottages these field systems have an unordered appearance. These systems may be associated with quarries, mining or other industrial activity. Often indicative of encroachment onto common land in the post-medieval or industrial periods.
Rectilinear Squatter Enclosure	FIE-4	The morphology of these field systems is one of small rectilinear fields with straight boundaries and has a more planned appearance than 'irregular squatter enclosure' and again often associated with networks of lanes, access tracks and small cottages. These systems may be associated with quarries, mining or other industrial activity. Often indicative of encroachment onto common land in the post-medieval or industrial periods.
Paddocks and Closes	FIE-5	Small irregular fields distinguished from the 'other small fields' character type by their location on the edge of settlements. These will in many cases represent small meadows and paddocks.
Small Assarts	FIE-6	Small irregular or rectilinear fields which appear to have been created through woodland clearance. Typically these will border or occur close to areas of ancient woodland.
Large Assarts with Sinuous Boundaries	FIE-7	Large irregular or rectilinear fields probably created through the clearance of woodland. This category includes fields which have been created through the post-1880s amalgamation of small assarts. This character type will border or occur in close proximity to areas of ancient woodland.

Planned Woodland Clearance	FIE-8	Small and large rectilinear or irregular field patterns typically having straight boundaries which appear to have been created through woodland clearance. These will either border or occur in close proximity to areas of ancient woodland.
Small Irregular Fields	FIE-9	Areas of small irregular fields not assigned to one of the other historic landscape character types. Includes small meadows and closes not occurring next to settlement boundaries.
Piecemeal Enclosure	FIE-10	This character type may be defined as field systems created out of the medieval open fields by means of informal, presumably verbal, agreements between farmers wishing to consolidate their holdings (Beresford, 1949). This process appears to have been underway in Leicestershire around the late 16th and early 17th centuries. Enclosure within this category will be characterised by small irregular or rectilinear fields with at least two boundaries exhibiting an 's-curve' or 'dog-leg' morphology indicating that they are following boundaries of former strip fields.
Re-organised Piecemeal Enclosure	FIE-11	Small irregular or rectilinear fields that have lost 10% or more field boundaries since the 1st ed 6" map, or areas of large irregular or rectilinear fields. In both cases at least two field boundaries will have an 's-curve' or 'dog-leg' morphology. These enclosure patterns have developed through a process of amalgamation of fields created through piecemeal enclosure. This will, in most cases have occurred since the publication of the 1st Ed. 6" OS map.
Drained Wetlands	FIE-12	This character type includes small or large, irregular or rectilinear fields. Most of the boundaries will be defined by the course of drainage ditches, some boundaries may also follow water courses.
Planned Enclosure	FIE-13	Either small or large enclosures with a predominantly straight boundary morphology giving a geometric, planned appearance. Laid out by surveyors these field patterns are the result of later enclosure during the 18th and 19th centuries. Included in this character type are commons enclosed by Act of Parliament.
Planned Enclosure Containing Ridge and Furrow	FIE-14	Either small or large enclosures with a predominantly straight boundary morphology giving a geometric, planned appearance. Laid out by surveyors these field patterns are the result of later enclosure during the 18th and 19th centuries. These fields will contain extant ridge and furrow earthwork remains visible on the GIS air photo layer
Other Small Rectilinear Fields	FIE-15	Area of small rectilinear fields not falling into one of the other character types. This group will include small meadows and closes not occurring next to settlement boundaries.
Other Large Rectilinear Fields	FIE-16	Large rectilinear fields exhibiting a significant number of sinuous boundaries, which cannot be assigned to one of the other character types. This group will include enclosure patterns created through the amalgamation of fields since the publication of the 1st Ed. 6" OS map.

Large Irregular Fields	FIE-17	Large irregular fields exhibiting a significant number of sinuous boundaries, which cannot be assigned to one of the other character types. This group will include enclosure patterns created through the amalgamation of fields since the publication of the 1st Ed. 6" OS map.
Very Large Post-War Fields	FIE-18	Very large fields, over 8.1ha and often significantly larger, created since the publication of the 1st Ed. 6" OS map. In most cases this will be the result of Post-War agricultural improvements intended to meet the requirements of intensive arable cultivation.

Orchards and Allotments

Historic Landscape Character Type	HLC Code	Description and Interpretation
Pre-1880s Orchards	ORC-19	Orchards marked on both the 1st Ed. 6" map and on the modern OS map base. These will date to the post-medieval or early to mid 19th century.
Post-1880s Orchards	ORC-20	Orchards which are marked on the modern OS map base but are absent from the 1st Ed. 6" OS map. These orchards will have been planted at some point over the past 125 years.
Pre-War Allotments	ORC-21	Allotments laid out prior to the Second World War and marked on the 1950s OS map and the modern OS map base. This category will include 19th century "pleasure gardens".
Post War Allotments	ORC-22	Allotments marked on the modern OS map base but which do not appear on the 1950s map. Consequently these allotments will probably have been laid out at some point over the last 50 years. It should be noted however that the OS were inconsistent in their recording of allotments.
Pre-1880s Nursery/Horticulture	ORC116	Areas marked on 1st Ed 6"/25" OS as Nurseries or containing greenhouses probably for commercial horticultural purposes.
Post-1880s Nursery/Horticulture	ORC117	Areas not marked on 1st Ed (as above) OS but which appear on the modern OS map layers as nurseries or containing greenhouses probably for commercial horticultural purposes.

Woodland

Historic Landscape Character Type	HLC Code	Description and Interpretation
Broadleaved Ancient Woodland	WDL-23	Woods identified by the Forestry Commission as being broadleaved and designated by English Nature as 'Ancient Semi-Natural'. This category will include the county's oldest woods some of which are likely to date to at least the medieval period. These areas have the potential for containing well preserved archaeological sites and relict landscapes dating to the Roman and prehistoric periods.
Mixed Ancient Woodlands	WDL-24	Woods identified by the Forestry Commission as being mixed and designated by English Nature as 'Ancient Semi-Natural'. This category will include the county's oldest woods some of which are likely to date to at least the medieval period, however some parts may have been planted with coniferous species. These areas have the potential for containing well preserved archaeological sites and relict landscapes dating to the Roman and prehistoric periods.
Replanted Ancient Woodlands	WDL-25	Woods designated by English Nature as Ancient Semi-Natural but identified by the Forestry Commission as containing conifers or young trees. It follows that theses areas represent woods which are likely to have been cleared/felled and replanted during the 19th or 20th century.
Broadleaved Woods with Sinuous Boundaries	WDL-26	Woods identified by the Forestry Commission as having a predominantly broadleaved component and which have sinuous boundaries. Whilst not designated as 'Ancient Semi-Natural' these areas may potentially contain fragments of older managed woodlands.
Mixed Woods with Sinuous Boundaries	WDL-27	Woods identified by the Forestry Commission as being mixed and which have sinuous boundaries. These areas may represent stands of older woodland colonised by or partially planted with conifers.
Coniferous Woodland with Sinuous Boundaries	WDL-28	Woodland designated by the Forestry Commission as coniferous and having sinuous boundaries. In most cases these are likely to represent plantations.
Other Woods with Sinuous Boundaries	WDL-29	Woods with no Forestry Commission designation. This is usually because they are less than 2ha. in size or identified as having either been felled or containing young trees. The boundaries of these areas have a predominantly sinuous morphology.
Broadleaved Plantation	WDL-30	Identified by the Forestry Commission as broadleaved. Here straight boundary morphology or the wood's name will suggest plantation at some point during the 19th or 20th century.
Mixed Plantation	WDL-31	Identified by the Forestry Commission as mixed. Here straight boundary morphology or the wood's name will suggest plantation at some point during the 19th or 20th century.

Coniferous Plantation	WDL-32	Identified by the Forestry Commission as coniferous. Here straight boundary morphology or the wood's name will suggest plantation at some point during the 19th or 20th century.
Other Plantation	WDL-33	Woods with no Forestry Commission designation. This is usually because they are less than 2ha. in size or identified as having either been felled or containing young trees. Here straight boundary morphology or the wood's name will suggest plantation at some point during the 19th or 20th century.

Industrial

Historic Landscape Character Type	HLC Code	Description and Interpretation
Post-1880s Industrial Complex	IND-34	Modern industrial complexes type unidentified. Includes industrial estates, large factories. Most of these will have a late 20th century date.
Pre-1880s Industrial Complex	IND-35	Industrial complexes type unidentified. Includes industrial estates, large factories and sewage farms. Most of these will have a late 18th or 19th century date.
Derelict Industrial Land	IND-36	Former industrial sites which have been cleared and had no subsequent development on them.
Other Works	IND-109	This category includes sites such as water treatment plants, power stations and sub-power stations covering an area over 1ha.
Engineering and Metal Working	IND-112	Industrial complexes and factories identified by OS mapping as being for engineering or metal working.
Textiles, Boot & Shoe and Associated Industries	IND-113	Industrial complexes and factories identified through the OS as being associated with the textile or boot and shoe industry. This category will include hosiery and lace making, dyeing and associated warehousing.

Extractive and Landfill

Historic Landscape Character Type	HLC Code	Description and Interpretation
Stone Quarries	EXT-37	Stone quarries in active use. Will normally be large modern quarries run by aggregates/ construction companies.
Abandoned/Restored Stone Quarries	EXT-38	Disused Stone Quarries. This category will usually consist of larger stone quarries created during the 19th and early 20th century. This category also includes areas that have been through some process of landscape restoration.
Sand and Gravel Quarry	EXT-39	Active Sand and gravel extraction identified through LCC Minerals and Waste GIS data and Modern OS Mapping.
Abandoned/Restored Sand and Gravel Quarry	EXT-40	Abandoned Sand and gravel extraction sites identified through LCC Minerals and Waste GIS data and Modern OS Mapping. This category also includes areas that have been through some process of landscape restoration.
Open Cast Coal Mines	EXT-41	Active open cast coal mines identified through LCC Minerals and Waste GIS data and Modern OS Mapping.
Abandoned/Restored Open Cast Coal Mines	EXT-42	Abandoned open cast coal mines identified through LCC Minerals and Waste GIS data and Modern OS Mapping. This category also includes areas that have been through some process of landscape restoration.
Abandoned/Restored Deep Coal Mines	EXT-43	Abandoned deep coal mines identified through LCC Minerals and Waste GIS data and Modern OS Mapping. This category also includes areas that have been through some process of landscape restoration.
Clay Extraction	EXT-44	Active brick and fire clay extraction identified through LCC Minerals and Waste GIS data and Modern OS Mapping.
Abandoned/Restored Clay Extraction	EXT-45	Abandoned brick and fire clay extraction sites identified through LCC Minerals and Waste GIS data and Modern OS Mapping. This category also includes areas that have been through some process of landscape restoration.
Gypsum Extraction	EXT-46	Active gypsum extraction site identified through LCC Minerals and Waste GIS data and Modern OS Mapping.
Abandoned/Restored Gypsum Extraction	EXT-46	Abandoned gypsum extraction sites identified through LCC Minerals and Waste GIS data and Modern OS Mapping. This category also includes areas that have been through some process of landscape restoration.
Landfill	EXT-115	Landfill sites recorded on the LCC Minerals and Waste GIS TAB. These will generally have a post-war date and typically be former quarry sites.

Military

Historic Landscape Character Type	HLC Code	Description and Interpretation
Barracks/Training Ground	MIL-48	Current military bases identified from modern OS map base. Most of these will have been built during the 20th century.
Military Depots	MIL49	Military storage facilities identified from the modern OS map base.
Former Ordnance Depot Now Used For Other Purposes	MIL-50	Areas characterised as having been used for munitions storage, typically during the Second World War, but are currently used for other purposes such as industrial units or storage although the military architecture continues to form the dominant historic landscape type.
Abandoned Ordnance Depot	MIL-51	Areas characterised as having been used for munitions storage, typically during the Second World War which have now been abandoned but continue to form the dominant historic landscape type.
Military Airfield	MIL-52	Areas identified from the modern OS map base as active military airfields or airbases.
Military Airfield Abandoned	MIL-53	Areas given over as military airfields, probably constructed during the Second World War which have since been abandoned but retain runways and other features identifying them as airfields.

Ornamental, Parkland and Recreational

Historic Landscape Character Type	HLC Code	Description and Interpretation
Parks and Gardens	OPR-54	Parks and gardens identified from the Leicestershire HER, the Historic Parks and Gardens Register and Cantor and Squires' study of the Leicestershire's Parks and Gardens and which can still be identified in the present day landscape. In most cases this will be the result of emparkment during the post-medieval or 19th century but may also include elements of earlier medieval parkland.
Golf Course	OPR-55	Golf courses identified as such from the current OS map base.
Sports Fields	OPR-56	Modern sports fields and stadia identified as such from the current OS map base.
Other Parkland	OPR-57	Other forms of parkland, recreational or ornamental landscapes which do not fall into any of the above categories. This character type will include playing fields and caravan parks.
Cemeteries	OPR-58	Areas identified from the modern OS map base as formally laid out cemeteries. These will typically date to the 19th and 20th centuries.
Racecourse	OPR-110	Horse racing tracks
Public Open Space	OPR-111	Areas of land accessible to the public commonly in an urban context and which have undergone a degree of landscaping, can include wider roadside verges.
Village Greens	OPR-119	Area of common land, often within the historic core of a village, typically used for recreational purposes

Settlements

Historic Landscape Character Type	HLC Code	Description and Interpretation
Historic Settlement Core	SET-59	Historic settlement cores suggested by morphology or data held in the HER. In most cases these represent the extent of the settlement either by the end of the medieval period OR by the beginning of the 19th century. The distinction between the two is made via the period category in the current historic landscape character component of the database.
Pre-1880s Settlement Terraced	SET-60	This category defines the extent of terraced settlement as marked on the 1st edition 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval and 19th century).
Pre-1880s Settlement Semi Detached	SET-61	This category defines the extent of semi detached settlement as marked on the 1st edition 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval and 19th century).
Pre-1880s Settlement Detached	SET-62	This category defines the extent of detached settlement as marked on the 1st edition 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval period or the 19th century).
Settlement 1st-2nd ed Terraced	SET-63	This category defines terraced settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 1st-2nd ed Semi Detached	SET-64	This category defines semi detached settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 1st-2nd ed Detached	SET-65	This category defines detached settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 2nd-3rd ed Terraced	SET-80	This category defines terraced settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.
Settlement 2nd-3rd ed Semi Detached	SET-81	This category defines semi detached settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.
Settlement 2nd-3rd ed Detached	SET-83	This category defines detached settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.

Settlement 3rd-4th ed Terraced	SET-84	This category defines terraced settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement 3rd-4th ed Semi Detached	SET-85	This category defines semi detached settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement 3rd-4th ed Detached	SET-86	This category defines detached settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement Pre-1970s Terraced	SET-87	This category defines the limit of terraced settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Pre-1970s Semi Detached	SET-88	This category defines the limit of semi detached settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Pre-1970s Detached	SET-89	This category defines the limit of detached settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Post-1970s Terraced	SET-90	This category defines the limit of terraced settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s (Following the pilot phase this Type was replaced by Post-1970s Residential Development).
Settlement Post-1970s Semi Detached	SET-91	This category defines the limit of semi detached settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s. (Following the pilot phase this Type was replaced by Post-1970s Residential Development).
Settlement Post-1970s Detached	SET-92	This category defines the limit of detached settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s. (Following the pilot phase this Type was replaced by Post-1970s Residential Development).
Country House	SET-97	Denotes large rural/semi rural buit-up areas usually associated with parkland or designed landscapes. Usually 18th or 19th century in date.
Farm Complex	SET-98	Denotes areas covered by farm houses and associated outbuildings.
Flats and Apartments	SET-103	Multi storey residential buildings. (Following the pilot phase this Type was replaced by Post-1970s Residential Development where appropriate.).
Post 1970s Residential Development	SET-118	This category defines the limit of settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s.

Civic and Commercial

Historic Landscape Character Type	HLC Code	Description and Interpretation
Municipal and Civic	CAM-66	This category includes areas within larger settlements defined by the presence of large civic buildings such as libraries, museums and town halls. This category will include complexes performing similar functions at out of town or urban fringe locations.
Educational	CAM-67	Educational establishments such as colleges, universities and school complexes.
Hospitals	CAM-68	Large hospital complexes.
Commercial and Retail	CAM-69	Large stores, commercial districts and retail parks identified from the current OS map base. These areas will include car parking.
Religious	CAM114	Buildings, complexes and associated grounds which serve a religious function, includes churches, temples, mosques and synagogues.

Transportation

Historic Landscape Character Type	HLC Code	Description and Interpretation
Major Road Junctions	TRA-70	Major road junctions and roundabouts over 1ha in size. These will date from the later half of the 20th century onwards.
Train Stations and Sidings	TRA-71	This category defines train stations, large sidings and cuttings as marked on the current 1:10,000 OS map.
Canal Locks/Basin	TRA-72	This category defines canal locks, basins or wharfs marked on the current 1:10,000 OS map.
Service Stations	TRA-74	Service areas typically associated with motorways and the larger trunk roads and marked on the modern OS map base.
Civil Airports	TRA-75	Airports and airfields for civil use. A number of these will have formerly been for military use and given over to civil use after the Second World War.
Disused Airfields	TRA-120	Disused airports and airfields. Most, if not all, of these will have formerly been for military use and given over to civil use after the Second World War.

Water and Valley Floor

Historic Landscape Character Type	HLC Code	Description and Interpretation
Miscellaneous Floodplain Fields	WVF-76	Areas of enclosure on river floodplain not falling into the Enclosed Land attribute group character types. These are fields which will have traditionally been used as meadows. Areas falling into this category type have the potential for containing the preserved earthwork remains of water meadows.
Artificial Lake/Pond	WVF-77	Lakes or ponds which can be recognised as artificial through the presence of retaining earthworks and/or dams. Include within this character type are ornamental lakes, recreational facilities such as modern fish ponds, flooded quarries and ponds associated with former industrial activity.
Reservoir	WVF-78	Bodies of water created specifically for the purposes of water supply and marked as such on the current maps. These will generally date to the late 19th and 20th centuries.
Natural Open Water	WVF-79	Expanses of open water over 1ha which have natural origins. Typically these will occupy basins formed during the last glaciation.
Moss/Raised Bog	WVF-101	Areas of unimproved peats, formation of which will typically have begun in the prehistoric period. Conditions in theses environments will favour the preservation of organic remains. These also sustain ecologically rich wetland habitats.
Marsh	WVF-102	Areas marked as marsh on the modern OS map base.

1.9.7 Previous Historic Landscape Character Type Definitions

1.9.7.1 The former historic landscape character is recorded through the 'Previous Types' form within the HLC module of HBSMR. It is not always possible to identify or suggest the previous landscape character of a polygon and when this is the case this part of the form will be left blank. However, where a previous character is identified this will usually be done through previous editions of the OS maps or will have been inferred from the current historic landscape character. So, for example, piecemeal enclosure will be assumed to have been derived from medieval strip fields. The HLC module allows for multiple Previous Broad and HLC Types to be entered so it will be possible to chart several phases of change in the character of the landscape.

1.9.7.2 In most cases the same character types, descriptions and HLC codes are used for 'Previous Types' as for 'Current Character Types'. There are however some additions and amendments. These changes are most notable for HLC Types falling within the Woodland Broad Type. The Forestry Commission's inventory of woodland types is a key data set for the identification current HLC Types is based largely upon the interpretation of aerial photography taken between 1991 and 2000. There would be difficulties in applying this interpretation to earlier character types, consequently a shorter list of HLC Character Types are used for Previous Woodland HLC Types. The full list of Previous Character Types is set out below.

Unenclosed Land

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Heathland	UNE-1	Generally below 244m OD this category distinguishes areas of heathland as identified by English Nature's Lowland Heathland Inventory.
Other Commons	UNE-2	This includes areas of common land which do not fall into the above category, this includes areas of low lying which may have been used for communal grazing but which on the basis of place name evidence do not appear to have been heathlands.

Enclosed Land

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Irregular Squatter Enclosure	FIE-3	Field systems characterised by small irregular fields with boundaries dominated with a sinuous or curvilinear morphology. Often associated with networks of lanes, access tracks or small cottages theses field systems have an unordered appearance. These systems may be associated with quarries, mining or other industrial activity. Often indicative of encroachment onto common land in the post-medieval or industrial periods.
Rectilinear Squatter Enclosure	FIE-4	The morphology of these field systems is one of small rectilinear fields with straight boundaries and has a more planned appearance than 'irregular squatter enclosure' and again often associated with networks of lanes, access tracks and small cottages. These systems may be associated with quarries, mining or other industrial activity. Often indicative of encroachment onto common land in the post-medieval or industrial periods.
Paddocks and Closes	FIE-5	Small irregular fields distinguished from the 'other small fields' character type by their location on the edge of settlements. These will in many cases represent small meadows and paddocks.
Small Assarts	FIE-6	Small irregular or rectilinear fields which appear to have been created through woodland clearance. Typically these will border or occur close to areas of ancient woodland.
Large Assarts with Sinuous Boundaries	FIE-7	Large irregular or rectilinear fields probably created through the clearance of woodland. This category includes fields which have been created through the post-1880s amalgamation of small assarts. This character type will border or occur in close proximity to areas of ancient woodland.

Planned Woodland Clearance	FIE-8	Small and large rectilinear or irregular field patterns typically having straight boundaries which appear to have been created through woodland clearance. These will either borer or occur in close proximity to areas of ancient woodland.
Small Irregular Fields	9	Areas of small irregular fields not assigned to one of the other historic landscape character types. Includes small meadows and closes not occurring next to settlement boundaries.
Piecemeal Enclosure	FIE-10	This character type may be defined as field systems created out of the medieval open fields by means of informal, verbal agreements between farmers wishing to consolidate their holdings (Beresford, 1949). This process appears to have been underway in Leicestershire around the late 16th and early 17th centuries. Enclosure within this category will be characterised by small irregular or rectilinear fields with at least two boundaries exhibiting an 's-curve' or 'dog-leg' morphology indicating that they are following boundaries of former strip fields.
Re-organised Piecemeal Enclosure	FIE-11	Small irregular or rectilinear fields that have lost 10% or more field boundaries since the 1st ed 6" map, or areas of large irregular or rectilinear fields. In both cases at least two field boundaries will have an 's-curve' or 'dog-leg' morphology. These enclosure patterns have developed through a process of amalgamation of fields created through piecemeal enclosure. This will, in most cases have occurred since the publication of the 1st ed. 6" OS map.
Drained Wetlands	FIE-12	This character type includes small or large, irregular or rectilinear fields. Most of the boundaries will be defined by the course of drainage ditches, some boundaries may also follow water courses.
Planned Enclosure	FIE-13	Either small or large enclosures with a predominantly straight boundary morphology giving a geometric, planned appearance. Laid out by surveyors these field patterns are the result of later enclosure during the 18th and 19th centuries. Included in this character type are commons enclosed by Act of Parliament.
Planned Enclosure Containing Ridge and Furrow	FIE-14	Either small or large enclosures with a predominantly straight boundary morphology giving a geometric, planned appearance. Laid out by surveyors these field patterns are the result of later enclosure during the 18th and 19th centuries. These fields will contain extant ridge and furrow earthwork remains visible on the GIS air photo layer.
Other Small Rectilinear Fields	FIE-15	Area of small rectilinear fields not falling into one of the other character types. This group will include small meadows and closes not occurring next to settlement boundaries.

Other Large Rectilinear Fields	FIE-16	Large rectilinear fields exhibiting a significant number of sinuous boundaries, which cannot be assigned to one of the other character types. This group will include enclosure patterns created through the amalgamation of fields since the publication of the 1st ed. 6" OS map.
Large Irregular Fields	FIE-17	Large irregular fields exhibiting a significant number of sinuous boundaries, which cannot be assigned to one of the other character types. This group will include enclosure patterns created through the amalgamation of fields since the publication of the 1st ed. 6" OS map.
Very Large Post-War Fields	FIE-18	Very large fields, over 8.1ha and often significantly larger, created since the publication of the 1st ed. 6" OS map. In most cases this will be the result of Post-War agricultural improvements intended to meet the requirements of intensive arable cultivation.
Tofts and Crofts	FIE-99	Former house plots where the dwellings typically lined a road or lane and the plots ran back to a common boundary line.
Strip Fields	FIE-100	This category identifies area which are likely to have formed part of medieval open fields, the presence of which can be suggested through the presence of piecemeal enclosure or ridge and furrow earthwork remains.

Orchards and Allotments

Previous Historic Landscape Character Type	**HLC Code**	**Description and Interpretation**
Pre-1880s Orchards	ORC-19	Orchards marked on both the 1st ed. 6" map and on the modern OS map base. These will date to the post-medieval or early to mid 19th century.
Post-1880s Orchards	ORC-20	Orchards which are marked on the modern OS map base but are absent from the 1st ed. 6" OS map. These orchards will have been planted at some point over the past 125 years.
Pre-War Allotments	ORC-21	Allotments laid out prior to the Second World War and marked on the 1950s OS map and the modern OS map base. This category will include 19th century "pleasure gardens".
Post War Allotments	ORC-22	Allotments marked on the modern OS map bas but do not appear on the 1950s map. Consequently these allotments will have been laid out at some point over the last 50 years.

Woodland

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Ancient Broadleaved Woodland	WDL-104	Woods classified by English nature as 'Ancient Semi-Natural' but no longer having a broadleaved composition according to the Forestry Commission's Woodland Habitat Survey. For the purposes of HLC it is therefore assumed that theses are areas are ones that would have formerly have been characterised as ancient broadleaved woodland.
Other Broadleaved Woodland	WDL-105	Areas marked on earlier editions by the OS map as being broadleaved but not classified by English Nature as 'Ancient Semi-Natural' and have changed composition. This category includes areas of broadleaved woodland that have been cleared over the past 120 years.
Mixed Woodland	WDL-106	Areas marked as mixed woodland on earlier OS editions but have either changed composition or since been cleared over the past 120 years.
Plantation Woodland	WDL-107	Woods with a morphology or name as marked on the 1st ed OS which suggests that they represent plantations but have since changed in character. This category includes plantations over 1ha that have been cleared over the past 120 years.

Industrial

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Post-1880s Industrial Complex	IND-34	Modern industrial complexes. Includes industrial estates, large factories and sewage farms. Most of these will have a late 20th century date.
Pre-1880s Industrial Complex	IND-35	Industrial complexes. Includes industrial estates, large factories and sewage farms. Most of these will have a late 18th or 19th century date.
Derelict Industrial Land	IND-36	Former industrial sites which have been cleared and had no subsequent development on them.
Engineering and Metal Working	IND-112	Industrial complexes and factories identified by OS mapping as being for engineering or metal working.
Textiles, Boot & Shoe and Associated Industries	IND-113	Industrial complexes and factories identified through the OS as being associated with the textile or boot and shoe industry. This category will include hosiery and lace making, dyeing and associated warehousing.

Extractive

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Stone Quarries	EXT-37	Stone quarries in active use. Will normally be large modern quarries run by aggregates/ construction companies.
Abandoned Stone Quarries	EXT-38	Disused Stone Quarries. This category will usually consist of larger stone quarries created during the 19th and early 20th century.
Sand and Gravel Quarry	EXT-39	Active Sand and gravel extraction identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Abandoned Sand and Gravel Quarry	EXT-40	Abandoned Sand and gravel extraction sites identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Open Cast Coal Mines	EXT-41	Active open cast coal mines identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Abandoned Open Cast Coal Mines	EXT-42	Abandoned open cast coal mines identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Abandoned Deep Coal Mines	EXT-43	Abandoned deep coal mines identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Clay Extraction	EXT-44	Active brick and fire clay extraction identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Abandoned Clay Extraction	EXT-45	Abandoned brick and fire clay extraction sites identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Gypsum Extraction	EXT-46	Active gypsum extraction site identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Abandoned Gypsum Extraction	EXT-46	Abandoned gypsum extraction sites identified through LCC Minerals and Waste GIS data and previous OS Map editions.
Deep Coal Mines	EXT-108	Areas of former deep coal mining activity marked on previous OS Map editions.

Military

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Barracks/Training Ground	MIL-48	Military bases identified and marked on previous OS Map editions and which have since changed in landscape character. Most of these will have been built during the 20th century.
Military Depots	MIL-49	Military storage facilities identified from previous OS Map editions and which have since changed in landscape character.
Military Airfield	MIL-52	Areas identified from previous OS Map editions as military airfields or airbases and which have since changed in landscape character.

Ornamental, Parkland and Recreational

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Parks and Gardens	OPR-54	Parks and gardens identified from the Leicestershire HER, the Historic Parks and Gardens Register and Cantor and Squires' study of the Leicestershire's Parks and Gardens and can still be identified in the present day landscape. In most cases this will be the result of emparkment during the post-medieval or 19th century but may also include elements of earlier medieval parkland.
Golf Course	OPR-55	Golf courses identified as such from previous OS map editions and which have since changed in character.
Sports Fields	OPR-56	Modern sports fields and stadia identified as such from previous OS map editions and which have since changed in character.
Other Parkland	OPR-57	Other forms of parkland, recreational or ornamental landscapes which do not fall into any of the above categories. This character type will include playing fields and caravan parks.
Cemeteries	OPR-58	Areas identified from previous OS map editions as formally laid out cemeteries and which have since changed in character. These will typically date to the 19th and 20th centuries.
Deer Park	OPR-82	Parks and gardens identified from the Leicestershire HER, the Historic Parks and Gardens Register and Cantor and Squires' study of the Leicestershire's Parks and Gardens and which can still be identified in the present day landscape. In most cases this will be the result of emparkment during the post-medieval or 19th century but may also include elements of earlier medieval parkland.

Settlements

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Historic Settlement Core	SET-59	Historic settlement cores suggested by morphology or data held in the HER. In most cases these represent the extent of the settlement either by the end of the medieval period OR by the beginning of the 19th century. The distinction between the two is made via the period category in the current historic landscape character component of the database.
Pre-1880s Settlement Terraced	SET-60	This category defines the extent of terraced settlement as marked on the 1st edition 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval and 19th century).
Pre-1880s Settlement Semi Detached	SET-61	This category defines the extent of semi detached settlement as marked on the 1st ed. 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval and 19th century).
Pre-1880s Settlement Detached	SET-62	This category defines the extent of detached settlement as marked on the 1st edition 6" OS map. In most cases this will effectively define the historic settlement core. However, for those settlements with an identified Historic Settlement Core this category will provide a measure of settlement growth since the period defined by the historic core (e.g. either over the course of the post-medieval and 19th century).
Settlement 1st-2nd ed Terraced	SET-63	This category defines terraced settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 1st-2nd ed Semi Detached	SET-64	This category defines semi detached settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 1st-2nd ed Detached	SET-65	This category defines detached settlement built after the publication of the 1st edition OS and which appears on the 2nd edition OS.
Settlement 2nd-3rd ed Terraced	SET-80	This category defines terraced settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.
Settlement 2nd-3rd ed Semi Detached	SET-81	This category defines semi detached settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.
Settlement 2nd-3rd ed Detached	SET-83	This category defines detached settlement built after the publication of the 2nd edition OS and which appears on the 3rd edition OS.

Settlement 3rd-4th ed Terraced	SET-84	This category defines terraced settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement 3rd-4th ed Semi Detached	SET-85	This category defines semi detached settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement 3rd-4th ed Detached	SET-86	This category defines detached settlement built after the publication of the 3rd edition OS and which appears on the 4th edition OS.
Settlement Pre-1970s Terraced	SET-87	This category defines the limit of terraced settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Pre-1970s Semi Detached	SET-88	This category defines the limit of semi detached settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Pre-1970s Detached	SET-89	This category defines the limit of detached settlement Built after the publication of the 4th edition OS and prior to the 1970s.
Settlement Post-1970s Terraced	SET-90	This category defines the limit of terraced settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s.
Settlement Post-1970s Semi Detached	SET-91	This category defines the limit of semi detached settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s.
Settlement Post-1970s Detached	SET-92	This category defines the limit of detached settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s.
Medieval Settlement	SET-93	Denotes areas of deserted settlement, often visible as earthwork remains and identified through the HER.
Monastic Foundations	SET-94	Areas associated with monastic foundations of the medieval period.
Roman Occupation	SET-95	Areas of know Roman occupation occupying over 1ha.
Pre-Medieval Occupation	SET-96	Known areas of occupation pre-medieval in date and not Roman in character. This category will include prehistoric occupations sites such as hill forts.
Country House	SET-97	Denotes large rural/semi rural areas usually associated with parkland or designed landscapes. Usually 18th or 19th century in date.
Farm Complex	SET-98	Denotes areas covered by farm houses and associated outbuildings.
Flats and Apartments	SET-103	Multi storey residential buildings.
Post 1970s Residential Development	SET-118	This category defines the limit of settlement shown on the current 1:10,000 or 1:2,500 HLCA base maps. Where other settlement categories exist, it provides a measure of settlement growth since the 1970s.

Civic and Commercial

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Municipal and Civic	CAM-66	This category includes areas within larger settlements defined by the presence of large civic buildings such as libraries, museums and town halls. This category will include complexes performing similar functions at out of town or urban fringe locations.
Educational	CAM-67	Educational establishments such as colleges, universities and school complexes.
Hospitals	CAM-68	Large hospital complexes.
Commercial and Retail	CAM-69	Large stores, commercial districts and retail parks identified from the current OS map base. These areas will include car parking.

Transportation

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Train Stations and Sidings	CAM-71	This category defines train stations and large sidings as marked on previous OS map editions and which have since changed in character.
Canal Locks/Basin	CAM-72	This category defines canal locks, basins or wharfs marked on previous OS map editions and which have since changed in character.

Water and Valley Floor

Previous Historic Landscape Character Type	HLC Code	Description and Interpretation
Miscellaneous Floodplain Fields	WVF-76	Areas of enclosure on river floodplain not falling into the Enclosed Land attribute group character types. These are fields which will have traditionally been used as meadows. Areas falling into this category type have the potential for containing the preserved earthwork remains of water meadows.
Artificial Lake/Pond	WVF-77	Lakes or ponds which can be recognised as artificial through the presence of retaining earthworks and/or dams. Include within this character type are ornamental lakes, recreational facilities such as modern fish ponds, flooded quarries and ponds associated with former industrial activity.
Reservoir	WVF-78	Bodies of water created specifically for the purposes of water supply and are marked as such on the current maps. These will generally date to the late 19th and 20th centuries.
Natural Open Water	WVF-79	Expanses of open water over 1ha which have natural origins. Typically these will occupy basins formed during the last glaciation.
Moss/Raised Bog	WVF-101	Areas of unimproved peats, formation of which will typically have begun in the prehistoric period. Conditions in these environments will favour the preservation of organic remains. These also sustain ecologically rich wetland habitats.
Marsh	WVF-102	Areas marked as marsh on earlier OS editions.

The Historic Landscape Characterisation Project for Lincolnshire

The Historic Character of The County of Lincolnshire

English Heritage Project No. 4661 Main

Report

John Lord and Alastair MacIntosh
Lincolnshire County Council

With contributions from

Adam Partington

September 2011

ENGLISH HERITAGE

Lincolnshire COUNTY COUNCIL

Cover image: Swanpool ©Richard Croft

All images not credited to Lincolnshire County Council were retrieved from

www.geograph.org.uk

and are used under the Creative Commons Licence.

Contents

Report

Appendices

(Available in separate volume)

Summary

The Lincolnshire Historic Landscape Characterisation Project began in October 2008.The aim of the project was to categorise and characterise the landscape of the county with specific reference to its development over time. This report describes the methodology and results of the project, including descriptive Character Area Statements designed to provide accessible interpretation of the HLC data. The appendices give a full breakdown of the types and attributes used in the mapping process, and a computer-generated analysis of each Character Area.

Acknowledgements

The Lincolnshire HLC project is the end result of the work of many people over several years. The authors would like to place on record their appreciation of the help and support they have received over the course of the project from various colleagues.

Mark Bennet and David Stocker for their support and management of the project and for freely sharing their extensive knowledge and experience. Graham Fairclough of English Heritage, for his valuable contribution at all stages of the project. Adam Partington of City of Lincoln Council, who co-wrote the project design with Dr. Beryl; Lott, and has given freely of his time and experience throughout the project, not least in the polygonisation of the City of Lincoln and in the assimilation of the Wash Estuary HLC data. Dr Beryl Lott and the staff of the Lincolnshire County Council Historic Environment Team for their hosting of the project and its staff. Alan Freeman, Head of Planning at Lincolnshire County Council, for his support of the project and for his occasional nuggets of military history. Ian Goldthorpe, Alison Williams and Mike Hemblade of North Lincolnshire Council for allowing the use of their facilities, data and resources, and for their constant support of the project team. Hugh Winfield of North-East Lincolnshire Council for allowing access to his data, and for his excellent catering skills. Stephen Jack and Louise Niekirk of the Lincolnshire Wolds Countryside Service, for their support of the project and for allowing the project team to address the Joint Advisory Committee of the Lincolnshire Wolds Area of Outstanding Natural Beauty. Rob Lawton, of West Lindsey District Council, Peter Udy, of Boston Borough Council, and Bob Bowe, of East Lindsey District Council, who have all hosted meetings for the HLC project. Peter Herring, Keith Miller and Tim Allen of English Heritage who have provided support and advice throughout the project. All the other members of the HLC Project board not mentioned above. From outside Lincolnshire Richard Clark and John Robinson, of Leicestershire County Council, and Dinah Saich, of South Yorkshire Archaeology Service, provided assistance and advice at the beginning of the project. The staff of exeGesIS Spatial Data Management Ltd, who have provided training and support with regard to the HBSMR package over the course of the project. Finally other friends and colleagues, not mentioned above, who have assisted the project team in innumerable small but vital ways.

This project was funded jointly by English Heritage, Lincolnshire County Council, North Lincolnshire Council, North-East Lincolnshire Council, The Lincolnshire Wolds Countryside Service, West Lindsey District Council, East Lindsey District Council, North Kesteven District Council, South Kesteven District Council, Boston Borough Council, South Holland District Council and City of Lincoln Council.

1. Introduction

Historic Landscape Characterisation (HLC) is a relatively new method for examining the development of the modern landscape. The first project was undertaken in Cornwall in 1994, but the programme has expanded since then to include almost every part of England.

At approximately the same time as the earliest HLC projects were being undertaken, the European Landscape Convention was being drafted and adopted. It came into force in 2004 and is a major influence on government policy with regard to landscape management. The convention gives a useful definition of the word 'Landscape':

Landscape means an area, perceived by people, whose character is the result of the action and interaction of natural and/or human factors.

This definition can be used to form the basis of a judgement-free analysis of our surroundings. Indeed, a fundamental principle of HLC is that it should not attempt to define the landscape in terms of its value. In order for the HLC dataset to be of the greatest use to the greatest number of people it must allow them to form their own judgments. It must, therefore, endeavour to be a means of understanding the modern landscape, rather than acting as a prescriptive definition or quantification of subjective measures such as 'beauty' or 'value'.

The Lincolnshire HLC project is a joint endeavour between English Heritage, Lincolnshire County Council, North Lincolnshire Council, North-East Lincolnshire Council, North Kesteven District Council, South Kesteven District Council, East Lindsey District Council, West Lindsey District Council, Boston Borough Council, South Holland District Council, City of Lincoln Council and the Lincolnshire Wolds Countryside Service.

Lincolnshire is one of the last areas in the country to undertake an HLC project and is, therefore, in a position to benefit from the methodology and technology developed by previous projects.

2. Methodology

2.1 Project Management

The project design, included as an appendix to this report, was based on a standard English Heritage template modified according to the experience gained from the Wash Estuary HLC project. This document set out the various phases of the project, and defined the project management structure.

The HLC project was carried out by staff from the Lincolnshire County Council Historic Environment Record. Two full-time project staff were responsible for the day-to-day operation of the project. The project staff were managed by the Senior Historic Environment Record Officer and a representative from English Heritage. This small team was responsible to the HLC Project Board, a supervisory body whose membership was drawn from the project partners, and which met at six-monthly intervals. A sub-committee of the Project Board, known as the management committee, was created in order to monitor project progress on a monthly basis.

2.2 Definition of Landscape Types

Before undertaking the pilot studies, it was necessary to create a list of landscape types. This was achieved through consultation with neighbouring HLC officers in Leicestershire and South Yorkshire, who made the lists used in their projects available to the Lincolnshire project. These lists were examined in detail and combined in order to create a provisional set of landscape types for use in the pilot studies. In addition to this, the landscape types used in

the Wash Estuary HLC project were consulted, and elements of these were incorporated as well.

The resulting list of character types was then examined and modified in order to trim away those landscape types that were not thought to be necessary for the Lincolnshire project. Finally, the list of character types was incorporated into the Lincolnshire HLC computer system.

After the completion of the Pilot Study, described below, the list of character types was re-assessed. Further alterations were made during the main data collection phase as required. The final list of all character types used in the project can be found as an appendix to this report.

2.3 Pilot Studies

At the beginning of the project, the Project Board defined six small areas for the purpose of testing and validating the emerging characterisation methodology. These areas typically comprised between two and four parishes and were intended to provide a cross section of landscape types. The pilot studies were the subject of a separate report to the project partners, which is available to the public through the Lincolnshire Historic Environment Record.

2.4 The Polygonisation Process

In broad terms, HLC attempts to map modern land use by considering the legibility of the historic processes that have created it and the survival of evidence in the landscape that reveals these historic processes. This is achieved by a combination of methods, including documentary research, map regression and the study of aerial photographs. The resulting information is processed and stored using a computerised Geographical Information System (GIS) allowing sophisticated data analysis techniques to be employed.

HLC is rooted in the principle that every element of the landscape can be described using pre-defined categories, such as 'settlement', 'field' and 'industry'. Within these categories there are numerous sub-types, which allow the object to be defined still further. For example, an object with the Broad Type 'field' might be further defined as a 'paddock' or 'planned enclosure'. The historic element of the process derives from the ability to define previous categories and sub-categories where possible, and to relate them to the formation of the current landscape type.

The basic HLC unit is known as a 'polygon' or a 'record'. These terms are largely interchangeable, although the former specifically refers to the mapping component of the data, while the latter refers to the database entry. Each polygon is drawn around an area of roughly uniform landscape character. Although there are some exceptions, the general guideline followed in the project is that at least 85% of the area of the polygon should be made up of a single character type. A further guideline is that the area of each polygon should not be less than 1 hectare in rural locations or 0.5 hectare in urban areas. Some exceptions to this guideline include isolated farm complexes, historic earthworks and significant buildings in an urban area, all of which are considered to be important parts of the historic character of their surroundings.

The HLC has been created and is maintained within the database and GIS system run by the Historic Environment Record. The Historic Environment Record uses the database application HBSMR (Historic Buildings, Sites and Monuments Record), built and supported by exeGesIS SDM Ltd. This is a Microsoft Access database application and includes an integrated mapping module based on the MapInfo GIS program. HBSMR is used by many local authority Historic Environment Records as a tool within the development management process. Both North Lincolnshire Council and North-East Lincolnshire Council, as well as

Lincolnshire County Council, use HBSMR. The HLC dataset is fully integrated into this application and will, therefore, be readily accessible to its users.

2.5 Identifying Past Landscapes

As well as the current landscape character, the system allows the user to record earlier, or past, landscape forms. These 'previous types' are identified using two main methodologies; firstly using historic map data. The earliest dataset available to the project on a county-wide level was the first edition Ordnance Survey County Series maps, dating from around 1888. Also available were the second edition County Series maps from around 1905. It was initially thought that the project might be able to make use of Enclosure and Tithe Award maps held by the Lincolnshire Archive, but restrictions on the amount of available material meant that this was not possible. Fortunately, the Enclosure Awards and pre-enclosure landscapes of many parishes have been analysed and published by Rex and Eleanor Russell in a series of volumes, and these were available to the project team from the Lincolnshire HER.

The second method is used to infer the existence of previous landscapes where no map evidence can be found. This involves examining landscape features, such as field boundaries, and estimating an approximate date for their origin from their morphology. As an example, planned, rectilinear field patterns are likely to date from the post medieval period, while irregular sinuous boundaries, in the absence of any contrary information, are likely to predate the enclosure movement and may, in some cases, have medieval origins.

There is no limit to the number of previous types that can be recorded, although in practice, it is not normally possible to recognise pre-medieval landscapes using the Lincolnshire HLC methodology.

2.6 Character Areas

As well as the main HLC dataset, the Lincolnshire HLC Project has created two broader levels of characterisation. These are intended to provide a basic level of interpretation to the HLC data in order to facilitate its use by those outside the heritage profession, as well as providing guidance to heritage professionals.

The highest level of interpretation is the Character Area. There are ten such areas within the county, excluding the major urban centres of Lincoln, Scunthorpe and Grimsby. These areas were defined by using the boundaries of the existing Natural England Joint Character Areas as a base, and modifying them according to observed concentrations of character types, landscape patterns and ground-truthing by project staff.

The ten Character Areas are complemented by the subsidiary Character Zones. There are three to five of these zones for each Character Area. Both the Character Areas and the Character Zones were defined in the MapInfo GIS package, and are available in that format. Each area also has a written description, known as a character statement, and the Character Area statements form the main body of this report. The template statement below shows the sort of information provided, and explains some of the terms used.

2.7 Character Area Template

Name of Area: The name given to the Character Area by the project team.

ARS sub-province: Taken from, Roberts, B. K. and Wrathmell, S., *An Atlas of Rural Settlement in England* (London: English Heritage, 2000).

Countryside Agency Countryside Character Area: Taken from, Countryside Commission, C*ountryside Character Volume 3: Yorkshire and the Humber* (Cheltenham: Countryside Commission, 1998).

Total area: In square kilometres.

Percentage of project area: The proportion of the Character Area compared with the project area as a whole expressed as a percentage.

The statement includes a map to indicate the location and extent of the Character Area within the project area.

Description of Present Landscape

This is a written description of the present character of the area under discussion. It is based on statistical analysis of HLC data, background research and site visits. It is intended to be an overall description of the essential elements that, taken together, create the distinct character of an area. The description is intended to be objective, free of value-laden terminology, and accessible to the general public, as well as those within the planning and heritage sectors.

The description includes a consideration of

- Topography
- Land use
- Settlement patterns
- Communications
- Above-ground heritage assets

Landscape History

Complementing the description of the present landscape, this section endeavours to describe the historical processes and events that have shaped the character of the area. The description is arranged chronologically, where possible, and describes past landscapes, their surviving elements and their impact on subsequent landscape features. It is intended that this should act as a guide to understanding historical developments within the landscape, and is not an exhaustive guide to the history or archaeology of the area.

Legibility

The concept of legibility is applied to all records in the HLC database. It is a measure of the extent to which past landscapes can be identified in later ones. For example, it may be possible to identify areas of former ridge and furrow cultivation by the characteristic s-shaped field boundaries left when it was enclosed. This section attempts to describe the survival of past landscapes into the present, and to show the specific features in the modern landscape which demonstrate a high degree of legibility.

Drivers of Change

Perhaps the most important underlying principle of HLC is that the landscape is not static. Just as former landscapes have been superseded, so the modern landscape will change in the future. It is not in the scope of this report to recommend actions in pursuit of landscape management, or to make judgements as to the desirability of change or conservation in the modern landscape. However, it has been thought appropriate to identify some factors which may cause changes to the landscape in the future. The lists are not exhaustive, and other factors may be identified in the future, as the changing landscape is presented with new threats or opportunities. The table below shows the various landscape categories which will either be altered by future change or from which such change will emerge.

Agriculture
• Changes resulting from alterations to farming practices relating to crops, livestock, fields or buildings

Climate Change
• Changes resulting from alterations to the climate or from attempts to mitigate such changes

Industry
• Changes resulting from the creation of new industries, the decline of old industries or the by products of existing industries

Settlement
• Changes resulting from the expansion or contraction of settlements or to the infrastructure needed for their support

Tourism & Recreation
• Changes resulting from pressure on recreational sites and associated infrastructure with particular reference to holidaymakers

3. Character Area Statements

3.1 Regional Character Area 1

The Confluence

ARS sub-province: CTRNT

Countryside Agency Countryside Character Areas:
39 Humberhead Levels
41 Humber Estuary
45 Northern Lincolnshire Edge with Coversands

Total area: 320 km²

Percentage of project area: 4.6%

Description of Present Landscape

This character area lies at the confluence of the Trent and the Ouse, in the extreme north-west of the historic county of Lincolnshire. To the south the area is bounded by the River Idle and, to the west, by the River Don. The area thus defined is largely flat with wide, uninterrupted views. The central part of the area has a higher topography than the rest, being a series of low hills. These hills form the Isle of Axholme and are home to the majority of the population of the area. Therefore, the area divides neatly into two types of landscape, one on the higher ground of the islands, the other on the flat drained land surrounding them.

Much of the drained lowland is used for arable farming, and this area is widely recognised as being very productive. The fields are generally bounded by drains, rather than hedges, and where hedges exist they are typically overgrown and not stock-proof. The land is worked from isolated farmsteads which typically comprise an old red-brick farmhouse with its associated outbuildings and a variety of more modern barns and sheds which are used for the storage of machinery and produce.

The high ground is limited to a large central island, with some smaller satellite islands, upon which are found the historic settlements of the area. The settlements range in size from small hamlets, such as Low Burnham, to large local centres such as Crowle, Epworth or Haxey. Each settlement retains a well preserved village core with later phases of twentieth-century ribbon development radiating away from the cores along the main roads. Later housing expansion is set back from the main roads in discrete estates with sinuous cul-de-sac street patterns. There is no evidence for settlement shrinkage or desertion on the Isle which indicates that deserted or derelict plots were quickly built upon.

Strip Farming near Haxey
©Jonathan Thacker

The farmland surrounding the settlements is largely derived from the ancient open fields. Indeed, the Isle is unique in Lincolnshire for the survival of large areas of open field farming in a largely unaltered state, with the Great Field at Belton being a particularly important example. These open fields are farmed in strips, giving a distinctive stripy pattern to the landscape, with different crops sown adjacent to each other with no hard boundaries between them. The strip farming is not now as extensive as it was even twenty years ago, and the strip fields are subject to encroachment from the nearby villages. A particular concern is the enclosure of strips for horse pasture. Another pressure is the engrossment of holdings by individual land-owners who are then able to consolidate adjacent strips into larger modern fields. This pattern is evident in some of the modern fields found in the vicinity of Haxey, which retain sinuous external boundaries indicative of their former use.

Another feature of upland farming in the area is the survival of irregularly shaped ancient enclosure adjacent to the historic settlements. These may have been used as winter grazing for the large numbers of livestock that the Isle supported before the surrounding wetlands were drained.

Historically, the main lines of communication in the area have been aligned north to south. This is in keeping with the orientation of the high ground upon which settlements were founded. After the wetlands were drained, new roads were built linking settlements to each other, and providing access to the new isolated farms and their associated land. Two of these new roads, Bank End road, near Westwoodside, and High Levels Bank road, south of Crowle, provide east-west access across the county boundary with South Yorkshire. The character area is also split across the middle by the M180 motorway. This runs through the lowland area between the two settlements of Belton and Crowle. It does not, however, mark a change in character between north and south, but rather cuts through an area of similar character without respect to pre-existing landscape features.

The area is predominantly rural, to a slightly greater extent than the county average. This is primarily an arable landscape, although there is some pasture in the small closes adjacent to the main historic settlements.

Landscape History

The Isle of Axholme has always stood apart from the rest of the county and this is still true to a great extent. Before drainage, the area was bounded by the Trent to the east, the Idle to the south, the Don to the west and the Torne to the north, creating an island separated from neighbouring counties. In addition to these natural boundaries, the area used to flood annually over the winter months creating a further barrier to communication with the surrounding areas.

From the earliest settlements in the post Roman Dark Ages, the high ground has been the stage for those activities requiring year-long dry land. The settlements in the area are nucleated in character and were established on the Isle proper as well as on smaller neighbouring islands. The settlements were set within their open fields which were also limited to the higher ground.

Before the drainage of the surrounding fens, the Isle supported large populations of cattle and sheep that grazed on the common fenland during the summer months and were accommodated in closes on the Isle, adjacent to the settlements, during the winter. The seasonal inundation laid down rich sediment over the common fens, which made the summer grazing especially lush. In winter, when the land was flooded, the islanders would support themselves by fishing and fowling.

In the seventeenth century outside forces brought radical change to the lifestyle of the Islanders. Sir Cornelius Vermuyden, a Dutch drainage engineer, was commissioned by King Charles I to 'improve' the Isle through drainage and a practice known as warping, in which the level of the land was raised by allowing the deposition of silt from deliberate flooding. In order to achieve his objectives, Vermuyden and his fellow 'Participants' constructed several major new drains, including catchwaters at the base of the islands, and altered the course of the Torne and the Idle. They also constructed a network of minor drains, forming a new rectilinear pattern of fields on the old fenland, effectively enclosing the common grazing land. The 'Participants' reward for their efforts was a share of the drained land, and their farmsteads and holdings can still be identified today.

The effect of these improvements on the lot of the local inhabitants was not entirely beneficial. At a stroke, they lost much of their winter grazing land, and also the peripheral resources, such as fish, fowl and hemp, that went with the regular inundations. The common that was left was eventually enclosed by various Acts of Parliament in the nineteenth century.

Although the enclosure and drainage of the fens was remarkably effective and wide-ranging, the ancient open fields found on the Isle and close to the River Trent have survived to this day, albeit in much reduced form. The strip fields, while no longer farmed communally, retain much of their original character. Several factors have influenced this survival, not least the independent character of the islanders themselves. Although local farmers were able to consolidate their ownership of individual strips into larger contiguous holdings, the right of common grazing over the land remained, and so the land could not be enclosed without depriving commoners of their rights. In some cases the arable farmers were themselves commoners, and with the removal of the common fenland by drainage, had to make full use of available grazing. In addition to this, the lack of powerful aristocratic landowners in the area, as shown by the distinct absence of surviving parkland, meant that the usual driving force behind enclosure was not present in the island.

Warped farmland adjacent to the River Trent
©Jonathan Thacker

During the twentieth century the area saw significant change, albeit slow and incremental. In the former fenland there has been a movement towards consolidation of fields into larger parcels of land in order to permit more efficient modern farming techniques. On the high ground of the islands, most of the historic settlements have been subject to residential expansion, initially in the form of ribbon developments along main roads. Later residential developments from the post-war period have been constructed at the expense of the open fields near the main settlements. The open fields have also been subject to consolidation of holdings into larger fields, leading to a significant diminution of the open field character of the area.

Legibility

The processes that have shaped the development of the Isle and its surroundings are well recorded in the landscape. Although the fenland has long since disappeared, the sophisticated drainage network is indicative of the former landscape. Even where fields have been consolidated, the essential rectilinear pattern remains visible. In several cases, the former courses of historic rivers, such as the Torne at Westwoodside, are preserved as field boundaries.

On the higher ground of the islands most settlements retain well preserved village cores which are surrounded by discrete phases of growth from subsequent periods. Although there has been some ribbon development along main roads between the settlements, none have, as yet, merged into larger conurbations. The medieval pattern of nucleated settlements on the islands is therefore also well preserved. Perhaps the most significant element of the historic landscape of the Isle is the survival of the open fields around Belton and Haxey.

Drivers of Change

Agriculture
• Encroachment of horse-pasture onto the surviving open fields • Consolidation of historic strips and fields to form larger units • New crops for bio-fuels • New climate-resistant crop strains

Climate Change
• Flood risk management may require new infrastructure, such as pumping stations, flood banks or storage areas • Wind energy facilities and infrastructure either on flat lowland plains or set on the high ground of the island • Solar panel installation on built features

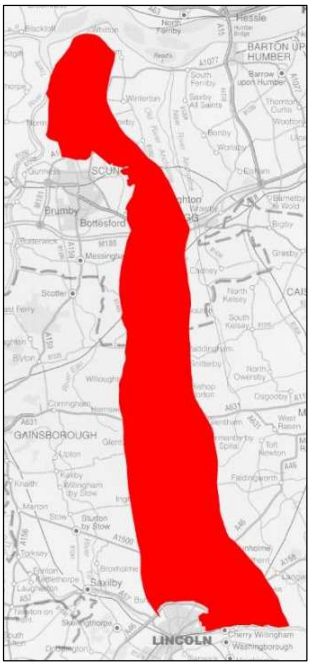
Industry
• New industrial facilities along M180 corridor • Expansion of existing sand and gravel quarrying capacity • Growth of industrial areas along the River Trent

Settlement
• Pressure for further expansion due to population increase • Historic settlements may merge if expansion is not adequately regulated

Tourism & Recreation
• The area is currently under-used as a tourist destination • New nature reserves may result from quarrying • Expansion of residential areas may require new recreational facilities

3.2 Regional Character Area 2

The Northern Cliff



ARS sub-provinces:
CLNSC
CTRNT

Countryside Agency Countryside Character Areas:
39 Humberhead Levels
41 Humber Estuary
44 Central Lincolnshire Vale
45 Northern Lincolnshire Edge with Coversands
48 Trent and Belvoir Vales

Total area: 336.4 km²

Percentage of project area: 4.82%

Description of Present Landscape

The landscape of this area has a strong north-south grain, influenced primarily by the presence of the Cliff, but also by the Roman Ermine Street that runs along the top of it. A map of parish boundaries in this Character Area shows that they all have the Roman road as an east or west boundary, and are laid out perpendicular to it.

There are two lines of settlement parallel to the Roman road, one on each side, set back from it at a distance of approximately one mile. The villages are generally small, with a mix of modern and historic buildings. Modern developments are set within the historic pattern of the villages rather than forming discrete extensions. The buildings are generally constructed of local stone, readily found on the Cliff, with clay tile roofs. These settlements are connected to each other by linear, yet irregular, north-south aligned roads, and to the Roman road by occasional straight east-west aligned lanes with wide verges, which are likely to have been laid out in the eighteenth or nineteenth centuries during the process of enclosure.

Enclosure Road near Spridlington
©Roger Geach

The other main concentration of settlement is made up of commuter villages around Lincoln, such as Nettleham, Sudbrooke and Cherry Willingham. Each of them retains an identifiable historic core, onto the edges of which modern residential developments have been added.

The modern developments typically have a sinuous pattern, with branching cul-de-sacs and crescents, and date from the 1970s and 1980s. The houses in these developments are generally brick built, and use slate roofing materials, rather than the local tile.

The rural landscape is characterised by rectilinear fields with straight boundaries, generally laid out at right angles to the long, straight roads that cross the Character Area. There are numerous farmsteads dotted among these fields, often retaining historic farm buildings but, more usually, surrounded by large modern agricultural structures. The Character Area is more wooded than the county average, and this largely due to many small blocks of plantation woodland scattered across the rural area. There is, however, a large area of Ancient Woodland to the east of Scunthorpe at Broughton.

The area is also heavily influenced by military activity. There are former Royal Air Force bases at Hibaldstow, Kirton-in-Lindsey and Hemswell, all of which retain characteristics of their previous use. The airbase at Scampton, which is still in use today, has an even greater influence on the character of the area than the others, even to the extent of diverting the course of the Roman road around its runway.

Landscape History

The earliest visible feature of this Character Area is the Roman road, Ermine Street, which linked Lincoln to the River Humber. A secondary road, Till Bridge Lane, runs westward towards the River Trent, and the crossing that would have existed at the Roman town of Segelocum, where Littleborough stands today. Although no other Roman features, are visible in the area today, these roads have influenced much of the later development of the surrounding landscape.

Ermine Street itself is notable for the lack of settlements situated directly on its course. Rather, the later Anglo-Saxon and Danish settlements are found in two lines running parallel to it, at a distance of one to two miles. The reason for this is not clear but it is observable in other parts of the country, for example along the Fosse Way between Leicester and Lincoln. Interestingly, both Ermine Street and the Fosse Way form the boundary between the parishes laid out to either side. It is clear that the post Roman settlement pattern is strongly influenced by the existence of the Roman road.

The parishes along Ermine Street (now the A15) are for the most part aligned east-west, and each of them enjoys the use of the heathland at the top of the Cliff and the heavier clay soils in either the Trent Valley or the Clay Vale. The medieval farming regime would therefore have involved an area of common pasture on the heath at either the west or east end of the parish depending on which side of the road it was situated. The settlement would have been surrounded by its open field arable land in two or three great fields. Then at the other end of the parish there would have been an area of common lowland pasture. Around the settlement, small areas of open field were gradually enclosed by villagers, in order to provide secure areas for over-wintering livestock, orchards or other supplementary farming practices. These small areas are still visible today as small irregularly shaped fields on the edge of settlements.

The medieval system of farming was swept away by the enclosure movement of the eighteenth and nineteenth centuries. In this area, the resulting landscape was one of rectilinear fields with hedged boundaries, and a pattern of long straight roads running through them. The allocation of land to a particular owner also allowed it to be used for new purposes, such as the creation of plantation woodland and game coverts. In order to work their new holdings more conveniently, landowners began to establish new farmhouses away from villages within their new lands. These isolated farmsteads quickly became a characteristic feature of the post enclosure landscape.

During the twentieth century new farming techniques began to change the appearance of the landscape once again. Increased mechanisation of tasks, such as ploughing and harvesting, created a requirement for larger fields and, to this end, many hedges were removed. The needs of the Royal Air Force have also shaped this character area, with many airfields being established along the line of the Cliff both prior to, and during, the Second World War. After the war several of these bases were adapted for use either by bomber or fighter squadrons during the long nuclear stand-off with the USSR. To this day, recognisable military facilities form an integral part of the character of this area.

Hangars at RAF Hemswell
© Richard Croft

Legibility

Perhaps more than any other part of the county, the Northern Cliff is a palimpsest of well-preserved landscape features. The Roman road runs through the area like a spinal cord, with medieval parishes and roads laid out to either side.

The medieval landscape has largely been removed by later processes, but the pattern of settlement is still largely from that period and the ancient enclosures found near to many villages retain the sinuous boundaries indicative of their origins as part of the open field system.

Although many fields have been consolidated into larger machine-friendly 'prairies', the essential rectilinear character of the underlying planned enclosure is still highly visible, both on maps and from within the landscape itself. Other features of the planned landscape, such as farms and roads, are also readily seen throughout the area.

The twentieth-century airfields, and other military facilities, are not as well preserved as the few surviving examples might appear to suggest. Upon closure, these facilities typically reverted to farmland, and even where the runways were paved they were often removed very quickly.

Drivers of Change

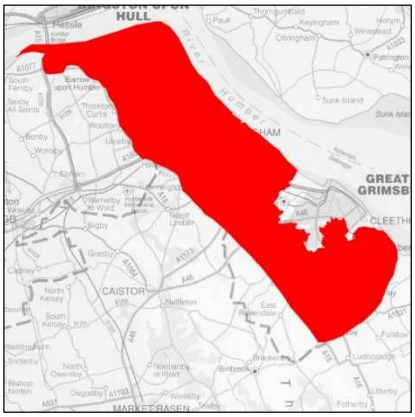
Agriculture
• Dereliction of historic farm buildings • Construction of modern agricultural facilities

Climate Change
• Changes to crop regime due to changing weather patterns • New bio-fuel crops and associated infrastructure • Potential for new wind energy facilities on higher ground

Industry
• Change in use or outright destruction of historic military facilities • Possible improvements to the A15 • Future changes to Scunthorpe steelworks

Settlement
• Expansion of commuter villages around Lincoln • Lincoln and surrounding area designated as a Growth Point Area • Further expansion of Scunthorpe into the northern part of the character area

3.3 Regional Character Area 3



The Northern Marshes

ARS sub-province: CLNSC

Countryside Agency Countryside Character Areas:
41 Humber Estuary
42 Lincolnshire Coast and Marshes
43 Lincolnshire Wolds

Total area: 281.1 km²

Percentage of project area: 4%

Description of Present Landscape

The landscape of the Northern Marshes Character Area is heavily influenced by the many industrial features along the coast. To the north of the area, along the inland bank of the River Humber, elements of the industrial past of this area has been preserved in a network of lakes which are the remnants of a once-thriving brick and tile industry at Barton-upon-Humber. Some of these lakes are now a valuable habitat for wildlife, while others have been remodelled as recreational facilities for water-sports.

Along the seaward bank of the Humber Estuary there is a large modern industrial presence clustered around the deep-water port of Immingham, which was completed in 1913. The most immediately visible of these industries is the Lindsey Oil Refinery at South Killingholme. The refinery complex includes many large and tall structures, such as tanks and flare stacks, which are a significant vertical element in this largely flat landscape. Other industries have also grown up in the vicinity and the coast north of Grimsby is strongly industrial in character for a distance of almost seven miles. Despite the frequent interpretation of these features as detrimental to the landscape of the North-East Lincolnshire Coast, the industrial facilities of the area make a significant contribution to its unique character, often creating brooding and dramatic skylines across great distances.

Killingholme Oil Refinery from East Yorkshire
© Andy Beecroft

Further north, along the coast, there are areas of well preserved open countryside. Between East Halton and New Holland the area is primarily rural in character with a preserved rectilinear field pattern indicative of nineteenth-century drainage and enclosure. Long straight roads with wide verges lead from these settlements toward the River Humber and the

landscape is dotted with isolated farms and other buildings. There is good visibility in all directions as the fields are bounded by ditches rather than hedges. The ditches indicate the marshland origins of the landscape. Further inland, between the A1077 and the coastal railway, the drained marsh character gives way to a more typical Lincolnshire landscape of nucleated settlement. Although the field patterns are still indicative of planned enclosure, there are also areas of more ancient enclosure to be found close to the villages. Views are more restricted in this part of the character area, as the roads are less straight and fields are more likely to be bounded by hedges.

The ruins of Thornton Abbey are perhaps the most significant standing archaeological remains in the character area. The abbey precinct covers a large area of land at the western edge of the Northern Marshes area, near to the village of Thornton Curtis. The floor-plan of the abbey is well preserved, although standing masonry is limited to a small portion of the cloister and the chapter house. The best preserved part of the complex is the fifteenth-century gatehouse which is brick built and largely intact. The gatehouse is in the care of English Heritage and the whole complex is a scheduled ancient monument. Although the complex is not readily visible from elsewhere in the character area, it enjoys wide views to the east across the Northern Marshes.

There is a variety of settlement types in this area. North of the industrial zone, there is a line of small villages, running from South Killingholme to Goxhill, that have retained much of their rural character, with limited modern growth and well preserved cores. The largest settlements, Barton and Barrow, have also grown into sizable commuter towns, given their proximity to, and communications with, Grimsby, Scunthorpe and Hull. Around the periphery of Grimsby, the major city of the area, the historic pattern of settlement has been distorted. The settlements of Scartho, New Waltham, Humberston and Healing, once villages in their own right, now form an extended suburb of their larger neighbour. As Grimsby continues to grow it may be that these small towns will become incorporated into the conurbation.

The southern part of the character area, particularly around Humberston, owes its character to the tourist industry. There are a number of large caravan parks, which provide accommodation for holidaymakers to Cleethorpes, and these are very similar to those found further south near Skegness.

Landscape History

The nucleated settlement pattern of the area constitutes its earliest landscape feature. With the exception of New Holland and New Waltham, each settlement in the character area was already in existence by the time of the Domesday survey, and there is a notable prevalence of Danish place-names ending with the suffix *-by*. Each of these medieval settlements was set within the typical arrangement of two or three large, open fields, in which a set amount of land was allocated to each farmer within the larger unenclosed field. The arable land was supplemented by the common grazing land on the marshes. Interestingly, those parishes which were landlocked, such as Habrough, had their own marshland holdings in neighbouring coastal parishes, such as South Killingholme. The medieval open-field farming system was in use before the Norman Conquest and continued largely unchanged until the Enclosure Awards of the eighteenth and nineteenth centuries. In most cases, some small areas of the open fields were enclosed at an earlier date, and these ancient enclosures often survive to this day, in close proximity to the village core. The early enclosures were probably undertaken to increase the area of land upon which sheep or cattle could be grazed.

The monastery at Thornton was founded in 1139 as a priory, became an abbey, and grew to become a wealthy religious house. The boundaries of the abbey precinct remain well defined to this day, although the surrounding landscape does not appear to retain any features

associated with the complex. This is largely due to more recent land use which has overwritten previous landscape forms across the character area.

The Enclosure Awards resulted in radical change to the landscape, sweeping away the former open-field farming system and the unenclosed common grazing land across virtually the whole county. In this area the vast majority of parishes were subject to this process and the resulting landscape of planned, rectilinear fields is very well preserved. As well as creating a new pattern of fields, the Enclosure Commissioners also laid out new straight roads which can be seen running at right angles to the older roads linking the historic settlements of the area. Another feature of the new landscape was the establishment of new farm complexes away from the villages, from which farmers could more easily exploit their new holdings. This has created a secondary dispersed settlement pattern in areas that would previously have had no permanent inhabitants.

The enclosure of the land paved the way for new uses of the landscape. The trend from agricultural to industrial land-use began in earnest in the middle of the nineteenth century, with the construction of the Great Grimsby and Sheffield Junction Railway in 1848. This provided access to inland markets for goods produced in the region, initially for fish from Grimsby, but later for other products. The area around Barton-upon-Humber became known for brick and tile making. This industry had a profound impact on the landscape as it required the extraction of large quantities of clay from land immediately adjacent to the river Humber, leaving many large open pits. Once extracted the clay was fired using coal imported by boat, and the finished product was exported the same way. This process necessitated the expansion of Barton's port facilities, and the town expanded accordingly. As new construction materials came into use in the twentieth century the industry at Barton gradually declined, leaving only one active brickworks open today.

Barton Haven
©Pete Burnett

In 1913 the new deep-water dock at Immingham was opened, having been conceived and financed by the Great Central Railway Company. This enabled the large-scale import of coal to service the ironworks at Scunthorpe. This was an entirely new facility constructed in an area that had, until that time, been purely agricultural. The dock at Grimsby was also owned by the Great Central Railway Company, and together these facilities provided the framework for the future prosperity of the area.

The area has been subject to many changes since the Second World War. Rural landscape has been subject to the same processes of field consolidation and enlargement as the rest of the county, along with the associated dereliction of defunct isolated farms. Many of the larger villages of the area have expanded to accommodate commuters from the nearby cities. This process has been accelerated by the opening of the Humber Bridge in 1981. The

bridge itself is a major local landmark, and is visible from much of the south bank of the River Humber.

Legibility

The medieval pattern of settlement is very well preserved. No settlements in the area have suffered total desertion, and where settlements have shrunk, for example at Habrough or North Killingholme, well preserved earthworks remain. Although the former open fields have been completely enclosed, the ancient enclosures that can be seen on the periphery of the historic settlements often retain the sinuous boundaries that are indicative of early enclosure of arable strip farming.

The area is characterised by the extensive survival of planned enclosure, which has created a strongly rectilinear pattern in the landscape. The long, straight roads that were laid out during the same period are also well preserved throughout the area.

Although modern industrial developments might appear at first sight to have wiped out all traces of the landscapes that preceded them, closer inspection reveals a reasonably high degree of legibility of the planned enclosure landscape in which they sit. The Lindsey Oil Refinery, Immingham Docks and the Humber Sea Terminal were all constructed within such a landscape, and they all respect the orientation and rectilinear form of the underlying pattern of enclosure. Where internal roads exist, they tend to follow the lines of old field boundaries.

Drivers of Change

Agriculture
• Consolidation of planned enclosure landscapes to accommodate new farming techniques and crops • Dereliction of isolated farm complexes • Introduction of new crop types, such as tall-growing biomass fuels • Transfer of arable land to pasture • Destruction of historic earthworks, such as ridge and furrow, through ploughing

Climate Change
• New renewable energy production and infrastructure facilities • Flood alleviation schemes • Alterations to built fabric – e.g. solar panels, whitewashing, air-conditioning

Industry
• New port facilities and associated infrastructure • Expansion of existing industrial capacity • Dereliction of existing industrial facilities

Settlement
• Expansion of residential areas around existing villages • Development pressure in the greater Grimsby area

Tourism & Recreation
• Expansion of tourist facilities and accommodation capacity to respond to greater future demand

3.4 Regional Character Area 4

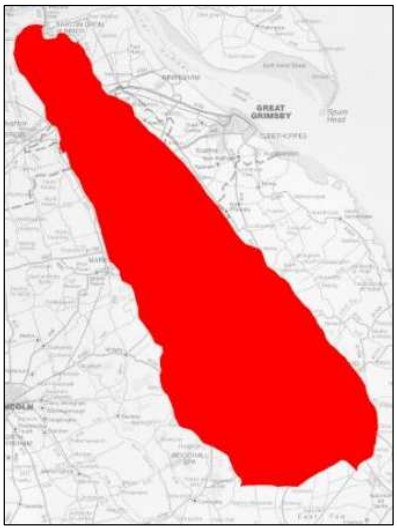
The Wolds

ARS sub-province: CLNSC

Countryside Agency Countryside Character Areas:
41 Humber Estuary
42 Lincolnshire Coast and Marshes
43 Lincolnshire Wolds
44 Central Lincolnshire Vale

Total area: 1,126 km²

Percentage of project area: 16.1%



Description of Present Landscape

The Wolds is a plateau of high ground surrounded by 'typical' Lincolnshire lowlands on all sides, the Central Vale to the east, the Fens to the south, and the Coastal Marsh to the east. The area has a rolling, undulating form, strongly influenced by the many dry river beds that are found there. While the crests of the dry valleys provide views across long distances, the valley floors are very enclosed with restricted views.

The area is predominantly rural with a slightly higher proportion of fields than the rest of the county, and a correspondingly lower proportion of industrial types. Indeed, the Wolds is the least industrialised of all the character areas defined in this study.

The area has a very high proportion of woodland HLC types, especially of plantation woodland and estate woodland. This reflects the extensive woodland cover around Brocklesby Park and the surrounding estate, and large areas of modern plantation in the vicinity of Market Rasen. Elsewhere, woodland is found as discrete blocks of plantation, set within open farmland.

Modern lines of communication are primarily oriented roughly east-west, often following the course of dried up river-beds. However, there are some examples of north-south oriented roads, notably Caistor High Street and the Bluestone Heath Road, both possible ancient trackways.

Derelict 19th Century farm complex near Tetford
© Tony Atkin

Settlement in this area is typically nucleated, although a secondary dispersed character has developed as a result of extensive settlement

desertion and nineteenth-century farm building. As a proportion of the area there is less settlement than in the county as a whole, including both the 'settlement' broad HLC type and the 'civic and commercial' broad HLC type. This is particularly remarkable, as the area contains several major settlements, including Louth, Horncastle and Spilsby.

Although there are several areas of well-preserved planned enclosure, much of the rural landscape consists of large modern fields. These have been formed through a process of boundary removal which is often undertaken in order to facilitate the use of modern farm machinery. Boundary removal can also be the result of the consolidation of farm holdings by sale or inheritance. Another consequence of this process is the dereliction of unused farm buildings and, in some cases, entire farm complexes.

The most well represented HLC type is 'fields and enclosed land', covering 89.5% of the land area. This is mostly given over to arable cultivation, with some pasture retained in close proximity to settlements or to larger isolated farms. As a result of government-led agri-environment schemes, with subsidies available for participating landowners, some areas of arable cultivation are being laid to pasture.

Landscape History

The present landscape of the Wolds is primarily the result of the enclosure of a largely typical open field farming regime, and the subsequent changes to the associated nucleated settlement pattern. However, the manner in which the landscape was enclosed is quite different to similar landscapes, such as the Northern Cliff, with particular regard to the date and purpose of enclosure.

The earliest enclosures are to be found in close proximity to historic settlements, whether deserted or surviving. This is quite common in Lincolnshire and represents an historic trend from arable farming to livestock rearing. Typically this was undertaken in order to raise sheep for wool production, which could then be sold. However, in the Wolds, these ancient enclosures are both more extensive than in the county as a whole, and more widespread, indicating that livestock made a proportionally larger contribution to the medieval economy. Later enclosure typically follows the same planned form as elsewhere in the county.

The pastoral history of the area has historically been closely allied to the fortunes of the neighbouring marshes and fens. In the later medieval period, and in the post medieval period, wealthy Wold's farmers would rent grazing land on the marshes in order to fatten their stock on the rich grasslands close to the sea. The many east-west aligned roads and tracks, perhaps initially intended to provide access to the coastal salt industry, would have served as drove roads taking livestock between the two areas.

The Deserted Village of North Ormsby
©Lincolnshire County Council

The remaining settlements in the area, small villages for the most part, tend to be found in former river valleys, perhaps as these would have been good places to sink wells. As well as the existing settlements, there are a large number of deserted or shrunken settlements which are identifiable from remaining earthworks.

Legibility

The Lincolnshire Wolds are remarkable for the depth of history identifiable in the landscape. There is a higher proportion of ancient enclosure than is found in most other areas, and there are many examples of well-preserved deserted or shrunken settlements. The visibility of the past is one reason why the area is popular with visitors and sought-after as a place to retire.

In much of the area previous rural landscapes are hidden beneath a current HLC type of 'planned enclosure'. However, in certain areas former open field strips have been fossilised, either in the form of ridge and furrow earthworks or in the boundaries of ancient enclosures, which typically reflect the sinuous shapes produced by strip farming. Although many historic field boundaries have been removed since the Second World War, the modern fields thus created occasionally retain enough of their original boundary morphology to provide a reasonably clear indication of their previous type.

Drivers of Change

Agriculture
• Further consolidation of farm holdings leading to abandonment of farm buildings and field boundary loss • Transfer of land from arable to pasture – food prices, legislation agri-environment • Possible destruction by ploughing of non-scheduled historic earthworks, e.g. ridge and furrow

Climate Change
• Development of renewable power generation facilities within the area or visible from it • Associated power transmission facilities, such as pylons or sub-stations • Potential flood risk from increased upland rainfall flowing downhill to lower ground • Introduction of biofuel crops, such as fast-growing trees or other tall vegetation

Industry
• Increase of industrial capacity from current low levels, especially near larger settlements • Industrial re-use of former farm buildings – workshops, small units • New utilities and infrastructure to accommodate population growth

Settlement
• New planned residential developments, especially around major settlements • Infill of vacant village plots or gardens • New isolated housing away from historic nucleated villages

Tourism & Recreation
• Increased resident population will require new recreational amenities • Increased domestic visitor numbers may result from foreign travel becoming more expensive • New transport infrastructure to accommodate visitors to and through the area • Increased light pollution from new developments may impact locally-valued dark skies

3.5 Regional Character Area 5

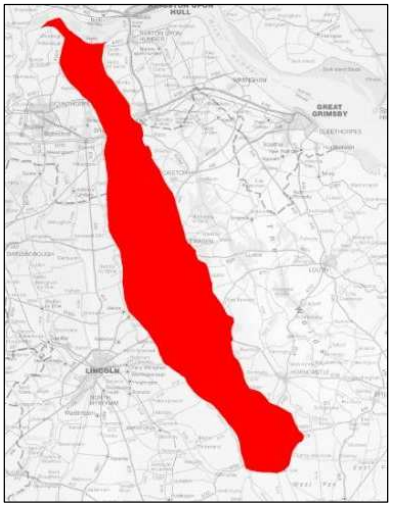
The Clay Vale

ARS sub-province: CLNSC

Countryside Agency Countryside Character Areas:
41 Humber Estuary
44 Central Lincolnshire Vale
45 Northern Lincolnshire Edge with Coversands
46 The Fens

Total area: 642.8 km²

Percentage of project area: 9.21%



Description of Present Landscape

The Clay Vale is an area of low-lying ground between the Lincolnshire Wolds, to the east, and the gentle westward slope leading up to the Northern Cliff. To the south, it is bounded by the fens. The character of the area is strongly defined by the rivers and streams that drain through it from neighbouring areas. The area is divided roughly in half by a watershed between the River Ancholme to the north and the Barlings Eau to the south. Numerous small streams run from the neighbouring high ground along east-west paths to these major watercourses. The Ancholme drains into the River Humber to the north and thence into the North Sea. The Barlings Eau drains into the River Witham, which forms the southern boundary of the character area. The presence of these two major water courses has led to an accumulation of heavy clay soils over the course of time, which has in turn strongly influenced the types of farming and husbandry that can be practiced in the area. In certain places, notably around Market Rasen, the clay has also been overlain with wind-blown sand deposits.

To the north of the A1103, an area roughly corresponding with the Ancholme Valley, the area is very sparsely settled. There are very few historic settlements in this part of the character area, and isolated farmsteads are equally limited in their distribution. The rural landscape is predominantly comprised of rectilinear drained fields which are often waterlogged in the winter months. These fields, known as Carrs, are found along the length of the river and are typically named for the parish in which they lie. Their flatness affords wide views across the width of the valley with few vertical intrusions. The fields are typically bounded with hedges, indicating former use as grazing land, although the hedges are now typically overgrown and no longer stock-proof. The straightening of the River Ancholme left its former course in existence, forming several islands of these Carr fields between the two watercourses.

The central part of the character area, between the A1103 to the north and the A158 Wragby Road to the south, is characterised by a greater number of settlements, both nucleated villages and isolated farms. The prevailing character of the fields is modern, resulting from large scale post-war hedge removal. This process has created a landscape of broad, open views, with Lincoln Cathedral as an important distant landmark. Although the main lines of communication are oriented approximately east to west, there is an important network of single track lanes connecting most of the villages in the area. Some of these have the

characteristic length and straightness of enclosure roads, whereas others are more sinuous, potentially indicating an earlier period of origin.

South of Wragby Road, the area is remarkable for the widespread survival of the historic Limewoods. These are a significant regional asset both in heritage and biodiversity terms. There are also several modern conifer plantations, typically planted to make use of the unproductive coversand soils, and the main roads are bounded by trees and hedges, restricting views across the landscape. The fields in this part of the vale are a typical mix of ancient enclosure, planned enclosure and modern fields. Where historic boundaries remain they are usually marked by hedges rather than ditches. The southern part of the character area is on the edge of the Witham Fens, with the River Witham itself forming the western boundary of the area. There are several ruined abbeys along the course of the river, of which Bardney Abbey is a particularly fine example. There is a higher proportion of nucleated settlements in this part of the character area than is found further north, and these are distributed evenly throughout the area.

Landscape History

The earliest recognisable settlements in the character area are the abbeys that were founded along the fen edge, to the south of Lincoln. Bardney Abbey, one of the best preserved examples, was founded in the late seventh century, but destroyed after several Viking raids. It was refounded after the Norman Conquest, and there were other new foundations at Stixwould, Tupholme and Kirkstead. These religious communities may have made early attempts to alter the course of the River Witham, and to drain some of the nearby fens. It is also likely that they controlled crossing points across the river and the fens, perhaps exacting tolls from travellers. The monasteries in this area were heavily involved in the production of wool, and in its export via the port at Boston, which would have been accessible via the River Witham.

Ruins of Tupholme Abbey, near Southrey
© Ron Strutt

The southern part of the character area, as well as being notable for the presence of many ruined abbeys, is also much more wooded than the rest of the area. This is largely due to the presence of the historic Lincolnshire Limewoods. The presence of woodland in the central part of Lincolnshire is recorded in the Domesday survey, and it is possible that some of the Limewoods, especially in the vicinity of Chamber's Farm Wood, are medieval in date.

The majority of settlements in the character area are small villages, most of which were in existence by the time of the Domesday survey in 1086. These communities appear to have been typical examples of nucleated settlements, set in the midst of open fields which have left many examples of ridge and furrow earthworks throughout the area. However, given the heavy clay soils of the character area, and the difficulty in working such soils, it is likely that there was a significant pastoral component to the medieval farming regime.

There are several examples of shrunken villages, and some examples of total settlement desertion. The settlement of Burreth, for example, was probably deserted in the fifteenth century, and had connection to the abbey at Tupholme. Close by is the deserted settlement of Osgodby, which was associated with Bardney Abbey, and may have been a monastic grange. This settlement may have been deserted after the dissolution of the abbey in 1538. Although there are many causes of settlement desertion, these examples illustrate the impact of the abbeys upon the historic character of the area both while they were active and in the effect their dissolution had on the surrounding landscape

The Ancholme Valley, in the north of the character area, was at one time a fenland area. Although useless for typical arable farming, the land would have been quite productive of grass for common grazing and haymaking. There would also have been managed wet woodland, as suggested by the 'carr' place-names that remain on modern maps. The Ancholme itself has been subject to improvement works, mainly for navigation purposes, since the thirteenth century. Beginning in the seventeenth century, attempts were made to drain the surrounding land as well, and to this end a new channel was cut for the river Ancholme running in a predominantly straight line from Bishopbridge to the Humber. The path of the old river can still be traced, meandering to either side of the new cut. Drainage of the northern area led to enclosure of the land in a typically planned rectilinear fashion, but the lack of isolated farmsteads in the area suggests that farmers remained in the villages, perhaps because of the risk of flooding on the newly-drained land.

During the nineteenth century a natural spring was discovered near Coningsby and the settlement of Woodhall Spa was created to take advantage of the growing fashion for 'taking the waters'. The village centre has a strongly Victorian character, and has a regular grid-shaped plan. The village is surrounded with plantation woodlands, and much of the modern development around the periphery is interspersed with both individual trees and copses. This means that even new housing stock retains the essential woodland character of the village.

The conflicts of the twentieth century have left their mark on the landscape of the character area in the form of several military airfields. There are disused bases at Bardney, Woodhall Spa and Wickenby, and an active Royal Air Force fighter base at Coningsby. The latter is famous for its role in the Dambusters raid, and crews from the base are routinely sent on active combat duty to this day. Indeed, the airfield has a significant and widespread impact on the wider landscape due to the frequent appearance of its aircraft, while on training flights across the area.

Modern Fields near Baumber
© Richard Croft

Legibility

The former fenland landscape of the Ancholme has been all but swept away. The only hints of its former character are the Old Ancholme and the fact that some of the drained fields are waterlogged over the winter months. The drainage landscape is well preserved, due to the difficulty of removing drainage infrastructure in order to consolidate fields.

Although the central part of the area has been subject to extensive consolidation of fields, the resulting pattern is strongly reminiscent of the pre-enclosure landscape. There are wide views across large areas, with very few hedges or blocks of woodland to interrupt the line of sight, a situation which strongly recalls the former moorland that made up a large proportion of this area.

The southern area retains strong legibility of many previous landscapes. Most of the former abbeys along the banks of the Witham are marked by well preserved earthworks, and, in some cases, standing masonry. Although the farmland in this area is largely made up of eighteenth century enclosures and modern fields, there are some well preserved examples of ancient enclosure to be found spread throughout the landscape.

Drivers of Change

Agriculture
• Expansion of modern farm buildings around historic farmsteads • Dereliction of historic farm buildings • Subsidies for transferring land from arable to pasture

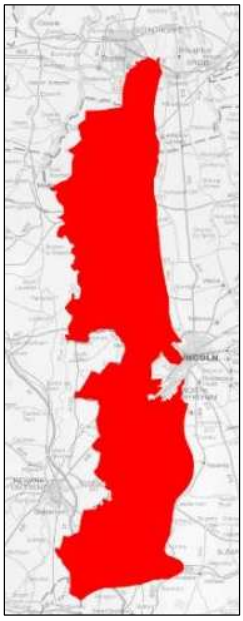
Climate Change
• Expansion of existing power facilities in the Ancholme Valley • Creation of new renewable energy facilities and infrastructure (e.g. wind power) • New crops for bio-fuel/biomass energy • New food crops to cope with altered climate patterns • Substantial flood risk to low-lying farmland

Industry
• Expansion of industrial facilities near larger settlements

Settlement
• New housing around existing settlements • Infill of vacant plots/new builds in residential gardens

Tourism & Recreation
• Increased footfall at heritage sites along the Witham • Facilities and infrastructure for boating and canoeing along the Ancholme

3.6 Regional Character Area 6



The Trent Valley

ARS sub-provinces:
CLNSC
CTRNT

Countryside Agency Countryside Character Areas:
39 Humberhead Levels
45 Northern Lincolnshire Edge with Coversands
48 Trent and Belvoir Vales

Total area: 682.9 km²

Percentage of project area: 9.79%

Description of Present Landscape

This area is primarily rural in character. The eastern edge is formed by the scarps of the Northern and Southern Cliff. The western edge of the area is formed by the River Trent in the north, and by the county boundary in the south. The entire area is characterised by nucleated settlements and isolated farmsteads. The nucleated settlements to the north of Lincoln are arranged in two distinct north-south lines: aligned along the eastern Trent bank and, to the east, along the line of the shallow ridge which leads up to the Northern Cliff scarp. The character of the nucleated settlements to the south of Lincoln fall into two distinct categories: those to the immediate west and south of Lincoln are much more scattered, of smaller size and less frequent in nature than those to the north of Lincoln; those in the far south of the zone are larger in size and more frequent forming a crescent following the edge of the low lying ground through which the River Witham flows. Isolated farmsteads are found throughout the area, with equal distribution, but, due to the lower frequency of nucleated villages, appear more dominant in the central part of the area.

The fieldscapes in the area comprise a balanced mix of field types. Close to the historic settlements at the edge of the area, there is some survival of ancient enclosures of the former open field systems. Survival of ancient enclosure is more prevalent north of Lincoln, apart from an extensive area in the vicinity of Haddington and Aubourn. There is also a strong survival of planned enclosure landscapes across the character area, and the modern fields, produced through a process of consolidation in the twentieth century, retain much of the rectilinear character of the underlying planned enclosures. Most of the modern fields and planned enclosures have a strong east to west orientation, evident from the long boundaries that have survived the process of consolidation.

West Burton Power Station
© Ian Paterson

Although outside of the county, views throughout the area are dominated by the visibility of the Trent valley power stations and associated infrastructure.

Settlements are generally small, scattered villages linked by a network of small, quiet country lanes, which contrast markedly with the busy A1 and A46 roads which both traverse this character area. The villages are, on the whole, closely linked to the underlying geology and topography with many located on slight rises. There are two distinct lines of settlement in the north of the character area which generally follow the line of current and former River Trent terraces, and a crescent of settlements in the south of the character area which follow the line of River Witham terraces.

Landscape History

Whilst there is evidence from excavation and aerial photography of occupation and utilisation of the landscape in this character area from the prehistoric and Roman periods, there is little surviving visible evidence of this in surviving landscape features, apart from the alignment of two Roman roads and possibly the line of the Foss Dyke canal which may be of Roman construction. The two Roman roads are the main road from Lincoln to Newark, the A46, which follows the line of the Fosse Way, and the present A1500, Tillbridge Lane, which follows the alignment of the Roman road which linked Ermine Street, north of Lincoln, with the crossing point of the River Trent at Marton and Littleborough. Many of the present parish boundaries still respect the line of the A46, and the Foss Dyke, suggesting that these features remained important elements in the landscape into later periods.

The organisation of the present landscape probably has its origins in the early medieval period, although it is difficult, from the material available, to draw a coherent picture of the precise settlement pattern and chronology, and therefore of land utilisation, during this period for this character area. The area around Stow, in the northern part of the character area, was the administrative centre of a large block of estates which belonged to the Bishops of Dorchester (later the Bishops of Lincoln) at this period. St Mary's, Stow is a large church which is highly visible from the surrounding countryside, and records show that it served as a Minster Church for the Lincolnshire part of this diocese. It is possible, therefore, that not only parish boundaries but also perhaps some of the farmsteads in this area date from this period. It is also clear that most of the current settlement names were in use as the names of manorial estates at the time of the Domesday Survey of 1086, although these manors many not necessarily have been located on the same site as the existing settlements; nevertheless, settlements following spring lines are likely. In addition, the important Anglo-Saxon town of Torksey was already established as a river port in this period.

St. Mary's Church, Stow
© Richard Croft

The process of enclosure of the open fields and commons, and the draining of the Witham and Till fenland, probably started in a limited and piecemeal fashion during the medieval period. This gathered pace in the eighteenth and nineteenth centuries with the enclosure movement. Within this character area approximately 60% of the parishes were enclosed by

Act of Parliament, with the remaining being enclosed privately. Some of the present road network is probably contemporaneous with planned enclosure, particularly in the fenland areas.

The advent of the Second World War saw the establishment of three airfields in the Character area. None of these is now in use by the Royal Air Force, although one is still in use as a civilian airfield.

After the Second World War there was extensive consolidation of the fieldscapes within the character area, with the removal of hedgerows and field boundaries to allow the use of increasingly heavy farm machinery. Although outside the county, the Trent Valley power stations and their associated infrastructure, constructed in the 1950s and 1960s, are visible from many vantage points within the Trent Valley.

Legibility

Legibility of the medieval landscape is evident in the survival of the linear settlement pattern and long east-west orientated field and parish boundaries. Some ridge and furrow, visible as extant earthworks and as crop marks on aerial photographs, is present within the ancient enclosures near to settlements.

Legibility of the post medieval landscape is evident in the good survival of planned enclosure and isolated farmsteads across the character area, which gives the area its dispersed character.

The modern landscape shows field consolidation inductive of contemporary agricultural practices. Most modern housing is centred on ancient settlements, but these settlements retain their historic character.

Drivers of Change

Agriculture
• Further field consolidation • Changes to the crop regime, mainly for bio-fuels • Closure and dereliction of farms

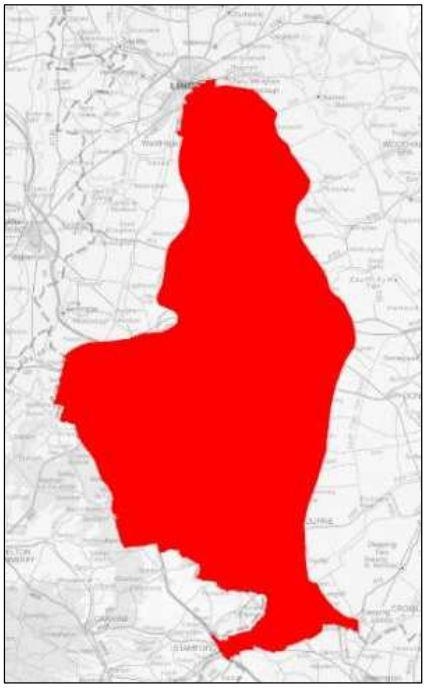
Climate Change
• Changes to the crop regime, mainly for bio-fuels • Construction of windfarms/micro-hydro generation • Loss of tree species

Industry
• Potential loss of existing power stations in Nottinghamshire as new sources come on-line • Creation of new aggregate extraction sites or expansion of existing ones

Settlement
• Modern development within and around settlement edges • New housing development around Gainsborough

3.7 Regional Character Area 7

The Southern Cliff



ARS sub-provinces:
CLNSC
EWASHW
CEMID
CTRNT

Countryside Agency Countryside Character Areas:
46 The Fens
47 Southern Lincolnshire Edge
48 Trent and Belvoir Vales
74 Leicestershire and Nottinghamshire Wolds
75 Kesteven Uplands
92 Rockingham Forest

Total area: 1,168 km²

Percentage of project area: 16.7%

Description of Present Landscape

The northern part of the area is situated on the same geological formation as the Northern Cliff; a north-south aligned west-facing limestone scarp, with a gently eastward sloping aspect. To the south, the upland character broadens out to join with the Nottinghamshire-Leicestershire Wolds. The area to the east of the limestone cliff sits above colluvial clays at the edge of the fens.

Although the Southern Cliff is part of the same geological formation as the Northern Cliff, the settlements found on it are arranged quite differently, both in their built form and in their location within the landscape. The historic villages of the area are constructed mainly of local limestone, excavated from the Cliff itself. This has resulted in a greater survival of older buildings than in other areas, where mud-and-stud was prevalent as a building material up until the advent of readily available brick and tile. Indeed, the area is notable for the extensive preservation of such historic towns as Stamford and Market Deeping. Later extensions to these stone-built towns are generally of brick, but there have been recent attempts to use stone cladding on modern estates and public buildings.

Sudbrooke Hill Farm
© Simon Mortimer

There is a distinctive line of settlements traceable along the Cliff from Lincoln southwards to Grantham. This line appears to follow the curvilinear course of the Cliff, but is not limited to the top of it. It may be that the settlements were established along a spring-line, as can be found at the edge of the Wolds. South of Grantham, the settlements follow the line of the Roman road, Ermine Street, which at this point joins with the A1. On the eastern edge of the character area, there is another line of settlements following the fen edge, with parish holdings extending out of the character area into the fens. Settlements in the central part of the area, that is to say the area bounded by the A52, the A1 and the A15, are more scattered than the rest. These villages are connected by a spider-web network of minor roads and their position may be governed by the past or present courses of the East and West Glen rivers.

The rural landscape of the area is today one of mixed farming, with a high proportion of surviving parliamentary planned enclosure to be found throughout. The northern part of the area is largely arable, with large rectilinear fields laid out on the top of the Cliff. The fields here are typically large, with unmaintained hedges that in places have grown into rows of trees. Along the main north-south roads there are stretches of stone walling that, in places, also form the east-west field boundaries. This pattern extends from Lincoln in the north to Ropsley, near Grantham, with a similar landscape to be found on the heathland to the west of the area, on the Lincolnshire-Leicestershire border around Skillington and Stoke Rochford. The southern half of the area is more undulating in form, in contrast to the broad plateau of the heath. There is a marked similarity to the landscape of the Wolds, in that the undulations appear to be formed by dry river valleys, the courses of which can often be traced in the sinuous woodland plantations found along many of the valley bottoms.

The hills and valleys of this landscape are more suited to pastoral farming, and there is a greater occurrence of pasture in this part of the area. Hedges in the pastoral area are better maintained, and most are stock-proof. To the east, where the limestone scarp dips beneath the clays at the fen edge, a well preserved landscape of parliamentary enclosure can be observed, and this landscape, like the upland heath, is largely arable. Due to the drainage processes involved in the creation of this farmland, the fields are largely bounded by ditches rather than hedges. This, combined with eastward views over the fens, gives the eastern fen edge settlements a more open aspect than the rest of the character area.

Swinstead Valley
© Tim Heaton

The area is well wooded, with a mixture of ancient woodland and more recent plantations. The large country estates in the area have also enhanced the woodland cover of the area through the planting of shelter belts, screens and game coverts. There is a greater occurrence of woodland in the rolling hills of the south than on the heath. There is less woodland cover on the eastern slopes at the fen edge, perhaps indicating the greater arable productivity of the soil in this part of the area.

The area is notable for the high proportion of stately homes and associated landscape parks. These are found throughout the character area, but especially in the area south of

Grantham. Some of these parks are open to the public, with the National Trust property at Belton being a popular destination for visitors.

This area is perhaps the best-connected part of the county. Grantham, the most populous town of the area, is situated on the A1, the A52 and the main railway line to London. Stamford, another important town, is also on the A1, and has a rail link to Peterborough. The modern character of these towns, and of their neighbouring villages, is heavily influenced by these factors. There is a higher proportion of modern residential estates in the area than in the county as a whole, resulting from the enhanced transport links of the area which allow commuters to live in a rural landscape and travel to work in London or Peterborough.

Landscape History

As with the Northern Cliff, the earliest discernable landscape features are the Roman roads, in this case Ermine Street and Mareham Lane. The town of Ancaster is in origin a Roman settlement and may owe its continuity of occupation to its strategic position on a natural gap in the Cliff. Later villages appear, from their names, to be a mix of Anglo-Saxon and Danish foundations, however the general patterns, as described above, appear to have been in existence by the time of the 1086 Domesday survey.

Although much of the land was unsuitable for arable cultivation, the pre-enclosure farming regime appears to have been centred on the traditional open strip field system. Settlements along the spring line in the west and the fen edge in the east had extensive open fields and large commons on the upland heath and on the fens, respectively. By contrast, settlements in the central upland area south of Grantham appear to have had smaller open fields with large areas of ancient enclosure, much of which has been lost to modern field consolidation.

The dry northern heath and the rolling Kesteven countryside have, historically, been much favoured for the raising of sheep. Indeed, the wool trade was responsible for much of the historic wealth of the area, which is evident in the widespread survival of stone farm buildings from the seventeenth and eighteenth centuries. A particularly important example of this type of building is Woolsthorpe Manor, the home of Sir Isaac Newton, now a property of the National Trust.

The wealth generated by the wool trade also allowed the establishment of several large estates by local aristocrats, and each has had a significant impact on its local area. The parks created new 'designed landscapes' that allowed the owners to demonstrate their wealth and taste to their peers, and gave them privacy within their own estates. In some cases former villages were removed from the landscape during the seventeenth and eighteenth centuries in a practice known as 'emparking'. In other cases, the natural growth of villages was considered displeasing to the landowner and the village was rebuilt to reflect his tastes. In order to accommodate

Estate Cottages, Londonthorpe
© Richard Croft

displaced villagers, many landowners built 'estate villages', such as Manthorpe near Belton, and Edenham near Grimsthorpe, which are characterised by uniformity of architecture, regular plot sizes and the frequent use of family crests or monograms on buildings. Such villages are usually situated outside the boundaries of the designed parkland landscapes. Estate buildings also occur individually in historic villages situated close to some estates.

The enclosure movement of the eighteenth and nineteenth centuries was a major force for change throughout the area. Although much of the uplands had already been enclosed privately by this time, large areas of open field arable land remained, and were removed from the landscape by the Parliamentary Enclosure Acts. The heathland along the top of the cliff was enclosed largely by various Acts of Parliament, creating the rectilinear formations seen there to this day. The fen edge settlements retained their ancient farming regime until the enclosure and drainage acts created the current landscape of drained fens to the east and enclosed commons to the west.

Today, the area retains strong elements of its historic character. However, the large areas of ancient enclosure found on the uplands have been very much diminished by the post-war trend towards larger fields, which allow efficient cultivation by machine. This is a direct result of the recent trend from pastoral farming to arable land, which has changed much of the appearance of the landscape, especially within former parkland. This process has been slowed in recent times, and there is now a movement in the other direction, as subsidies have been made available for pasture.

As with the Northern Cliff, this area has been used extensively by the Royal Air Force. However, there are few surviving bases in the area and former bases have been subject to demolition or dereliction.

The popularity of the area with commuters has put pressure on local towns and villages, some of which have expanded rapidly and sometimes without regard to the historic character of the older buildings. Modern housing estates, both social and private, can be found especially around the major towns, Stamford, Grantham and Sleaford. The smaller villages of the area are often affected by new development on their edges or by modern in-fill within their core areas.

Legibility

Despite the many changes to the landscape over the centuries, each period has left a recognisable mark on the landscape of the Southern Cliff. The earliest features are Roman, and the line of Roman roads can still be traced across the landscape. The small town of Ancaster retains the location of its Roman antecedent, although little of the Roman town remains above ground today.

The early post-Roman character of the landscape is only visible in the pattern of settlements throughout the area. It is possible to distinguish between Anglo-Saxon and Danish settlements on the basis of their names, and formations such as the spring-line and the fen edge are still readily identifiable. Some of the ancient woodland identified in the area may be very ancient indeed, and it has been observed that Kesteven, the Saxon kingdom from which the area takes its name, may be derived from the Celtic '*coed'* for' woodland'. Whether there is any remaining pre-Roman woodland or not, the area is still remarkable for its woodland cover, and this is at least indicative of earlier landscapes.

The wool trade, upon which the wealth of the area was built, is identifiable by the irregular field shapes, and by the evident historic wealth indicated by the many surviving stone houses of the local yeomanry. The large parks and houses of the aristocracy are also

indicative of the wealth of the area, and many of these houses have been preserved either by private individuals, as at Grimsthorpe, or by bodies such as the National Trust.

Drivers of Change

Agriculture
• Consolidation of historic fields through loss of boundaries • Neglect of surviving ancient hedgerows • Change of use from arable farming to pasture

Climate Change
• Loss of traditional woodland species • New methods of energy production, especially micro-generation facilities on historic buildings • Infrastructure for energy transmission from more northerly areas • Introduction of new crops, if current varieties prove unsuitable to warmer, drier weather

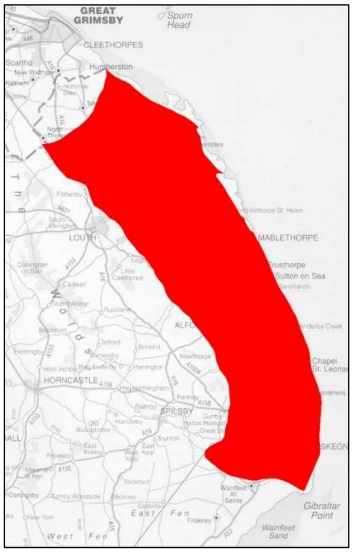
Industry
• Expansion of industrial facilities around major settlements • Change of use of old farm buildings from agriculture to light industry • Possible closure of RAF bases and dereliction of disused airfields

Settlement
• Further expansion pressure throughout the area from an increased commuter population • Growth of existing population requiring affordable housing • Dereliction of isolated farm buildings and agricultural units

Tourism & Recreation
• Increased visitor numbers to stately homes and parks throughout the area • Traffic through the area on major roads, e.g. A1, A15

3.8 Regional Character Area 8

The Grazing Marshes



ARS sub-provinces:
EWASH
CLNSC

Countryside Agency Countryside Character Areas:
42 - Lincolnshire Coast and Marshes

Total area: 544.7km²

Percentage of project area: 7.81%

Description of Present Landscape

The landscape of this area is predominantly flat with generally wide, open views across long distances. In the south of the area, especially around Burgh-le-Marsh, these views are compromised somewhat by the 'Bocage' effect of hedged roads and paths, which tend to restrict visibility from the main lines of communication. There are, however, fewer large blocks of woodland in the area than are found in the county as a whole, and woodland as a proportion of the landscape is less well represented.

There is a strong maritime influence on the landscape with much of the agricultural land having been reclaimed from the sea over several centuries. There are several active and relict sea banks in the area aligned parallel to the coast. Much of the coast is made up of salt marsh and dune systems which are well preserved. This preservation can be attributed to the presence of the Royal Air Force bombing ranges along the coast and, more recently, to the establishment of a number of nature reserves. The marshes, along with other areas of rough grassland on the seaward side of the defences, are used for grazing by local cattle farmers.

Settlement in the area is predominantly dispersed. There are many small, isolated farms throughout the area and villages often have a long, straggling pattern, with large plots, and wide gaps between them. There are some examples of classic nucleated villages, but these are relatively fewer in number than in the neighbouring

Saltfleetby All Saints
©Lincolnshire County Council

upland areas. In general, more ancient settlements tend to be found on areas of relatively higher ground, with newer settlement features found in areas of more recent drainage. Despite the dispersed character of the settlement in this area, there is a higher proportion of settlement in this area than the average for the county.

The area is dominated by rural character types and has a notably higher proportion of ancient enclosure than the county average. There is significantly less planned enclosure, however, and modern fields are no more prevalent in this area than in the county as a whole. Although there are exceptions, arable land is generally found in the 'modern fields' or 'planned enclosure' landscape types, while pasture is limited to ancient enclosures in close proximity to historic settlements.

The Lincolnshire coast is well known for its seaside resorts, which are in many ways the economic backbone of the area. Skegness, Mablethorpe and Ingoldmells are the main resort towns, and each has a large hinterland of caravan parks. Much of the pre-nineteenth century character of these towns is no longer visible, having been subsumed beneath a facade of amusement arcades, holiday shops and fast food restaurants. The holiday industry is seasonal, and the towns experience an annual cycle of booms during the summer months and busts in the winter. From October to April, the character of the towns changes from bustling tourist honeypots to one of shuttered desertion.

Ingoldmells in January
© Ian Paterson

Landscape History

The landscape in this area can be divided into two broad areas: the Middle Marsh, and the Outmarsh. These areas are closely connected by historical land use and farming practices, but are the result of distinctly different processes.

The Middle Marsh is that area of higher ground running from Louth in the north to Burgh-le-Marsh in the south, and lying between the foothills of the Wolds and a rough line from Fulstow to Alford. The Outmarsh is that land between the Middle Marsh and the sea. The Middle Marsh is relatively higher than the Outmarsh, and is characterised by a greater proportion of nucleated historic settlements.

Much of the land in the Outmarsh area owes its existence to the various phases of drainage and reclamation that have taken place over the centuries, whether planned or as the by product of other land use. The earliest phase of reclamation that can be seen is the result of medieval salt making along the former coast lines. These are identifiable by the parallel lines of settlements running down the coast from north to south. The process of salt making created, as a by-product, large quantities of spoil, made up of sand and silt, which was disposed of on large mounds. As the saltern mounds grew in size and number, so the sea receded, and new settlements were founded on the reclaimed land in order to continue the salt making process. The newer settlements are identifiable from names such as Somercotes, suggestive of a temporary settlement (somer = summer, cotes = huts), and

Marshchapel, which indicates a satellite chapel of a parish church. Other names, such as Theddlethorpe St Helen and Saltfleetby St Peter, further indicate the establishment of 'daughter settlements' in newly reclaimed marsh.

This phenomenon is less pronounced in the south of the area, between Mablethorpe and Skegness. Here, the dominant process of reclamation and drainage appears to have been the result of more familiar processes, such as Parliamentary Acts and private agreements. This area also lost land through erosion to the sea during the medieval period. Aside from the major settlements, such as Skegness and Mablethorpe, this part of the area is characterised by dispersed settlement types, such as isolated farmsteads, and string villages of predominantly nineteenth-century character. This is the result of a planned process of drainage and enclosure with the establishment of farmsteads on newly drained land.

The larger settlements of the coastal area have grown as a result of the tourist industry, and this is strongly reflected in their built character. Although historic elements are visible in these resort towns, most of the buildings, either residential or civic, date from the late nineteenth century onwards.

Legibility

The former salterns in the northern part of the character area have been largely ploughed out in the mid to late twentieth century. However, their presence can still be inferred from the sinuous boundaries of the fields in which they used to be found. These boundaries have survived as they represent the course of ancient creeks that once flowed around the base of saltern mounds, and have since become a vital part of the local drainage system. Hence they cannot be removed without causing flooding. Therefore, although the salterns no longer exist, their influence in the landscape can still be read in the pattern of ancient enclosure near the coast.

The landscape of the eighteenth and nineteenth centuries is strongly legible in the extensive survival of planned enclosure field types. The associated pattern of isolated farmsteads is also well preserved, although changing farming methods have led to some dereliction of ancillary farm buildings and to the erection of large modern barns.

Drivers of Change

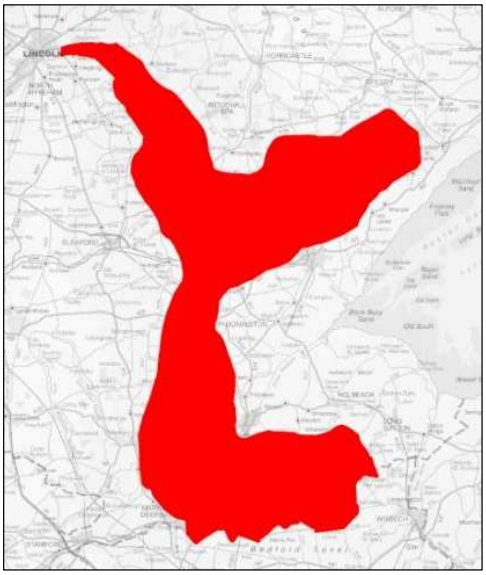
Agriculture
• Further consolidation of field boundaries • Fluctuating food prices causing changes between arable and pastoral uses • Bio-energy crops with different appearance

Climate Change
• New energy production infrastructure – wind turbines, transformers, power lines • Alterations to housing fabric – whitewash, air-conditioning, building materials, solar panels • Changes to sea level – flood risk, construction of defences, managed retreat

Settlement
• Expansion of larger settlements – Burgh-le-Marsh, Louth, Skegness • Infill of straggling linear villages and hamlets • Decline of isolated farms – Disuse of ancillary buildings, abandonment

Tourism & Recreation
• Expansion of resort facilities along recreational coastline • Associated expansion of caravan parks • Enhancement of roads and public transport for increased numbers of visitors

3.9 Regional Character Area 9



The Fens

ARS sub-provinces:
EWASH
CLNSC

Countryside Agency Countryside Character Areas:
44 – Central Lincolnshire Vale
46 – The Fens
47 – Southern Lincolnshire Edge

Total area: 1,052Km²

Percentage of Overall Project Area: 15.1%

Description of Present Landscape

The Lincolnshire Fens represents a large proportion of the southern half of the county. The area is well defined to the north and west, as in these directions there is a clear edge, defined by higher ground. To the south, the boundary is partially formed by the River Welland, but also meanders across the countryside for great lengths, presumably following the course of long-forgotten rivers, until it joins with the River Nene. The eastern edge is defined by the Townlands, a silt bank upon which many of the historic Wash settlements are situated.

At first glance, the area appears to be quite uniform in character. The landscape is the most rural in the county, and is mostly made up of arable fields. These fields are typically rectilinear, with boundaries formed from drains rather than hedges. The drains form a network of channels, from individual field drains, to large, navigable artificial channels such as the Forty-Foot Drain. The flat landscape is relieved by occasional small blocks of woodland, raised roads and tracks, and the occasional isolated farmstead. The character area is the least settled in the county as a proportion of its area, largely due to the lack of nucleated settlements.

However, there are subtle differences across the landscape, most of which are influenced by the length of time since drainage. The long tongue of fenland reaching up to Lincoln along the river Witham is sparsely populated, with only a handful of isolated farms along its length. The fields are arranged in a strongly rectilinear pattern, perpendicular to the primary east-west aligned farm tracks. In most cases, these tracks terminate at the river. The only vertical intrusions in this otherwise flat landscape are the isolated farmsteads and their associated modern barns, which are often situated some distance away from the residential farm buildings.

Red House Farm, Branston Fen
©Ian Carrington

The few trees to be found in the area are also found near and around the farmsteads and there are no hedges in evidence as field boundaries. The overall effect of the flatness of the landscape, and the lack of tall objects therein, is to emphasise the impact of the sky. This is above all a lonely landscape, with wide unrelieved areas of flat farmland standing in stark contrast to magnificent cloudscapes and dark night skies.

A broadly similar landscape prevails along the fen edge from Bourne to Heckington, between the Southern Cliff character area and the South Forty-Foot Drain. The drained fenland in this part of the area is arranged along a series of east-west aligned farm tracks leading from the settlements on the high ground to the newer isolated farmsteads in the fen itself. The parishes themselves have elongated rectangular shapes on an east west alignment, with each parish having a share of the upland in the Southern Cliff and the fens to the east.

The fens to the south of Spalding, and to the east of the Forty-Foot Drain, are somewhat different in character to those of the north and west. The farm tracks and field boundaries are predominantly straight and regular, but are not parallel, instead forming a radial pattern around the South Holland Main Drain. Although the area is still characterised by the preponderance of isolated farmsteads, there are also several small settlements of a dispersed and linear character, such as Holbeach Drove and Sutton St Edmund. The exception to this settlement pattern is the small town of Crowland which, while retaining many historic features, such as its partially ruined abbey and the famous Trinity Bridge, has been enlarged and expanded by the addition of modern residential estates.

Landscape History

Before drainage, the landscape of the fens was one of rivers, meres and seasonally inundated land. Successful exploitation of the landscape would have required an intimate knowledge of its workings, but would have provided all the necessities of survival. Fishing and wildfowl hunting would have provided a good source of food, while the inundated fens would have provided excellent grazing for sheep and cattle in the summer months. The natural growth of reeds and the ready availability of thick mud provided the raw material for house building. This way of life probably existed before the Roman conquest, and continued until the mid eighteenth century.

Although the traditional Fenland way of life was sustainable for the inhabitants and even provided enough surplus production for trade outside the area, it was observed, by Sir Joseph Banks among others, that the land, when drained, would be eminently suitable for cultivation. The earliest attempts to drain the landscape were in the Roman period, when a small area was drained by the construction of the Car Dyke. Early drainage was achieved by the construction of new watercourses, such as the Forty Foot Drain, but as the land dried and the peat shrank, the water began to reclaim the land. Wind power was extensively used to pump water away, but full stable drainage was finally achieved

Lade Bank Pumping Station
©Richard Croft

using coal-fired steam pumps in the eighteenth and nineteenth centuries.

The individual drainage projects were undertaken by various parties. The Witham Fens were the subject to an Act of Parliament in 1762, which created the Witham Drainage General Commissioners, which had oversight of the drainage process. The Witham was divided into districts, to which each parish could elect a commissioner. Parliamentary Acts were obtained as necessary, and drainage of the Witham Fens was largely complete by 1850. The Holland Fen was drained separately in 1767, also by Act of Parliament. The East, West and Wildmore Fens were drained in 1803, by a single Act of Parliament.

The Fens to the south of Spalding have a rather different history of drainage. The earliest reclamations appear to have been undertaken by the settlements on the Townlands, which built dykes and drains to the south-east. The place-names, such as Holbeach Drove, indicate that this engineering work was undertaken in order to provide access to grazing land for cattle. Once the initial stages of drainage had been completed, the parallel lines of drains, dykes and drove roads were infilled by many perpendicular drains, creating numerous small thin fields, known as dylings. Although these fields have been subject to a great deal of consolidation over the past fifty years, the essential pattern remains intact to this day.

Although the most far-reaching changes to this landscape occurred centuries ago, the landscape has continued to evolve during the last fifty years. Since the Second World War the increasingly mechanised nature of agriculture has necessitated the removal of field boundaries to create larger fields that can more easily be worked by machinery, such as combine harvesters. The trend towards mechanisation has also reduced the number of people employed by the agricultural sector, which has affected the survival of farmsteads and associated buildings, some of which are now falling into disrepair.

Legibility

The historic wetland natural heritage of the Fens has largely been lost under the modern landscape of intensively farmed arable land. However, the successive phases of drainage, and the techniques used to keep the land dry, can all be identified in the area today. The hierarchy of drainage channels in the area remains largely unchanged from its nineteenth-century form, although individual field drains are much reduced in number.

The southern part of the Fens retains a well preserved pattern of medieval enclosure, especially immediately to the south of Spalding. This is despite the extensive loss of field boundaries over the last few decades. Later planned enclosure is also well preserved throughout the area, and even where many boundaries have been lost the essential rectilinear character of the landscape is highly legible.

The ongoing struggle to keep the land dry is demonstrated by the large numbers of windmills found throughout the area. At various points along the drains, there are surviving examples of nineteenth-century pumping stations, further indicating the historic processes of drainage.

Drivers of Change

Agriculture
• Introduction of tall-growing bio-mass crops • Consolidation of fields leading to loss of historic patterns • Change of use from arable to pasture

Climate Change
• Flood alleviation schemes – storage pools, pumping facilities, dykes • New crops capable of dealing with drought

Industry
• Construction of new energy production facilities – especially wind power • Creation of associated energy infrastructure, such as pylons and substations

Settlement
• Dereliction of historic isolated farm buildings • Infill developments in straggling linear villages

Tourism & Recreation
• Few existing tourist destinations in the area • Possible expansion of roads (e.g. A52) to accommodate higher levels of through-traffic between the Midlands and the coast

3.10 Regional Character Area 10

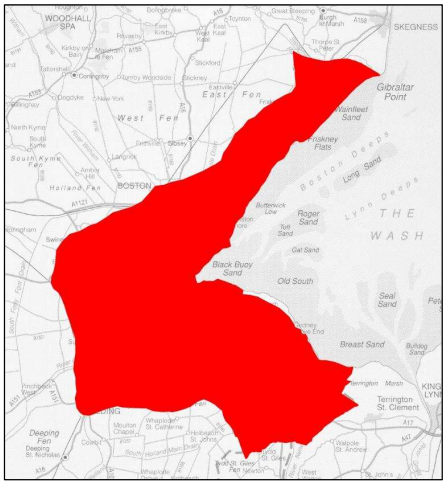
The Wash

ARS sub-province: EWASH

Countryside Agency Countryside Character Areas:
46 – The Fens

Total area: 660.3 km^2

Percentage of Overall Project Area: 15.1%



Description of Present Landscape

The Wash is a large estuarine complex on the east coast of Lincolnshire. It is fed by the Rivers Witham, Welland, Steeping, Great Ouse and Nene, which are themselves fed by numerous drains and streams across the East Midlands. The western edge of the character area is dominated by a silt ridge which stands about 4m above sea level. The land between this ridge and the Wash Estuary itself is typically at or below sea level, with earthen banks at regular intervals parallel to the coast marking the extent of former coastlines.

The shoreline of the Wash has changed dramatically over the last thousand years, not least because of human influence. Although the shape of the coast has changed naturally as a result of changes in sea level, rainfall and climate, much of the dry land of the character area owes its existence to successive periods of artificial drainage for agricultural purposes. The rural landscape is one of broad, open views with occasional vertical intrusions from buildings or features, such as the tower of St Botolph's Church in Boston, wind power facilities or relict sea banks. Roads are typically elevated from their surroundings by up to a metre, and even this modest height allows views over great distances, especially on the drained marshland.

Large Modern Field at Croft Marsh
© Richard Croft

The area is predominantly agricultural, with the highest proportion of modern fields by area in the county, which is indicative of the high rate of field boundary loss. There is also a surprisingly high proportion of surviving ancient enclosure. Perhaps the most striking element of the modern landscape is the occurrence of very large modern fields, sometimes referred to as 'prairies'. These large flat arable fields are almost industrial in character, with parallel lines of uniform crops, such as lettuces or brassicas stretching away into the

distance. The enormous quantities of produce grown require a large infrastructure for processing, and the rural landscape is punctuated by industrial complexes such as canneries and freezing plants. The main roads of the area are often busy with large articulated lorries carrying the produce to distant markets, and these can be seen for miles around.

The flat open expanses of the coastal farmland have proved suitable for the construction of wind farms. This is not a new development, as wind power has been used in the area for centuries, both for milling grain and pumping water, and remains of these windmills can be seen in villages across the character area. However, modern wind power generators are generally much larger than historic windmills and tend to be built in groups, as at Gedney Marsh. The wind farms are visible over great distances, and, as elsewhere in the county, have proved controversial.

Settlements are typically found on high ground, particularly on the silt ridge known locally as the Townlands, extending from Wainfleet in the north, around the coast to Boston, Spalding, Holbeach and Long Sutton. The formation continues across the county boundary to Kings Lynn and around the eastern edge of the Wash, and is roughly parallel to the current coast of the Wash. The Townland settlements are typically nucleated in character, although there has been some development along the main roads that threatens to merge some of the smaller settlements with their larger neighbours, and some ribbon development along the historic drove roads leading north from the Townlands to the drained marsh. The major settlements tend to have a broad mix of housing types from a variety of periods. The historic cores are generally surrounded by increasingly more recent housing, with modern residential estates on the periphery.

Away from the main settlements there is a relatively high proportion of dispersed rural settlement. This was historically made up of isolated farmsteads and associated cottages but new dwellings have been added at a steady rate over the last century. Although parts of the drained marsh can feel isolated due to the large fields and vast skies, it is generally possible to see at least two farmsteads from any position in the landscape, and often five or six, making the landscape a little more intimate than it might at first appear.

Landscape History

The modern landscape of the area has been created by the interplay of two factors. The first is the struggle to drain and retain land from the encroachment of the sea. The second is the exploitation of the rich, fertile land gained by doing so.

Inland View from Friskney Sea-Bank
© Ian Paterson

It is likely that the entire character area has only existed as dry land since the end of the Roman period. At some point in the centuries following the departure of Roman authority, the land on the seaward side of the Townlands was drained either by human activity or by receding sea levels. The Townlands themselves may have existed as islands before this point, but there is little evidence for extensive occupation until the

Anglo-Saxon settlement of the area. By the time of the Domesday survey, the main settlements of the Townlands were in existence in some form. The survey also recorded the presence of salterns along the length of the coast, whose mounds may have been partly responsible for the next phase of reclamation recorded by the fourteenth century. This strip of former marsh, running parallel to the silt bank on the seaward side, is likely to have formed by accretion after numerous high spring tides, which would eventually have left the land dry enough to enclose and surround with a sea-bank. At this point the reclaimed land was most likely to have been used for year-round pasture, with the salt marsh on the far side of the bank providing further grazing when not inundated by the sea.

The process of gradual accretion followed by defence and enclosure continued gradually for several centuries. This resulted in a series of sea banks, which can still be seen in the landscape today. The subsequent phases of enclosure are also indicated by the pattern of field boundaries, which become increasingly more planned and straight the closer they are to the coast. In many places, the former courses of creeks are preserved within the field pattern, presumably still forming an important part of the drainage system. An interesting variation on this theme can be seen at Friskney and Wrangle Tofts, where the field boundaries continue their long straight course across several sea-banks. Taken together with the line of settlement from which these fields emanate, this pattern indicates a continuity of ownership over a considerable period of time, with initial plots, laid out at the back of small farmsteads along what is now the A52, being extended each time a new phase of enclosure was completed.

Over the last century, much of the farmland of the area has been turned to arable cultivation. The fertility of the land has been augmented by the adoption of modern farming techniques, but the same techniques require increasing use of machinery, such as tractors and combine harvesters. In order to accommodate the machinery, farmers here, as elsewhere in the county, have consolidated their fields by removing some of the historic boundaries. This has resulted in the creation of large ‘prairie’ style fields across the character area.

The battle against the sea has been an important part of the historic development of the area. This battle continues, but has recently become more urgent with the impending challenges presented by climate change. It is predicted that sea levels will rise sufficiently to threaten much of the low-lying farmland of the character area in the next fifty years. In order to combat this threat new techniques have been employed, such as the managed retreat at Freiston Shore. As the current policy is that no more land should be surrendered, other methods will need to be employed, such as enhancing existing sea-defences, building new sea walls and adding to the existing array of pumping stations. The threat of climate change has also led to the construction of wind farms across the area, with notable examples at Gedney Marsh and Bicker Fen. These can have a significant visual impact within the landscape, but do not typically damage historic landscape elements, such as field boundaries or standing archaeology. Sub-surface archaeology is, of

Wind Farm at Gedney Marsh
© Glyn Drury

course, as vulnerable to the erection of wind turbines as it is to any other ground disturbance.

Although less than optimal as a site for airfields, the landscape of the Wash nevertheless experienced the effects of the twentieth century conflicts. The remains of pill boxes and other defensive installations can still be seen throughout the character area, having been constructed in order to slow the advance of a potential German invasion force.

Legibility

Despite the many changes to the landscape, much of its historic character remains evident to this day. The marshland that once covered the entire area is still visible from the outermost sea wall, and indeed is a major tourist attraction, as it provides a habitat for large numbers of migratory birds. There are several specific nature reserves, and the whole estuary has been designated as a National Nature Reserve.

Away from the semi-natural landscapes of salt marsh, the rest of the area is entirely man-made. The various phases of drainage can be identified in the field patterns and relict sea-banks and former creeks are seen throughout the area. Despite the removal of many field boundary ditches, the underlying patterns remain well preserved. This is largely due to the inadvisability of removing too many drains in a landscape that is largely below sea level.

Drivers of Change

Agriculture
• Introduction of tall-growing bio-mass crops • Consolidation of fields leading to further loss of historic patterns around settlements • Creation of large 'prairie' fields on drained marsh

Climate Change
• Flood alleviation schemes – storage pools, pumping facilities, dykes • Enhancement of existing sea banks • Introduction of new crops capable of dealing with drought

Industry
• Construction of new energy production facilities – especially wind power • Creation of associated energy infrastructure, such as pylons and substations

Settlement
• Regeneration of historic settlements - Boston, Spalding • Expansion of residential areas around larger settlements • Ribbon development along main connecting roads • Infill developments in straggling linear villages

Tourism & Recreation
• Wider appreciation of biodiversity leading to increase in Nature Tourism • Local economic regeneration through promotion of tourist destinations

4 User Guide

4.1 Background Information

4.1.1 Introduction

The Lincolnshire HLC dataset enables the user to understand more fully the historical development of a given area. Starting with the present, and working backwards through time, it is possible to see what the landscape is now, what it was in the past, and how the former landscapes have influenced and shaped those we see today.

Using a range of sources, the data has been produced according to a nationally recognised methodology, which has been developed over the past twenty years by English Heritage, in partnership with many local authorities.

Although Lincolnshire is among the last of England's historic counties to benefit from this programme, it should be noted that the methodology is now mature, and that many uses have now been found for HLC data as a result of earlier projects.

4.1.2 The Theoretical Framework

Each HLC project undertaken to date has been conducted according to an established set of principles and guidelines developed by English Heritage. While there are often significant differences of focus and methodology between each project, they are all firmly rooted in the same principles.

4.1.3 Guiding Principles for HLC – English Heritage

- **Present not past:** it is the present day landscape that is the main object of study. Landscape as history not geography: the most important characteristic of landscape is its time-depth; change and earlier landscapes exist in the present landscape.
- **Landscape not sites:** HLC-based research and understanding are concerned with area not point data.
- **All aspects of the landscape,** no matter how modern, are treated as part of landscape character, **not just 'special' areas.**
- Semi-natural and living features (woodland, land cover, hedges *etc*.) are as much a part of landscape character as archaeological features; **human landscape – bio-diversity is a cultural phenomenon.**
- Characterisation of landscape is a matter of **interpretation not record, perception not facts;** understand 'landscape' as **an idea**, not purely as an objective thing.
- **People's views:** it is important to consider collective and public perceptions of landscape alongside more expert views.
- Landscape is, and always has been, dynamic: **management of change, not preservation** is the aim.
- The process of characterisation should be **transparent**, with clearly articulated records of data sources and methods used.
- HLC maps and text should be easy to understand, **jargon free** and **easily accessible** to users.
- HLC results should be **integrated** into other environmental and heritage management records (e.g. SMRs or HERs).

4.1.4 Sources

The current landscape type is defined using a combination of modern spatial data. The primary source is the Ordnance Survey 1:10000 map. This is supplemented by aerial photographs and internet resources such as Google Maps and Street View. Previous landscapes are identified using old Ordnance Survey maps, primarily the 6 inch first edition

County Series maps from about 1880. Earlier landscapes are identified from Parliamentary Enclosure maps, where available, the Lincolnshire HER and other documentary sources. It is also possible to identify former land use from place-name evidence and from features in the landscape, such as street patterns and field boundaries.

4.1.5 Methodology

The Geographical Information System (GIS)

In order to understand the make up of the landscape we have today, HLC Project staff broke the landscape down into smaller areas of consistent types. These smaller areas, variously known either as *records* or *polygons*, are recorded within a computer database. The HER database application (HBSMR) is used, linked to a computerised mapping system. The area under investigation is defined using the map, and a line is then drawn around it to form a *polygon,* ranging in size from 1 ha to 300 ha.

This *polygon* is linked to a *record* in the database element of the application, in which the textual data is held. This textual data includes a description of the area, how it has developed over time, and any definable attributes of the area. This procedure is then repeated for every definable area of consistent landscape type across the entire county, resulting in seamless coverage.

Character Areas

As well as the individual records, the Lincolnshire HLC project has defined two other levels of interpretation, *Zones* and *Areas.* These are intended to provide a narrative of landscape processes over a wider area. There are ten *Areas,* roughly corresponding to the Joint Character Areas defined by Natural England. These *Areas* are further subdivided into *Zones*, of which there are forty-five. This includes the three cities of Lincoln, Scunthorpe and Grimsby, which have not been included in the *Areas*.

The *Areas* and *Zones* were defined using a combination of analysis of the HLC data, field visits, and documentary research. Each *Area* is characterised by a dominant historical process which, in combination with variations of topography, geology and settlement patterns, has given rise to a specific and identifiable modern character. Within each *Area* there are three to five smaller *Zones*, which derive from variations to the dominant character type.

It is intended that the descriptive statements of the *Areas* and *Zones* should provide a basis for informing decisions that affect large areas of the landscape. Each statement includes a description of the current character and a narrative statement of historical development, along with a brief summary of potential forces for change that may affect each *Area* or *Zone*.

4.2 HLC Data – Advice to End-Users

4.2.1 How can HLC data be used to assess the impact of a development?

There is no single correct way to use HLC data. There are, however, guidelines available from several sources. English Heritage have produced a document called *Using Historic Landscape Characterisation* which provides examples of how HLC data has been used in the planning process. The Highways Agency has also published a guidance document, *Assessing the Effect of Road Schemes on Historic Landscape Character*. These documents provide a good starting point, but are not an exhaustive guide to the methods available.

HLC data can also be useful when studied alongside other datasets, such as geology maps or digital terrain models. It is always a good idea to consult with local authority officers who maintain the data, and may be able to advise on the availability of compatible datasets, or provide information about other projects that have used HLC in the area. The important first

step is to define the study area. Once this has been achieved, other methods such as definition of attributes like sensitivity can be attempted, perhaps by adopting a pre-existing model such as the one used by The Greater Norwich Development Partnership and Norfolk County Council.

Web links:
Clark, J., Darlington, J. and Fairclough, G., *Using Historic Landscape Characterisation*, (English Heritage, 2004)

[redacted]

Highways Agency, *Assessing the Effect of Road Schemes on Historic Landscape Character* (Highways Agency, 2007)

[redacted]

Norfolk County Council, *Historic characterisation and sensitivity assessment: GNGP preferred option growth areas*, (Norfolk County Council, 2009)

[redacted]

4.2.2 How should a study area be defined?
It is not likely that a development will only impact upon the specific HLC units that fall within its physical footprint. The character of the surrounding landscape may also be affected. In order to take this into account it may be useful to prepare a wider study area. At its most simple, the study area may comprise a buffer around the known footprint of a development. If this method is used, the buffer should be large enough to encompass all HLC units that might be affected by the development. Many GIS software packages allow more sophisticated analysis of topography than this and, if there is sufficient ancillary data, it may be more appropriate to define an area of influence around the development. Perhaps you might use a viewshed analysis to define the areas from which the development will be visible. If the development has other measurable effects, such as noise or smell, you might use the estimated area of those effects as well. Once an area of effect has been defined, it may then be advisable to widen the area still further, in order to provide a comparison.

4.2.3 Why is a larger study area needed?
Any development will have an impact on the HLC units directly under its footprint, and is likely to have an effect on neighbouring units as well. In order to understand the effect of the proposed changes on the landscape as a whole, it is necessary to understand the wider context of the proposed development. For example, a larger study area will reveal whether the HLC types in the area of effect are characteristic of the wider study area, or if they represent a rare type, locally speaking. Furthermore, a study that is limited to the footprint of a development has more to do with site-specific analysis than the landscape scale information provided by HLC.

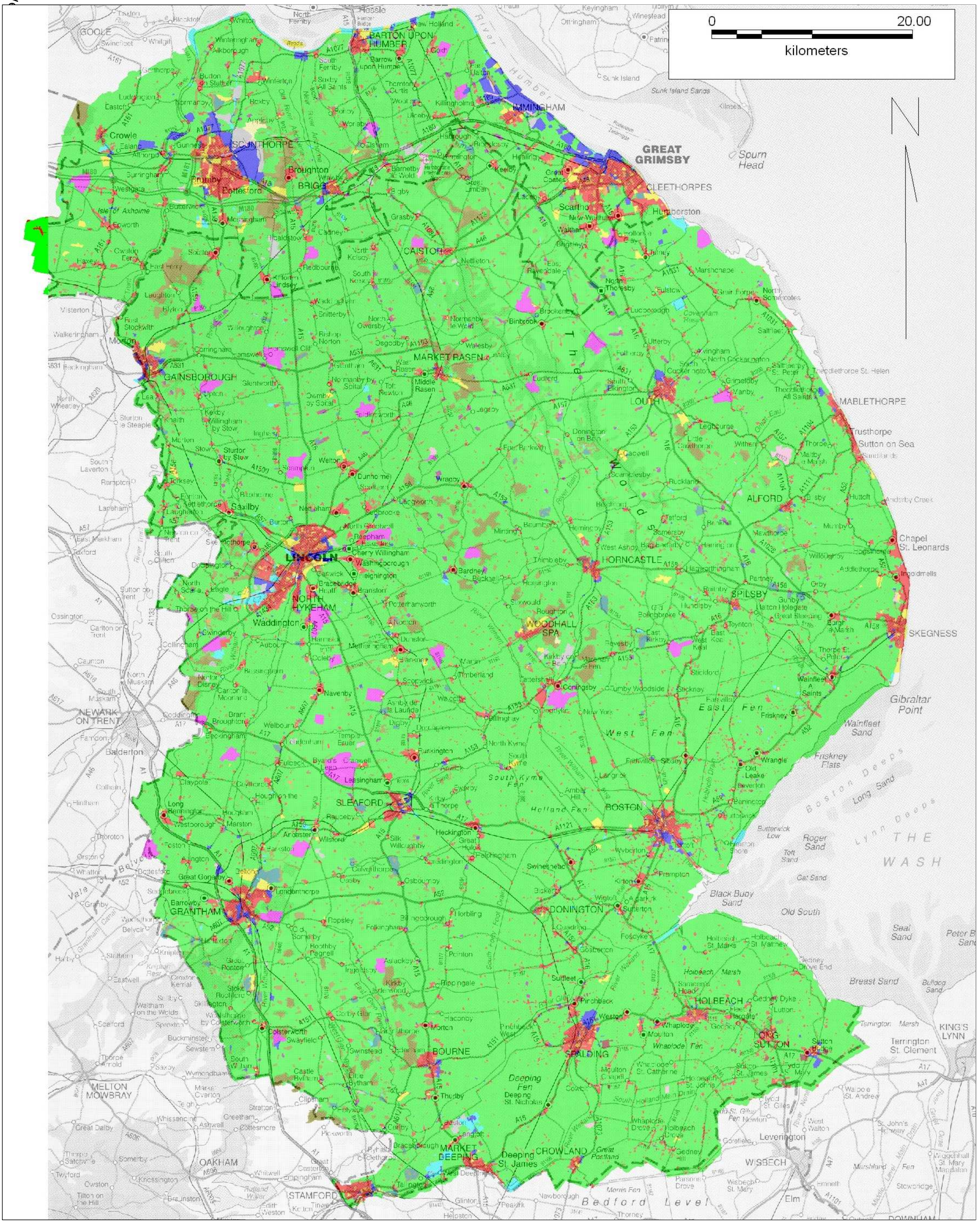


Figure 1. Broad Type data with indicative raster map data

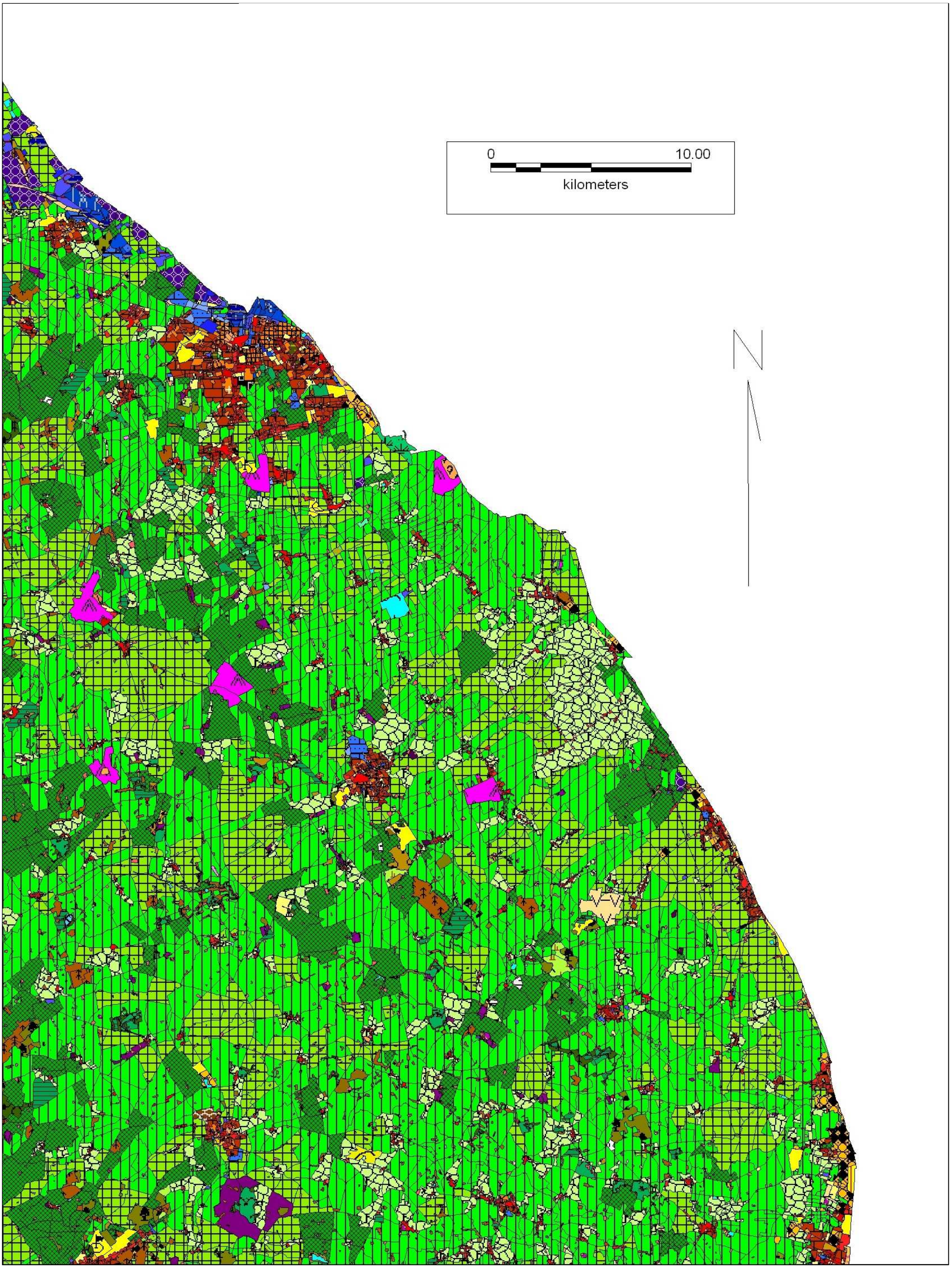


Figure 2. HLC Type data for North-East Lincolnshire

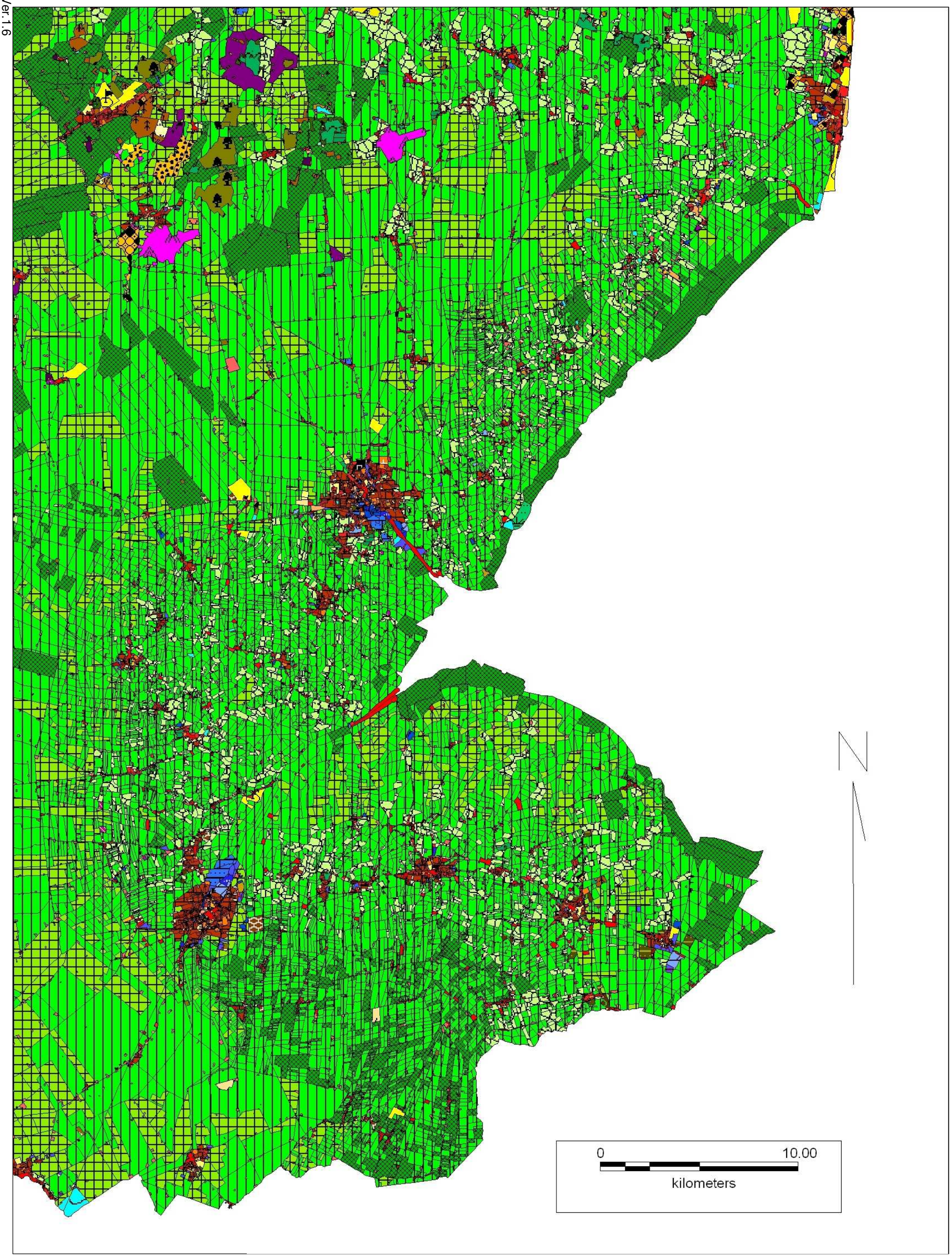


Figure 3. HLC Type data for South-East Lincolnshire

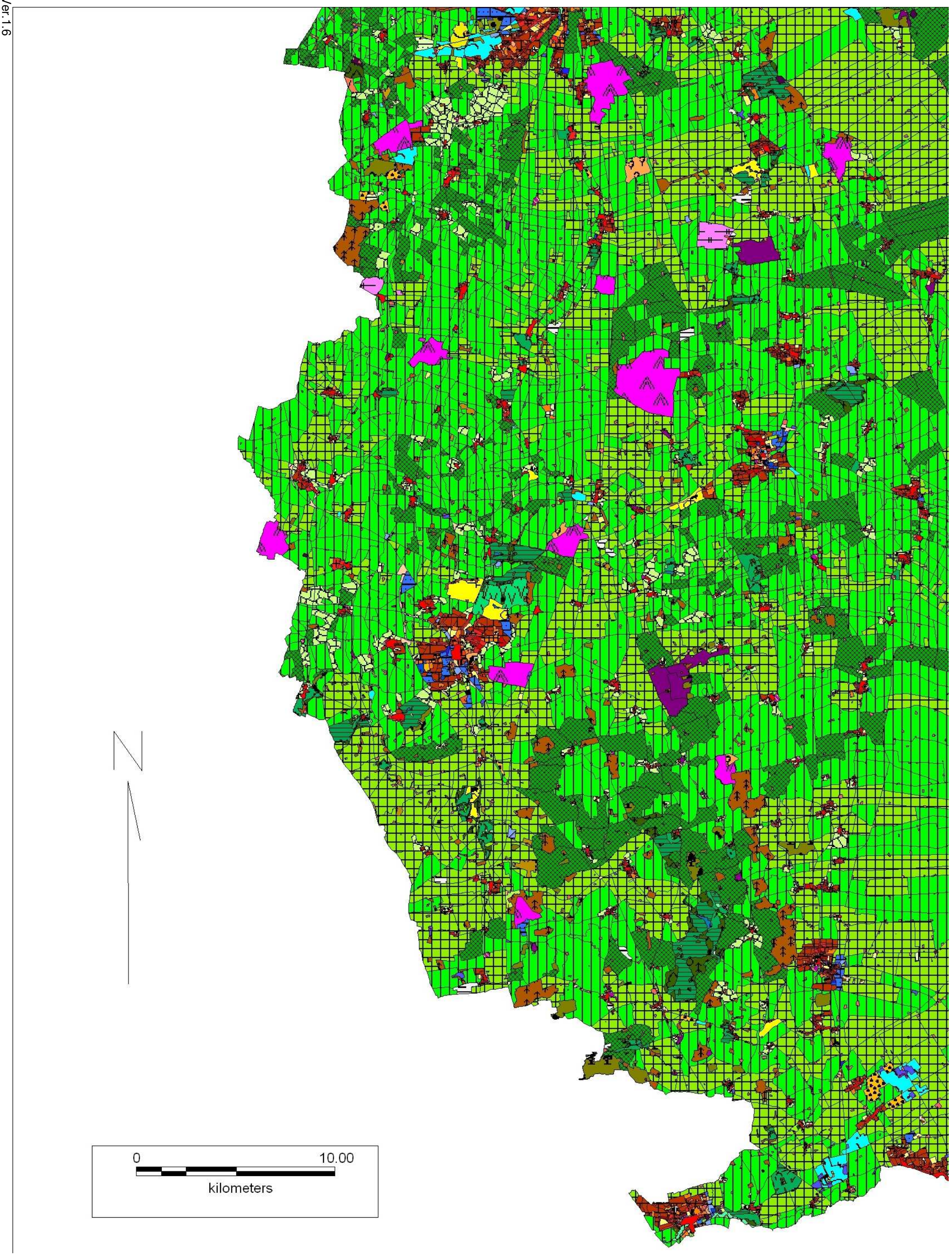


Figure 4. HLC Type data for South-West Lincolnshire

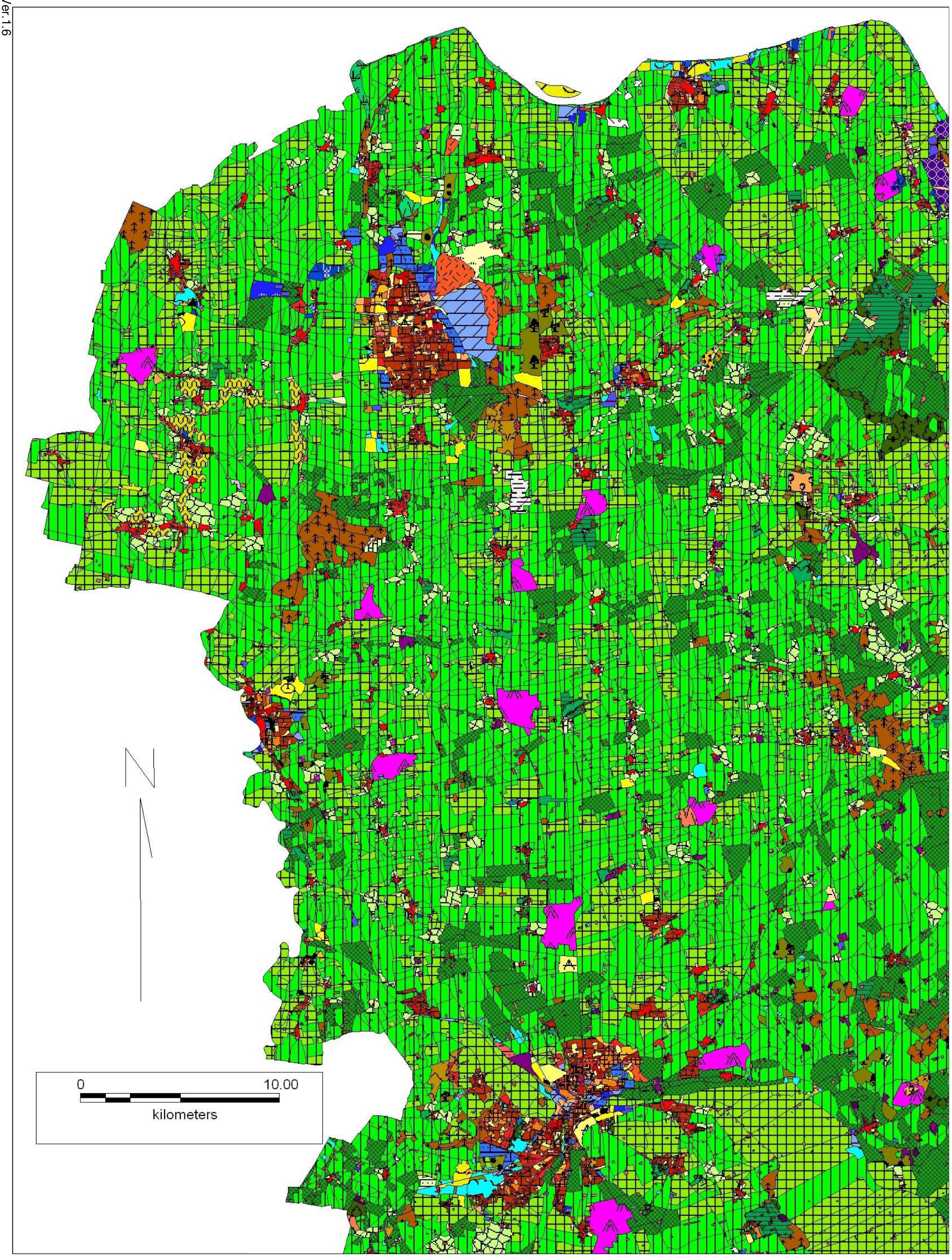


Figure 5. HLC Type data for North-West Lincolnshire

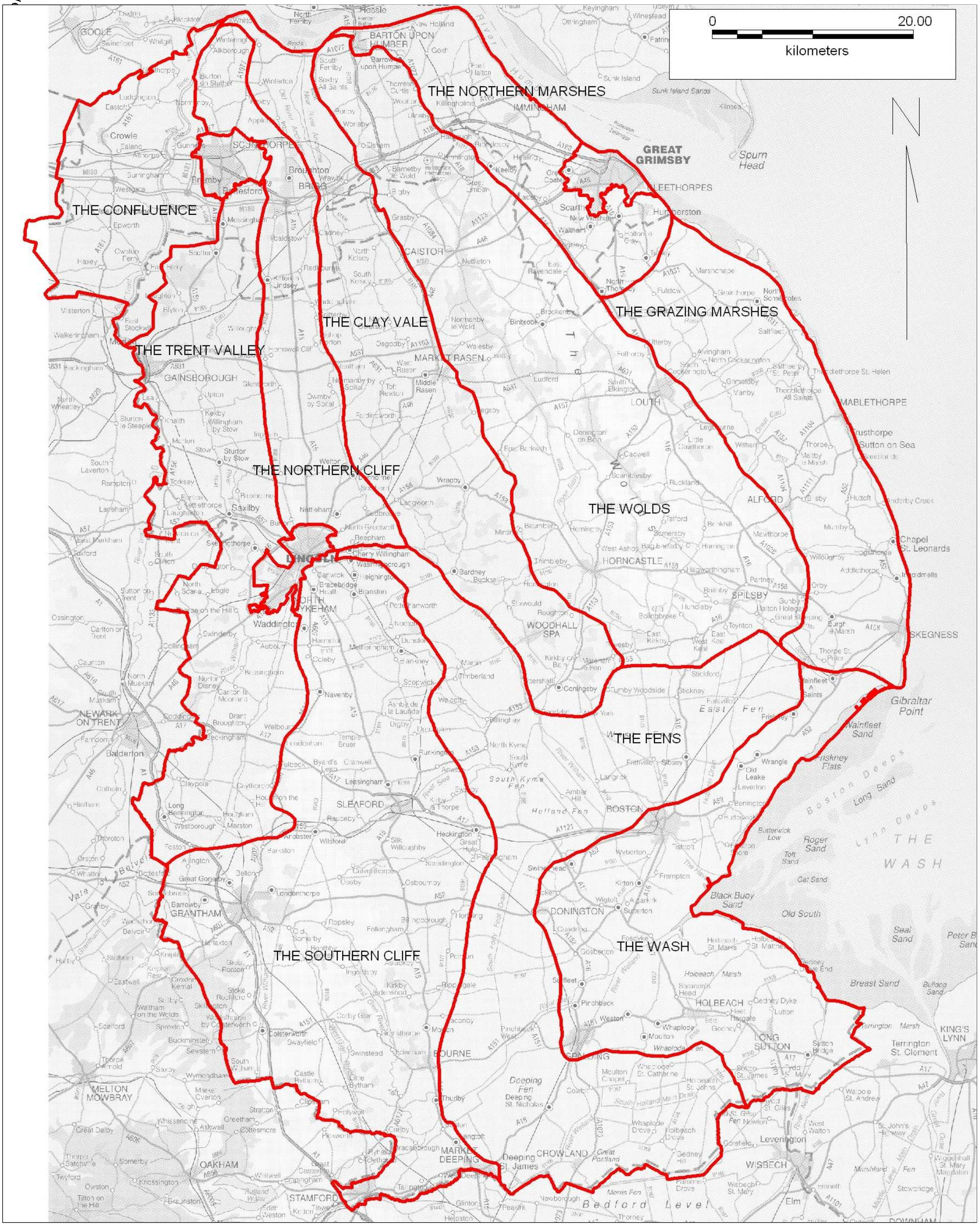


Figure 6. Historic Landscape Character Areas with indicative raster map data

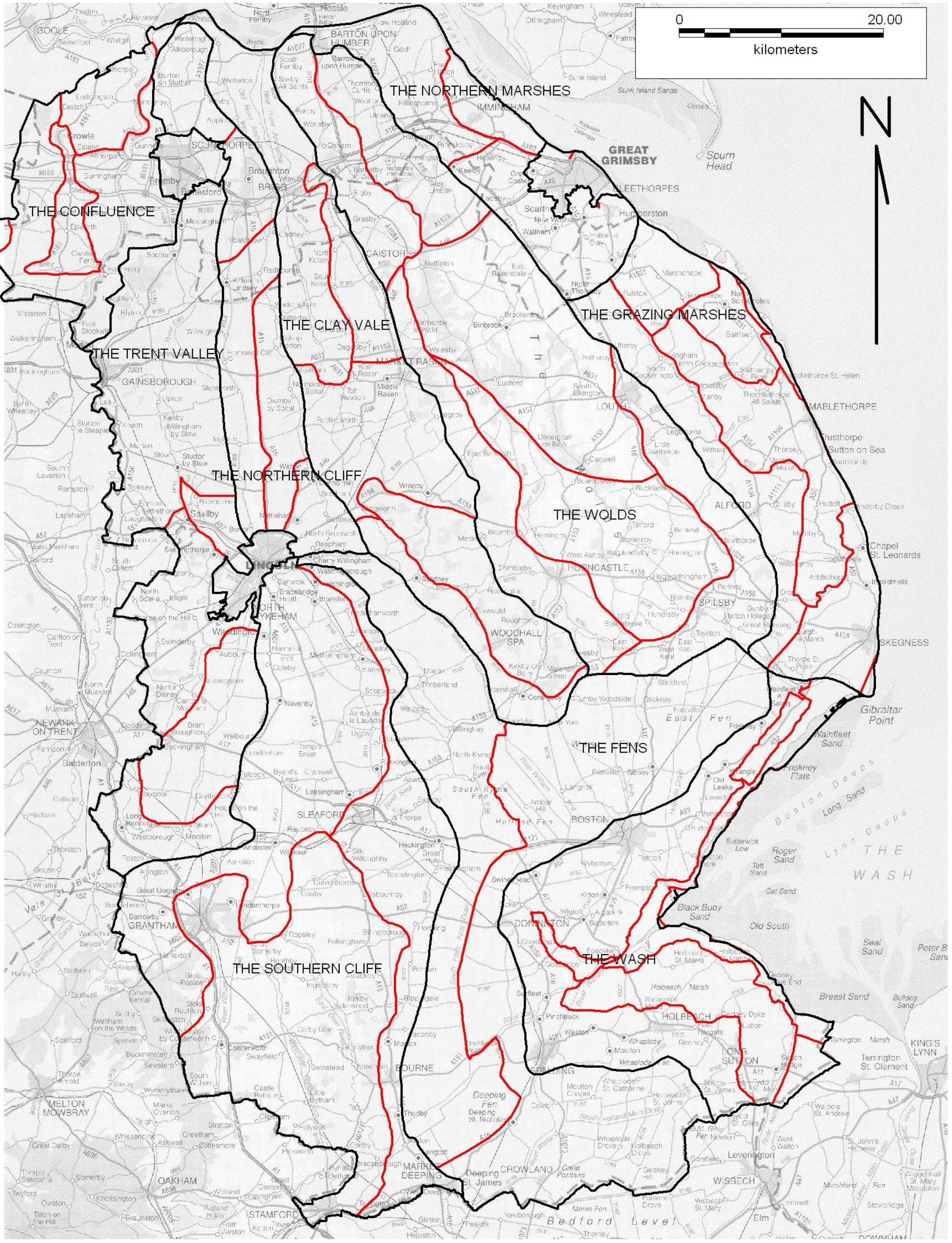


Figure 7. Historic Landscape Character Zones with indicative raster map data

Broad Type	***County***	***Northern Cliff***	***Southern Cliff***	***Wolds***	***Clay Vale***	***Coastal Marsh***	***Northern Marsh***	***Confluence***	***Valleys***	***Fens***	***Wash***
Agriculture	0.15	0.16	0.09	0.18	0.22	0.13	0.17	0.11	0.17	0.14	0.10
Civic	0.33	0.19	0.30	0.10	0.14	0.16	0.45	0.21	0.20	0.03	0.51
Communication	0.17	0.08	0.13	0.21	0.10	0.52	0.50	0.17	0.07	0.07	0.04
Extraction	0.37	1.40	0.35	0.37	0.46	0.02	0.28	0.04	0.32	0.14	0.00
Fields	87.66	80.79	85.65	89.54	87.28	90.88	77.48	88.96	87.47	96.80	91.59
Historic Earthworks	0.23	0.47	0.15	0.37	0.38	0.21	0.54	0.00	0.26	0.06	0.06
Industry	1.06	1.12	0.71	0.21	0.44	0.31	6.11	1.54	0.35	0.27	1.32
Military	1.11	3.43	2.05	0.91	1.06	0.68	1.55	0.68	1.23	0.17	0.00
Orchards	0.17	0.05	0.09	0.07	0.02	0.05	0.15	0.02	0.12	0.15	0.85
Parkland	0.47	0.83	1.12	0.85	0.22	0.12	1.00	0.03	0.24	0.03	0.12
Recreational	0.75	0.92	0.74	0.39	0.53	0.68	2.15	0.92	0.74	0.22	0.34
Settlement	3.74	3.91	3.76	1.78	2.44	4.81	6.67	3.23	2.99	1.29	4.41
Unenclosed Land	0.10	0.55	0.05	0.00	0.05	0.09	0.00	0.13	0.01	0.00	0.00
Water and wetland	0.45	0.31	0.32	0.11	0.42	0.62	0.86	0.87	0.72	0.34	0.48
Woodland	3.25	5.77	4.50	4.90	6.24	0.71	2.08	3.08	5.12	0.28	0.17

Table 1. Percentage of each Character Area covered by each Broad HLC Type

Type	*County*	*Northern Cliff*	*Southern Cliff*	*Wolds*	*Clay Vale*	*Coastal Marsh*	*Northern Marsh*	*Confluence*	*Valleys*	*Fens*	*Wash*
Ancient Enclosure	4.81	2.16	1.99	6.67	3.43	12.50	3.83	3.98	3.83	1.26	11.07
Modern Fields	52.31	54.43	44.33	48.15	53.54	52.80	41.00	56.42	58.57	60.23	66.05
Parliamentary Planned Enclosure	19.44	16.38	26.93	18.54	12.63	21.23	22.60	22.52	14.85	25.33	6.60
Private Planned Enclosure	9.97	6.82	10.30	14.16	17.07	3.99	8.21	2.67	9.75	9.74	7.75
Medieval Village Earthworks	0.14	0.39	0.06	0.30	0.23	0.11	0.22	0.00	0.14	0.01	0.00
Military Airfield	0.99	3.43	1.74	0.79	0.88	0.59	1.54	0.68	1.07	0.17	0.00
Landscape Park	0.38	0.58	0.79	0.79	0.21	0.11	0.91	0.02	0.21	0.03	0.11
Historic Settlement Core	0.58	1.11	0.75	0.48	0.54	0.48	1.08	1.03	0.73	0.12	0.30
Isolated Farmstead	0.39	0.38	0.28	0.35	0.34	0.46	0.36	0.42	0.25	0.48	0.50
Planned Residential Development	1.25	1.27	1.68	0.27	0.50	0.81	2.97	0.45	0.93	0.16	1.99
Ancient Woodland	0.59	1.17	0.69	0.41	2.38	0.18	0.36	0.00	0.52	0.02	0.00
Plantation Woodland	1.95	3.35	2.79	2.80	3.40	0.47	1.36	2.93	3.52	0.23	0.11

Table 2. Percentage of each Character Area covered by a selection of key indicator HLC Types

Bibliography

Aston, M. and Bond, J. 2000. *The Landscape of Towns*. (Stroud: Sutton)

Atkins. 2004. *RAF Scampton Historic Characterisation*

Beckwith, I. 1967. 'The Remodelling of a Common-field System', *Agricultural History Review*. **15** (2), pp.108-12

Bennet, M. 2009. 'The Wolds Before AD1000' in *The Lincolnshire Wolds* edited by D. N. Robinson, pp.17-30. (Oxford: Windgather)

Blake, R., Hodgeson, M. and Taylor, B. 1984. *The Airfields of Lincolnshire since 1912*. (Leicester: Midland Counties)

Bond, J. 2000. 'Landscapes of monasticism' in *Landscape: the richest historical record* edited by D. Hooke, pp.75-84. (The Society for Landscape Studies)

Boutwood, Y. 1998. 'Prehistoric Linear Boundaries in Lincolnshire and its Fringes' in *Lincolnshire's Archaeology from the Air* edited by R. H. Bewley, pp.29-46. (Lincoln and Swindon)

Bowden M., Brown G. and Smith, N. 2009. *An Archaeology of Town Commons in England: 'A very fair field indeed'*. (Swindon: English Heritage)

Brears, C. 1940. *Lincolnshire in the 17th and 18th Centuries*. (London: A. Brown and Sons)

Cameron, K. 1998. *A Dictionary of Lincolnshire Place-Names*. (Nottingham: English Place-Name Society)

Catney, S. 2003. 'Setting the Scene' in *Time and Tide: The Archaeology of the Witham Valley* edited by S. Catney and D. Start, pp 3-5. (Heckington: HTL)

Chapman, J. 1993. 'Enclosure Commissioners as Landscape Planners', *Landscape History*. **15**, pp.51-56

Cheshire County Council. 2007. *The Cheshire Historic Landscape Characterisation*

Clark, J., Darlington, J. and Fairclough, G. (eds). 2003. *Pathways to Europe's Landscape*. (ECPL)

Clark, J., Darlington, J. and Fairclough, G. 2004. *Using Historic Landscape Characterisation*. (London: English Heritage and Lancashire County Council)

Clay, P. 2007. 'Claylands Revisited: The Prehistory of W. G. Hoskins's Midlands Plain' in *Prehistoric and Roman Landscapes* edited by A. Fleming and R. Higley, pp.70-82. (Macclesfield: Windgather)

Cocroft, W. D. and Thomas, R. J. C. 2004. *Cold War: Building for Nuclear Confrontation 1946-1989*. (Swindon: English Heritage)

Countryside Commission. 1998. C*ountryside Character Volume 3: Yorkshire and the Humber*. (Cheltenham: Countryside Commission)

Elliott, S. 1968. 'The Role of the Open Fields in the Development of Nineteenth Century Stamford', *Lincolnshire History and Archaeology*, **3**, pp.11-17

Everson, P. L., Taylor, C. C. and Dunn, C. J. 1991. *Change and Continuity: Rural Settlement in North-West Lincolnshire*. (London: HMSO)

Everson, P. and Stocker, D. 2003. ' "Coming from Bardney…" – The Landscape Context of the Causeways and Finds Groups of the Witham Valley' in *Time and Tide: The Archaeology of the Witham Valley* edited by S. Catney and D. Start, pp.6-15. (Heckington: HTL)

Field, N., Parker Pearson, M. and Rylatt, J. 2003. 'The Fiskerton Causeway: Research – Past, Present and Future' in *Time and Tide: The Archaeology of the Witham Valley* edited by S. Catney and D. Start, pp.16-32. (Heckington: HTL)

Gould, J. D. 1955. 'Mr Beresford and the Lost Villages: a Comment', *Agricultural History Review*, **3** (2), pp.107-13

Grady, D. M. 1998. 'Medieval and Post Medieval Salt Extraction in North-East Lincolnshire' in *Lincolnshire's Archaeology from the Air* edited by R. H. Bewley, pp.81-95. (Lincoln and Swindon)

Hall, D. 1981. 'The changing landscape of the Cambridgeshire silt fens', *Landscape History*, **3**, pp.37-49

Hall, D. and Coles, J. 1994. *Fenland Survey: An essay in landscape and persistence*. (London: English Heritage)

Hamerow, H. 2010. 'The development of Anglo-Saxon rural settlement forms', *Landscape History*, **31** (1), pp.5-22

Healey, H. 1993. 'Salt-Making II: Saxon and Medieval' in *An Historical Atlas of Lincolnshire* edited by S. Bennett and N. Bennett, pp.28-29. (Hull)

Highways Agency. 2007. *Assessing the Effect of Road Schemes on Historic Landscape Character.* (London: Highways Agency)

Hindle, P. 1998. *Medieval Roads and Tracks*. (Princes Risborough: Shire)

Holderness, B. A. 1974. 'Aspects of Inter-Regional Land Use and Agriculture in Lincolnshire, 1600-1850', *Lincolnshire History and Archaeology*, **9**, pp.35-42

Hoskins, W. G. 1954. 'Regional Farming in England', *Agricultural History Review*, **2**, pp.3-11

Hoskins, W. G. 1970. *The Making of the English Landscape*. (Harmondsworth: Penguin)

Johnson, S. A. 1962. 'Some Aspects of Enclosure and Changing Agricultural Landscapes in Lindsey from the sixteenth to the nineteenth century', *Lincolnshire Architectural and Archaeological Society Reports and Papers*, **9** (2), pp.134-50

Johnson, S. A. 1963. 'Enclosure and Changing Agricultural Landscapes in Lindsey', *Agricultural History Review*, **11** (2), pp.95-102

Jones, M. J., Stocker, D. and Vince, A. 2003. *The City by the Pool*. (Oxford: Oxbow)

Lane, T. and Trimble, D. 2010. *Fluid Landscapes and Human Adaptation: Excavations on Prehistoric Sites on the Lincolnshire Fen Edge 1991-1994*. (Heckington: HTL)

Lake, J. and Edwards, B. 2006. 'Farmsteads and Landscape: Towards and Integrated View', *Landscapes*, **7** (1), pp.1-36

Lord, J. and MacIntosh, A. 2010. *Historic Landscape Characterisation Project for Lincolnshire: The Historic Character of the Lincolnshire Coastal Grazing Marshes*. (Unpublished report for Lincolnshire Coastal Grazing Marshes Project)

Lott, B. and Partington, A. 2008. *Historic Landscape Characterisation; A Project Design for Lincolnshire.* (Unpublished Report)

Loughlin, N. and Miller, K. R. 1979. *A Survey of Archaeological Sites in Humberside*, (Hull: Humberside)

MacIntosh, A. 2009. *The Historic Character of Gainsborough and its Surroundings.* (Unpublished report for West Lindsey District Council)

MacIntosh, A. 2009. *Historic Landscape Characterisation Project for Lincolnshire; Report on the Completion of Pilot Studies.* (Unpublished report for the Lincolnshire HLC Project Board)

Martin, E. 2008. 'The archaeological evidence for early fields in East Anglia' in *"*Wheare most Inclosures be*" East Anglian Fields: History Morphology and Management* edited by E. Martin and M. Satchell, pp.7-10. (Suffolk County Council)

Martin, E. 2008. 'The origins of fields in East Anglia' in *"*Wheare most Inclosures be*" East Anglian Fields: History Morphology and Management* edited by E. Martin and M. Satchell, pp.214-28. (Suffolk County Council)

May, J. 1976. *Prehistoric Lincolnshire*. (Lincoln: Society for Lincolnshire History and Archaeology)

McCamley, N. 2004. *Avoncliff: The Secret History of an Industrial Hamlet in War and Peace.* (Bradford on Avon: Ex Libris Press)

Miller, K. 1997. *The Isle of Axholme Historic Landscape Characterisation Project*. (Leeds: Countryside Commission)

Mills, D. R. 1959. 'Enclosure in Kesteven', *Agricultural History Review*, **7** (2), pp.82-97

Muir, R. 1992. *The Villages of England*. (London: Thames and Hudson)

Muir, R. 2004. *Landscape Encyclopaedia: A Reference Guide to the Historic Landscape*. (Macclesfield: Windgather)

Muir, R. 2007. *How to Read a Village*. (London: Ebury)

Norfolk County Council. 2009. *Historic characterisation and sensitivity assessment: GNGP preferred option growth areas*. (Norfolk County Council)

Otter, P. 1996. *Lincolnshire Airfields in the Second World War*. (Newbury: Countryside)

Palmer, R. 1996. 'Air Photo Interpretation and the Lincolnshire Fenland', *Landscape History*, **18**, pp.5-16

Pawley, S. 1993 'Maritime Trade and Fishing in the Middle Ages' in *An Historical Atlas of Lincolnshire* edited by S. Bennett and N. Bennett, pp.56-57. (Hull)

Pevsner, N. and Harris, J. (1964) *The Buildings of England: Lincolnshire*. (Harmondsworth. Penguin Books)

Platts, G. 1985. *Land and People in Medieval Lincolnshire*. (Lincoln: Society for Lincolnshire History and Archaeology)

Quigley, P. 2007. *The Creation of Character Area Boundaries through the Analysis of HLC Polygons: A Technical Paper.*(Black Country Archaeology Service)
[redacted] accessed on 22/06/10

Rippon, S. 2000. 'Landscapes in transition: the later Roman and early medieval periods' in *Landscape: the richest historical record* edited by D. Hooke, pp.63-74. (The Society for Landscape Studies)

Rippon, S. 2004. *Historic Landscape Analysis: Deciphering the Countryside*. (York: CBA)

Roberts, B. K. 1987. *The Making of the English Village*. (Harlow: Longman)

Roberts, B. K. and Wrathmell, S. 2000. *An Atlas of Rural Settlement in England*. (London: English Heritage)

Roberts, B. K. and Wrathmell, S. 2002. *Region and Place: A study of English rural settlement*. (London: English Heritage)

Rogers, A. 2007. 'Beyond the Economic in the Roman Fenland: Reconsidering Land, Water, Hoards and Religion' in *Prehistoric and Roman Landscapes* edited by A. Fleming and R. Higley, pp.113-30. (Macclesfield: Windgather)

Roffe, D. 1993 'Domesday Settlement' in *An Historical Atlas of Lincolnshire* edited by S. Bennett and N. Bennett, pp.34-35. (Hull)

Russell, E. and Russell, R. C. 1982. *Landscape Changes in South Humberside*. (Hull: Humberside Leisure Services)

Russell, E. and Russell, R. C. 1983. *Making New Landscapes in Lincolnshire: The Enclosures of Thirty Four Parishes in Mid Lindsey*. (Lincoln: Lincolnshire Recreational Services)

Russell, E. and Russell, R. C. 1985. *Old & New Landscapes in the Horncastle Area*. (Lincoln: Lincolnshire Recreational Services)

Russell, E. and Russell, R. C. 1987. *Parliamentary Enclosures & New Lincolnshire Landscapes*. (Lincoln: Lincolnshire Recreational Services)

Russell, R. C. and Bennett, S. 1993. 'Parliamentary and Older Enclosure in Lincolnshire' in *An Historical Atlas of Lincolnshire* edited by S. Bennett and N. Bennett, pp.82-85. (Hull)

Russell, R. 2009. 'Medieval Desertion' in *The Lincolnshire Wolds* edited by D. N. Robinson, pp.31-34. (Oxford: Windgather)

Russell, R. 2009. 'Parliamentary Enclosure' in *The Lincolnshire Wolds* edited by D. N. Robinson, pp.31-34. (Oxford: Windgather)

Rudkin, E. H. and Owen, D. M. 1960. 'The Medieval Salt Industry in the Lindsey Marshland', *Lincolnshire Architectural and Archaeological Society*, **8**, pp.76-84

Sawyer, P. 1998. *Anglo-Saxon Lincolnshire*, (Lincoln: Society for Lincolnshire History and Archaeology)

Simmons, B. 1993. 'Iron Age and Roman Coasts Around the Wash II: Archaeology' in *An Historical Atlas of Lincolnshire* edited by S. Bennett and N. Bennett, pp.20-21. (Hull)

Sharp, T. 1946. *The Anatomy of the Village*. (Harmondsworth: Penguin)

Slater, T. R. 2000. 'Understanding the landscape of towns' in *Landscape: the richest historical record* edited by D. Hooke, pp.97-108. (The Society for Landscape Studies)

Stocker, D. 2006. *England's Landscape: The East Midlands*. (London: Collins)

Stocker, D. and Everson, P. 2006. *Summoning St Michael: Early Romanesque Towers in Lincolnshire*. (Oxford: Oxbow)

Taylor, C. 2000. *Fields in the English Landscape*. (Stroud: Sutton)

Thirsk, J. 1953. 'The Isle of Axholme before Vermuyden', *Agricultural History Review*, **1**, pp.16-28

Thirsk, J. 1957. *English Peasant Farming: The Agrarian History of Lincolnshire from Tudor to Recent Times*. (London: Methuen)

Thomas, R. M. 2006. 'Mapping the Towns: English Heritage's Urban Survey and Characterisation Programme', *Landscapes*, **7** (1), pp.68-92

Thorold, H. and Yates, J. 1965. *Lincolnshire: A Shell Guide*. (London: Faber & Faber)

Turner, S. 2007. *Ancient Country: The Historic Character of Rural Devon*. (Exeter: Devon Archaeological Society)

Van de Noort, R. and Ellis, S. (eds). 1998. *Wetland Heritage of the Ancholme and Lower Trent Valleys: an Archaeological Survey*. (Humber Wetlands Project, University of Hull)

Walshaw, G. R. 1935. 'An Ancient Lincolnshire Map', *The Lincolnshire Magazine*, **2** (7), pp.196-206

Welch, M. G. 1985. 'Rural Settlement in the Early and Middle Anglo-Saxon Periods', *Landscape History*, **7**, pp.13-26

Whitwell, J. B. 1992. *Roman Lincolnshire*. (Lincoln: Society for Lincolnshire History and Archaeology)

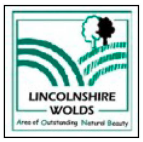
Williamson, T. 2000. 'Landscapes The rural landscape 1500-1900, the neglected centuries' in *Landscape: the richest historical record* edited by D. Hooke, pp.109-18. (The Society for Landscape Studies)

Williamson, T. 2006. *England's Landscape: East Anglia*. (London: Collins)

Williamson, T. 2006. 'Mapping Field Patterns: A Case Study from Eastern England', *Landscapes*, **7** (1), pp.55-67


NORTH
LINCOLNSHIRE
COUNCIL

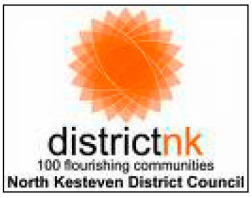

NORTH
EAST
LINCOLNSHIRE
COUNCIL
www.nelincs.gov.uk


LINCOLNSHIRE
WOLDS


West Lindsey


East Lindsey
DISTRICT COUNCIL


CITY OF
Lincoln
COUNCIL


districtnk
100 flourishing communities
North Kesteven District Council


BOSTON
BOROUGH COUNCIL


SOUTH KESTEVEN
DISTRICT COUNCIL


Lincolnshire
COUNTY COUNCIL


SOUTH
HOLLAND
DISTRICT COUNCIL


ENGLISH HERITAGE

Appendix Q Q10.0.7 Socio-economic Studies and Papers

EVALUATION OF THE IMPACTS OF ONSHORE WIND FARMS ON TOURISM

A Report Commissioned by Northumberland County Council

October 2014

Executive Overview

The increase in onshore wind farms in recent years as a strategy to shoulder some of the responsibility of generating renewable capacity has led to an often fierce debate about the desirability of further growth. Part of the debate is the concern about negative impacts of onshore wind farm development on the tourism sector.

Tourism is very important to Northumberland and there is a requirement for the County Council to have access to an objective assessment of the most reliable evidence on the actual impacts of wind farms on tourism in UK settings that may or may not offer useful comparability to Northumberland. A particular issue faced by planners and decision-makers is that there is much unsubstantiated or selectively derived opinion on the relationship between wind farms and tourism. This report offers a reliable pathway through such material, in a UK context, and critically assesses its own contribution to knowledge on the issues raised in relation to the Northumberland setting.

The report comprises findings from four pieces of research: a 'meta-study' of research that has been published on the impacts of wind farms on tourism throughout the UK; an online survey of potential tourists to Northumberland; an online survey of Northumberland based, tourism-related, businesses on the impacts of wind farms on them; and a focus group with twelve people who represent the voice of concern regarding the impacts of wind farms on tourism in Northumberland.

The desk-based meta-study

The desk-based meta-study consists of numerous steps that constitute a detailed and planned pathway for funnelling extant UK research studies toward a logical, overall and authoritative outcome or set of outcomes derived from evidence.

The overall conclusion from the desk-based meta-study is that there is no empirical evidence to-date that wind farms/turbines have a significant impact on tourism either positively or negatively in UK settings.

The research brief requested the team to consider whether any of the studies consulted had been 'effectively used to inform the statutory planning process'. There is no indication that any of the studies consulted have been effectively used to inform the statutory planning process.

A decision making framework based on the generalised UK findings is provided as a potential aid to planners when considering the potential impacts of wind farm development(s) on tourism in a given area.

The online survey of potential visitors to Northumberland

The overall conclusion of the online survey of potential visitors to Northumberland is: The impact of additional wind farms on visitor numbers to Northumberland is present but the majority feel that wind farms are not having an influence on their likelihood to visit the area. Only 11% said that the presence of wind farms would affect their decision to visit Northumberland. For those whose decision to visit would be affected this was primarily because of the impact on scenery and because they are unattractive but overall 61% of the total sample agree that a correctly sited wind farm does not ruin or intrude on the landscape.

The online survey of tourism-related businesses in Northumberland

The online survey of tourism-related businesses in Northumberland found that 63% of respondents said that wind farms had not impacted upon their businesses. However, the remaining 37% who said that they experienced negative effects is a significant minority. 33% of the respondents said their future investment decisions will be affected by future wind turbine development, again a significant minority of the Northumberland business community. Concerns about negative impacts on landscape and scenery and the effects of this on tourists are uppermost in these responses.

The focus group

The focus group with twelve people representing the voice of concern regarding the impacts of wind farms on tourism in Northumberland revealed a very deep scepticism of any voice or research that indicates wind farms are either neutral or beneficial in regard to tourism because, as this opinion has it, this does not square with day to day, real world experience of Northumberland. This is particularly the case regarding certain localities. Numerous qualitative comments in the tourism related business survey concur with this body of opinion.

Limitations of this report

The findings of the desk-based meta-study cannot be definitive with regard to Northumberland because of two key points: 1) there is a dearth of robust UK studies, particularly in recent years (when turbine sizes have tended to increase because of technological advances); and 2) there was no robust empirical research undertaken in Northumberland found and all the research findings in the report are drawn from empirical research undertaken in locations other than Northumberland. Therefore, the scope to extrapolate conclusions from extant UK research to the Northumberland setting is very limited indeed, and it is not recommend that concrete conclusions relating to Northumberland be drawn from any of the specific or general conclusions of the desk-based meta-study. The findings of the 'meta-study' are useful for information purposes.

The online survey of potential tourists to Northumberland does not assess the actual impacts of wind farms on tourism because of its geographical remoteness to Northumberland. It therefore only gives an indication of potential visitor intentions, not actual visitor intentions, to visit Northumberland in light of wind farm development there.

The online survey with tourism-related businesses is limited because, as Aitcheson (2012) indicates, surveying tourism-related businesses in such a way does not address the issue regarding the impacts wind farms have on tourism. Rather, such a survey reveals only how businesses assess the effects wind farms have had or are having on them.

The focus group cannot be considered as being representative in any statistical sense, but it does give some representation to the voice of concern regarding the impacts of wind farms/turbines on tourism in Northumberland.

Recommendations

Given these limitations, empirical research in Northumberland itself that specifically addresses the impacts of wind farms on tourism there is needed. Such research would draw robust conclusions

that would be timely, geographically specific, and therefore of significant use to planners and decision-makers in Northumberland on the relationship between wind farms and tourism there.

Furthermore, given the out of date nature and the varied quality of the extant UK empirical research on this issue it would be timely to conduct longitudinal research that revisits a selection of the cases in that research to undertake further empirical work that 'tests' the older findings and recommendations in the 'here and now'. This work would greatly strengthen the ability to build robust generalised conclusions on the impacts of wind farms on tourism in UK settings.

Contents

List of Tables

Introduction

1. Purpose, scope and context

Purpose and scope

1.1 This report presents the findings of four studies that, together, evaluate the impacts of wind farms on tourism in Northumberland, both in a national and in a regional context. The studies are:

- A systematic desk-based, meta-study review of research studies which assess the effects of onshore wind farms on tourism in the UK.
- A survey of potential tourists' views on the effects of wind farms in Northumberland on their visitation intentions
- A survey of Northumberland tourism-related businesses on the impacts of wind farms on tourism in Northumberland
- A focus group with twelve representatives of groups or organisations that are interested in and/or concerned with the impacts of wind farms in Northumberland

Please note, any reference to wind farms or wind turbines in this document is a reference to onshore wind farms and/or turbines (excepting small scale domestic turbines) unless otherwise stated. Furthermore, the words 'tourist' and 'visitor' are used interchangeably. The phrases 'wind farms' and 'wind turbines' are also used interchangeably at times but the report endeavours to clarify any potential confusions of meaning either by direct reference or by making meanings clear in relation to the context in which these phrases are used.

The context: Northumberland, tourism and wind farms

1.2 The policy to increase onshore wind farms in recent years in Europe and the UK as a strategy to shoulder some of the responsibility of generating renewable capacity has led to an often fierce debate about the desirability of further growth. An important part of the debate is the concern about negative impacts on the landscape and its amenity value which in turn impacts on visitors and therefore the tourism sector. Moreover, the increasing diversity of ownership of wind energy projects and the government's spatial strategy for wind farms will see a concentration of development opportunities into further large scale projects in relatively sparsely populated rural

areas. This is a particular concern for Northumberland tourism because it is officially the most sparsely populated county in England, with only 62 people per square kilometre.

1.3 Northumberland is also a county blessed with many natural and cultural assets, and landscape is key to its draw for tourists. Tourism is an extremely important to Northumberland, making up 11.8% of the county's economy, bringing in £708 million per annum. Over 11000 jobs are supported directly by tourism expenditure and a further 2000 jobs are supported indirectly. Tourism also raises the profile of the county as a place to visit and invest in. Moreover, to build on success further, there is a 6% growth target set for tourism in Northumberland by 2016, which will result in 795 extra jobs and £42 million more in revenues (NCC tender document 2013; Northumberland Economic Strategy 2010-2015).

1.4 To achieve this Northumberland needs: more visitors; visitors to stay longer; visitors across the whole year and not just the summer; visitors doing more while they are here; visitors spending more in the county; and businesses to invest in more capacity and facilities (ibid.). All of which mean that the Northumberland landscape, which is so important to tourists, needs to be protected and, where possible, enhanced. It is therefore crucial that the County Council can support its decisions on whether or not to permit particular wind farm developments on the most up-to-date and reliable evidence on the *actual* impacts of wind farms on tourism in comparable UK settings to that of Northumberland.

1.5 A particular challenge faced by planners and professional researchers is the amount of unsubstantiated or selectively derived opinion on the relationship between wind farms and tourism which is publicly available – particularly on the internet. This comes from a variety of sources such as special interest websites and submissions to public enquiries that selectively quote findings from purported 'robust' studies. However, given that wind farms are a relatively new feature of the British landscape, few studies on this have been conducted in any depth or rigour (Aitchison, 2012). Moreover, what research there is is methodologically patchy and great care needs to be taken to interrogate the validity of these studies. It is this aspect which is of central concern to the desk-based meta-study in this report as it aims to identify the most reliable and appropriate research from which sound conclusions can be drawn. The online surveys with potential visitors and tourism-related businesses in Northumberland, and the focus group research, focus more directly on Northumberland itself and offer different, and useful, contextual comparisons to the desk-based study.

The desk-based research

2. Research design

2.1 This research is underpinned by the following statement in the tender document which states that the desk-based work should

> determine the evidence that already exists with regard to the impact of wind farms on tourism. This will include identifying and assessing the robustness of studies and research undertaken by tourism bodies, wind farm developers, opposition groups and independent organisations locally and in other parts of the country and whether any of this work has been effectively used to inform the statutory planning process. When analysing research, an assessment should be made of whether the findings are based on evidence before or after the wind farms were in place.

2.2 Simply put, the desk-based study requested in the tender is what is commonly termed in evidence based practice research (see below) as a 'meta-study' of research that has been done on the impacts of wind farms on tourism in any area of the UK. The tender document specifically requested that the evidence-base for the desk-based research be derived from searches of various UK sources, such as:

- Tourism bodies
- Wind farm developers
- Opposition groups
- Independent local organisations
- Independent organisations from elsewhere in the UK

In its response to the tender document the Northumbria research team made the case that comparable academic studies published in internationally respected academic journals should be included in the search. The blind peer review processes - in which a selection of experts in the field independently and anonymously review research papers submitted to learned journals - is the most thorough going quality control filter available for any published work. Indeed, because of this thoroughness it can take several years for research to appear in refereed learned journals. From

consulting such a research base the study can confidently build an assessment of the most authoritative studies in terms of validity of methods, their appropriateness to this study, and the reliability of data and findings. Furthermore, the research focus was kept to the UK in order to minimise the problems of inferring data and findings from places so removed from the Northumberland setting to that setting when in reality they have no relational value. Indeed, because of the age of the research reports and papers available and because no empirical evidence based research is available that covers Northumberland, this report is very cautious about extrapolating general conclusions to the Northumberland setting. At best general conclusions offer a useful backcloth but are not definitive or specific enough to do more with regard to the impacts of wind farms on tourism in Northumberland. Furthermore, there was no evidence in the studies consulted that they had been effectively used to inform the statutory planning process.

2.3 To start the meta-study process a wide net was cast in order to gauge the scale and scope of studies available, and to capture as much relevant data as possible from varied sources without too much pre-judgement of credibility at this stage. As stated above, identifying appropriate academic studies published in peer reviewed journals was the first priority and other information was drawn from a wide range of sources including: commissioned reports, policy documents, and public enquiry reports. 'Calls for evidence' where also sent out through varied academic and professional networks of interest to capture potentially important works not available through other search instruments.

2.4 It soon became apparent that a filtering process was needed not only to filter out unsubstantiated reports and commentary but to identify and rank the most reliable data from the most credible sources.

2.5 Once studies of sufficient rigour were identified issues of methodological inconsistencies between them became an important, and complicating, factor because it can be the case that the type of methods used in research can have great bearing on final outcomes. This is a far more important factor than, say, focusing on who commissioned the research because bias or skewed results can be eradicated by good research design regardless of who commissions the research, assuming that the data itself is collected with integrity. It therefore was essential to treat all research equally and assume data was collected with integrity, regardless of who commissioned it, and that the most appropriate research methods were identified to underpin a filtering of the research in a process of elimination of the weakest or inappropriate.

2.6 A further complication is that many studies, particularly large studies, attempting to definitively assess the impacts of wind turbines on tourism have used mixed methods approaches to

corroborate findings. While such triangulation is relatively common and an accepted part of research design, if done less than optimally it can trade off appropriately targeted methods against a catch-all approach that rounds results from a range of methods that are more or less appropriate than others. When this happens results can be of less value than they appear. This is another reason why the desk-based research focus has been on capturing the most methodologically reliable research available rather than, say, taking a more aggregate approach that quantifies results from varied research studies regardless of how they were derived. In so doing the most appropriate and reliable research, according to methods used, have been categorised accordingly. As an adjunct to this other studies were identified that may fall outside of the most appropriate and reliable category but for reasons of further completeness are included in this report and confidence in the findings of these studies is clearly articulated.

2.7 To anchor this approach a working definition of what constituted a 'research study' was developed in order to provide a consistent foundation from which the most appropriate studies can be identified, assessed and compared:

> A research study is either a written report or article that demonstrates credibility, is in the academic or public domain, and is derived from empirical data gathered in the actual field of study whether that be a place or a particular population or both.

Ostensibly, there are two sources of research study examined here: academic and non-academic. As already outlined, the process by which research is scrutinised and peer reviewed before publication in academic journals is far more rigorous to that of commissioned research reports. Therefore, it is logical that baseline control studies should be sourced from there before turning to non-academic research studies to build the evidence base.

2.8 The aim of this strategy was to identify research studies which represent the most recent, directly relevant and robust UK based academic studies and use them as a benchmark for identifying and assessing the most rigorous non-academic UK based studies.

3. Search results of most relevant academic research studies

3.1 The first significant observation was that there are only two academic research studies published in the last five years that, in different ways, assess the impact of wind farms on tourism in a UK context, and both of these are based on empirical evidence from Scotland. The studies are:

> Warren C and McFadyen M (2010) 'Does community ownership affect public attitudes to wind energy? A case study of south-west Scotland' *Land Use Policy* 27 pp. 204-213
>
> Riddington G, McArthur D, Harrison T and Gibson H (2010) 'Assessing the Economic Impact of Wind Farms on Tourism in Scotland: GIS, Surveys and Policy Outcomes' *International Journal of Tourism Research* 12 pp. 237-252.

These papers are very different in a number of respects. The Riddington et al (2010) paper's focus is purely on the economic impacts of wind farms on tourism, while the Warren and McFadyen (2010) focus is on residents' and tourists' expressed opinions on wind farm development. Moreover, the Riddington et al (2010) paper is based on GIS and internet survey data gathered for the GCU (2008) research study discussed in the next section of this report. That research will therefore be considered in its original context of the larger GCU (2008) study in section 4. This leaves only one meaningful paper to consider here, the Warren and McFadyen (2010) paper, which not only provides this study with useful (though relatively dated) data but, more importantly, provides **a validated methodological template** from which a robust assessment and categorisation of the non-academic research studies examined can be built (see sections 3.5 and 3.6 below).

3.2 Warren and McFadyen (2010) researched the attitudes of residents and tourists towards onshore wind farm developments in south-west Scotland in 2006.

> Specifically, it examines the socio-psychological effects which different development models have on attitudes to windfarms by comparing public pereceptions of a community-owned windfarm on the Isle of Gigha with attitudes on the adjacent Kintyre peninsula where several large (15MW) developer-owned windfarms exist. In addition, it investigates the perceptions of both residents and tourists concerning the impacts of onshore windfarms on landscapes and seascapes, including the cummulative effects of multiple windfarms (p. 204).

The research was not commissioned and comprised a survey of 106 residents and 5 face to face interviews with 'key stakeholders' supplemented with 38 face to face interviews with tourists on the Isle of Gigha and the Kintyre peninsula (see Table 1.).

Table 1. **Wind Farms Featured in the Warren and McFadyen (2010) Study**

Name	**Date commissioned**	**No of turbines**	**Turbine Height (m)**	**Capacity (MW)**	**Developer**
Deucheran Hill	2001	9	93	15.8	Powergen
Beinn an Tuiric	2001	46	63	30	Scottish Power
Beinn an Tuiric 2.	Under construction	19	100	38	Scottish Power
Tangy	2002	15	62	12.8	Scottish and Southern Energy
Tangy extension	Under construction	7	75	6	Scottish and Southern Energy
Gigha	2005	3	30	0.7	Gigha Renewable Energy Ltd.

3.3 The interviews with tourists were to specifically test the following hypothesis:

Extensive wind farm development makes a region less attractive to tourists.

The main findings were:

- Tourists expressed a wide range of concerns about wind farms
- Virtually all had seen wind farms during their visit and a quarter found them noticeable or very noticeable
- 20% of tourists had no concerns at all
- 23% were concerned about habitat disruption
- 22% were concerned about visual impact
- 79% were supportive of wind energy in Scotland as a whole and 64% in the locality
- 90% said wind farms would have no effect on them returning
- 50-50 split (5% and 5%) between those who said wind farms are more or less likely to make them return with strong views expressed at each end of the spectrum

- Overall, 'the presence of wind farms was not a significant factor for most tourists in their choice of destination' (page 209).

3.4 Warren and McFadyen (2010: 210) conclude the tourism aspect of their study thus:

> Critics of wind farms often assert that their landscape impacts will damage Scottish tourism, but the results reported here lend no support to such claims… Although the number of tourists interviewed was small, the results indicate that windfarms are, at present, having no net impact on tourism in this region. The fact that visitor numbers have been increasing since 2004, and that some tourists choose to visit windfarms (TIC, 2006), supports the conclusions of other studies that windfarms are unlikely to damage Scottish tourism (Scottish Government, 2008).
>
> Warren and McFadyen (2010) also make the general point that sensitive siting of wind farms is key and if done well will not only have a neutral effect on tourism but can help promote Scotland as an environmentally friendly country. On understanding public engagement and attitudes toward wind farm development, the main reason why the study was conducted, they conclude: public attitudes are more positive towards windfarm developments in areas where local communities have a direct involvement in them than in areas where they do not… [T]he results of this study show that community-ownership [of windfarms] does not transform an overall negative view of wind power into a positive one; attitudes in the wider population are already broadly positive. What it appears to have done is amplify these pre-existing positive attitudes and supress the negative ones' (p. 211).

They go on to state that given the rapid increases in turbine size and costs, large multinationals are the major players in the market, and significant public opposition has subsequently emerged.

Methodological lessons

3.5 The Riddington et al (2010) paper and the Warren and McFadyen (2010) paper offer two very different methodological means of addressing the impact issue. While both are robust in their own right - and are published in well ranked, international, learned journals as a testament to this - only one, the face to face interviewing of tourists in situ where wind farms are present in the Warren and McFadyen (2010) study, has been replicated to-date in non-academic studies. For practical reasons alone this method deserves consideration as a control mechanism against which to evaluate non-

academic research studies. However, more than this, there are sound methodological reasons to support this approach (also see Aitchison, 2012 for discussion). Its strengths are summarised below:

- The geographical context is real and immediate for those being interviewed
- The tourist experience at the time of interview is therefore embodied and involves all the senses as well emotions and intellectual processes
- It elicits situated knowledge and some dialogue in situ giving the data some contextual depth as well as good coverage of opinion
- It assesses tourism in process from the first-hand point of view of the tourist
- It is not overly technical or specialist and is therefore available to be replicated by all relevant empirical research

3.6 This methodological approach is therefore the primary control mechanism for assessing the viability of non-academic studies in the next section of this report. In this the first line categorisation, Category A, is an analysis of non-academic research studies premised on using substantial face to face interviewing with tourists in situ as the benchmark. For completeness, a further two categories of studies are included: Category B, which is based on studies using face to face interviews with tourists but which are less robust than those studies in Category A; and Category C, which is made up of studies that contain sufficiently reliable research that, while they may be inconsistent in terms of say methodology, methods used and/or research focus, are of sufficient rigour and insight to warrant inclusion and analysis in this report.

4. Search results of the most relevant research studies not published in international, peer reviewed academic journals

4.1 Because all of the studies, except part of one, assessed here are not published in learned journals and have therefore not gone through such a thorough, independent review process, their robustness cannot be assumed in any way. As such, and as explained in the previous section, the method of 'quality control' is to rank the studies in Categories A and B on the basis of their methodological rigour. Studies in Category C are not ranked in this way because of their diversity. Each category ends with a summary conclusion of findings. Moreover, **all findings are those of the studies and not those of the authors of this report.** The categories are as follows:

A. Studies based on substantial use of face to face interviews with tourists in situ - other methods may also have been used

B. Studies based on some use of face to face interviews with tourists in situ

C. Studies of interest and sufficient rigour even though their methodologies, methods or focus are not wholly consistent either with the definition of a research study, methodological control mechanism or with each of the other two categories

Category A.

4.2 Only two research studies meet the methodological rigour criteria set out in section 3. to be included in this category and are reviewed in descending order of significance and reliability. The GCU (2008) study is on existing wind farms - though it also includes proposed wind farms - while the other study, the UWE (2004) study, is on a proposed wind farm development. The full references for the two research studies are:

- Glasgow Caledonian University (GCU) (2008) *The Economic Impact of Wind Farms on Scottish Tourism: A report for the Scottish Government*.
- University of West of England (UWE) (2004) *The Potential Impact of Fullabrook Wind Farm Proposal, North Devon: Evidence Gathering of the Impact of Wind farms on Visitor Numbers and Tourist Experience.* Commissioned by North Devon Wind Power.

4.3 The most comprehensive and sophisticated study is the GCU (2008) research study which, as Regeneris (2014) acknowledge, is widely regarded as the most authoritative study on the impacts of wind turbines/farms on tourism in the UK. The UWE (2004) research study is a substantial piece of work which was submitted to the Renewables Inquiry by the Scottish Government about a proposed

development and commended by the Planning Inspectorate (2007) 'as a model of good practice in research design, implementation and analysis' (Aitchison, 2012 p. 10).

GCU (2008)

4.4 The GCU (2008) study is a very extensive and sophisticated research study that investigates the overall impact of meeting Scotland's wind energy targets on the tourism sector. By way of interviews with tourists, an internet survey with potential tourists, a GIS study of tourist movements, and economic modelling of potential changes in tourist expenditure and consequent changes in employment and income, the research was designed to:

- Identify the potential number of tourists affected by wind farms
- Identify the reactions of those tourists affected by wind farms
- Identify the economic impacts of those reactions

The study explored the actual effects of specific wind farm developments as well as national level impacts because, as other research has identified (e.g. Regeneris, 2014), the size and scale of the area under investigation is an important factor regarding the impacts wind turbines can have on tourism. In the following discussion of the GCU (2008) findings each research method is taken in turn before outlining the study's overall conclusions. This is important because, as already alluded to, in a large mixed methods study such as this the data need to be contextualised by the means through which they were derived to assess whether their triangulation is valid. Because of the level of sophistication of this study, it is the only one that receives an extended analysis of this kind. Details of the geographical case study areas, the numbers of existing wind farms/turbines in these areas, and number of wind farms and turbines seeking planning approval in these areas at the time of the research (2007/2008) are listed in Table 2. below.

Table 2. **Number of Farms and Turbines Considered in the GCU (2008) study**

	Constructed and Permitted		Applications		Total		
Area	**Farms**	**Turbines**	**Farms**	**Turbines**	**Farms**	**Turbines**	**% Scottish Capacity**
Caithness & Sutherland	6	60	8	125	14	195	4.4%
Stirling, Perth & Kinross	4	85	3	88	7	173	5.3%
Scottish Borders	7	157	6	217	13	274	5.4%
Dumfries & Galloway	8	134	10	246	18	380	8.2%
Total	25	436	27	676	52	1022	23.4%

4.5 Importantly, in terms of the control method, the GCU (2008) research conducted 380 face to face interviews with tourists in the four case study areas - Caithness and Sutherland; Stirling, Perth and Kinross; Scottish Borders; Dumfries and Galloway. Key findings are as follows:

- 75% of respondents felt that wind farms had a positive or neutral effect on the landscape (39% positive, 36% neutral, 25% negative)
- 10% of tourists (included in the 25% above) were very negative about the impact of wind farms on the landscape
- the overall figure of 25% of respondents who gave negative responses to the impact of wind farms on the landscape should be seen in context that 49% of respondents were negative about Pylons, 36% about mobile phone masts and 26% about power stations
- 68% agreed that a well sited wind farm does not ruin the landscape
- 48% agreed with the statement 'I like to see wind farms' with a further 24% neutral
- overseas visitors were more positive than domestic tourists about wind farms
- tourists who were active in the rural landscape/countryside tended to be less negative and more positive about wind farms than those who were not (19% negative against 25%, and 45% positive against 39%)
- the vast majority of respondents had seen a wind farm while on holiday and those that did were less hostile to wind farms than the small minority that had not
- 20 to 30% of respondents preferred landscapes without wind farms but only a very small proportion of these changed their intentions about revisiting Scotland because of wind farms

- 93 to 99% of respondents who had seen a wind farm were not affected by that experience
- 2.5% of respondents indicated they would not revisit an area if wind farm development was extended, at the national level this was 0.5%

4.6 The data derived from the GIS modelling and the internet survey was, to a large extent, combined to extrapolate and model findings. As pointed out earlier, this work was also published in an academic journal (Riddington et al, 2010), though not so much for the merits of its findings as for the novelty and argued efficacy of the methodology. The authors freely admit, however, that some of the data they used were 'far from perfect' and that some assumptions they had to make, because of lack of concrete information, 'could be subject to challenge' (p. 250). These issues are common with quantitative work of this nature and while these findings are somewhat speculative the issues do not disable their validity. Indeed, their triangulation with the findings of the face to face interviews strengthens them and adds value by casting further light on potential impacts, though they do need to be read in that context rather than being seen as absolute. Indeed, this is a major reason why it was chosen to assess the GIS and internet survey data here rather than in the previous section via the Riddington et al (2010) paper on its own.

4.7 The internet survey surveyed 600 potential tourists in the UK and 100 from the US for their opinions on wind farms/turbines. The key objective of the GIS modelling was to map tourist movements and position tourist accommodations against the location of wind farms in order to establish any correlated effects. The overall aim was to establish:

- patterns of visitor flows and accommodation location
- current and proposed future wind farm locations and their 'zones of visual impact'
- estimates of possible reduction in price of rooms affected by views of turbines and use this to extrapolate wider economic impacts
- the structure and linkages of tourism in the economy

4.8 The internet survey findings were as follows:

- The youngest respondents (16-25 years) in general thought wind farms have less of an impact than other respondents
- Foreign respondents were more favourably disposed toward wind farms than UK respondents

- 63% would prefer a hotel room without a view of wind turbines, 28% were neutral and 9% positively liked wind farms
- There is diminishing marginal loss of landscape value in relation to size of a wind farm once a wind farm is established
- There would be a drop in accommodation expenditure in each area by tourists of between 0.48% to 1.59% because of wind farm developments

Accommodations more directly exposed to wind farms are expected to be more therefore it is mooted in the report that they may have to alter their pricing accordingly.

4.9 Combining these latter two findings with the GIS data the following effects were calculated in the GCU report:

Table 3. **The Economic Effects of Wind Farm Developments on Tourist Accommodation in the GCU (2008) Study**

Area	**Tourists affected**	**Accommodation affected**	**Reduction in expenditure**
Caithness and Sutherland	81%	4.9%	0.48%
Sterling, Perth and Kinross	85%	6.6%	0.65%
The Scottish Borders	91.6%	6.7%	0.66%
Dumfries and Galloway	98%	16.2%	1.59%

4.10 For example, in the Scottish Borders it can be expected that 91.7% of tourists in that region will be affected by wind farms in one way or another, 6.7% of tourist accommodation bed spaces will be affected by wind farms, and the total net loss of accommodation expenditure in the region can be expected to be 0.66%, which represents a very small trade-off for wind farm development. It is important to note that these extrapolations are based on internet derived (self-selecting) perception surveys and certain assumptions built into the GIS survey. As the GCU (2008) study alludes, it is therefore crucial to note that even the strongest perceptions do not necessarily equate with real world impacts and, as it also finds, tourists who have seen wind farms in place are more disposed towards them.

4.11 It is also worth noting that the study found that price effects can operate independently of impacts on visitor numbers and as a result it is feasible that the number of visitors to an area could remain the same yet the value that they attach to a particular location and willingness to pay for certain activities and/or views may change. For example, some tourists may pay a premium for hotel rooms that do not look onto a wind turbine or wind farm. Concomitantly, rooms that do look out on to wind turbines could have to discount their prices. And, as the internet survey shows, accommodations closest to wind farms will be most affected and, the GCU (2008) study advises, may need to be adept with pricing policies because of this.

Table 4. **Estimated Reduction in General Expenditure of Tourists by Area in the GCU (2008) Study**

Area	**Tourists affected**	**Tourist expenditure reduction**	**Tourist Expenditure £m**	**Expenditure reduction £m**
Caithness and Sutherland	60.75%	1.54%	£37.35	£0.58
Sterling, Perth and Kinross	51%	1.3%	£657	£8.54
The Scottish Borders	62.29%	1.58%	£175	£2.77
Dumfries and Galloway	67.62%	1.72%	£359	£6.17

4.12 Again, taking the Scottish Borders as an example, a total of around 62% of tourists are likely to be affected in terms of overall spending, with a total reduction of 1.58% or £2.77 million in that spending because of wind farm developments.

4.13 The overall conclusion of the GCU (2008) study is that Scotland as a whole would lose a maximum of 211 full time equivalent jobs that would have been gained from tourist spending. This is the equivalent of less than 0.1% of tourism employment in Scotland and equivalent to £4.7 million of income at 2007 prices (page 282). On this the report reemphasises: 'It should be remembered that these are not job losses that will be felt instantaneously, rather it is a reduction in the number of jobs that will be created in future as a result of tourism spending' (p. 6).

4.14 Individual local areas would be more negatively impacted than the country as a whole. This is owing to a substitution effect in which tourists with more negative opinions on wind turbines could

and would switch destinations within Scotland. The size of the tourist area under consideration is therefore vital, and the larger that area the less any negative impacts will be. As with other studies, such as Warren and McFadyen (2010), the GCU (2008) study strongly suggests that careful siting of wind farms is the key issue rather than wind farms per se (though providing generally useable metrics regarding optimum siting in a given location in relation to impacts of wind farms on tourism is something that this and other research consulted abstains from). By way of a general conclusion the GCU (2008) study states:

> The research suggests that there is a need to make clear to the general public that in some "scenic/widerness" areas they will not see large commercial wind farms and that some other areas are marketed as green centres of renewable energy. In this context it should be noted that this research suggests that a few very large farms are better than a large number of small farms. A number of medium sized farms dispersed in a relatively small area so that they become contiguous, is also not desirable… Our overall conclusion is that the effects are so small that provided planning and marketing are carried out effectively, there is no reason why [renewable energy targets and tourism targets] are incompatible (p. 17).

UWE (2004)

4.15 The UWE (2004) was a large study designed to establish the specific impact on visitor numbers, tourist experience and tourism expenditure of the proposed onshore wind farm at Fullabrook, North Devon, commissioned by North Devon Wind Power. 279 face to face interviews were conducted with tourists in three locations: 196 interviews in North Devon (mainly in Ilfracombe, Woolacombe, Braunton and Barnstaple) relatively close to Fullabrook were supplemented with 93 interviews in Mid Wales (Bryn Titli and Carno) and 90 interviews in Cornwall (Bears Down and St Breock) where wind farms had been established for over a decade in order to triangulate data regarding possible future impacts with regards to Fullabrook with actual impacts in comparable locations with established wind farms. Key findings were:

- 94% of tourist would not be discouraged from visiting the area if there was a wind farm
- 4.1% stated that they would be 'marginally' discouraged from visiting
- 2% stated that they would be 'strongly' discouraged from visiting
- 7.2% stated that they would be more encouraged to visit if there was an onshore wind farm

- 87% of respondents stated that the presence of a wind farm would neither discourage or encourage them from visiting
- 58.2% of respondents thought that wind farms have 'no overall impact' on the visitor or tourist experience
- Wind farms could be a tourist attraction for some tourists and if accompanied by a visitor centre many tourists could be attracted

4.16 The overall conclusions were that the Fullabrook wind farm would have: no overall negative impact on visitor numbers, no overall detrimental impact on the tourist experience, and there would be no overall decline in tourist expenditure.

Overall conclusion of this section by University of Northumbria researchers

4.17 These studies do not suggest that wind farms significantly impact upon tourism either positively or negatively and wind farm development will not affect the vast majority of tourists' intentions to return. The small numbers that might be negative about wind farms are off-set by those who are positively disposed toward them. It is significant that those who see a wind farm while on holiday tend to be much more positively disposed toward them than those that had not – suggesting first hand familiarity is an important factor in their acceptance by tourists. Overseas and young visitors/prospective visitors indicated they are most favourably disposed towards wind farms.

4.18 The size and spread of wind farms are important considerations. The GCU (2008) study suggests there is a diminishing loss of landscape value in relation to wind farm size once a farm is developed and that it is better to have fewer larger wind farms than many smaller ones cumulatively spread throughout the landscape. It also suggests that accommodations sited closest to wind farms will be the most affected and may have to reduce prices if room views are directly affected by wind turbines. Views of wind farms on main transit routes are much better tolerated/received.

4.19 Although responses here indicate that wind farms accompanied by a visitor centre could make them part of the tourism economy and enhance the experience of tourists generally, this has not been verified in practice or by research findings as yet.

4.20 Economically, while certain directly affected areas may experience some small loss through displacement of tourists those tourists are unlikely to be lost to the wider region as they substitute affected places for those less affected within the region.

4.21 These considerations point toward the critical issue of the location of wind farms. Indeed, regardless of size, the research suggests that the location of wind farms is perhaps the most important issue and if done sensitively and strategically there is no evidence that tourism and wind farms cannot coexist in an area as long as saturation of the former does not reach a tipping point for the latter.

4.22 The larger the area in spatial terms of the tourism economy under question the greater the ability for it to absorb and manage wind farm impacts optimally whether they be positive or negative impacts.

4.23In general terms, the research here suggests that whether tourists are being questioned about existing wind farms or proposed wind farms, overall wind farms have no positive or negative affect on tourists and their actual or intended visitation behaviour.

Category B.

4.24 This section is made up of five studies: a 2002 Mori study undertaken in Scotland, a study by the Centre for Sustainability (2002) in Somerset, a study conducted by Leeds Metropolitan University (2003) in and around the Lake District National Park, and two somewhat controversial studies conducted by NFO (2002 and 2003) using the same approaches in Scotland and in Wales.

4.25 All the studies are now quite dated but use face to face interviews within the vicinity of wind farms, though not as robustly as those studies in Category A. In the Mori Scotland (2004) only 40% of tourists were aware of the presence of wind farms on their visit, it therefore does not meet the methodological criteria set out in section 3., and the Centre for Sustainability (2002) study on a proposed wind farm development in Somerset was only made available in an abridged form, it was therefore difficult to interrogate this study fully and it is apt that it features in this category. The Leeds Metropolitan University study (Campey et al, 2003) was commissioned by The Friends of the Lake District and was only made available by that organisation in incomplete form, although its main findings were fully available. This study was also not sufficiently well located 'in situ' to meet the methodological criteria set out in section 3. because most of the respondents were not aware of wind farms in the vicinity. It therefore sits well alongside the other studies in this section of the report because of its limitations. The NFO studies are often referred to by tourism-related interests that are anti, or sceptical of, wind farm development, and are somewhat controversial because of the way they use face to face interviews with tourists (discussed in more detail below). The

limitations of these NFO studies are recognised by the Northumbria research team but they are included here for magnanimity because they are referred to so often - though that has no bearing on their assessment and findings in this report. The full references for the five studies are:

- MORI Scotland (2002) *Tourist Attitudes Towards Wind Farms*. Research Study conducted for the Scottish Renewables Forum and British Wind Energy Association
- Centre for Sustainability (2002) *Martin's Hill Wind Farm Tourism Survey* undertaken on behalf of Wind Prospect
- Campey V. et al (2003) *A Study into the Attitudes of Visitors, Tourists and Tourism Organisations towards Wind Farms on the Boundaries of the Lake District National Park*, Leeds Metropolitan University for the Friends of the Lake District
- NFO/System 3 (2002) *Investigation into the Potential Impact of Wind Farms on Tourism in Scotland,* Final report prepared for Visit Scotland
- NFO (2003) *Investigation into the Potential Impact of Wind Farms on Tourism in Wales*, for the Welsh Tourist Board

MORI Scotland (2002)

4.26 In this research over 300 tourists visiting Argyll and Bute were interviewed face to face. There were three large wind farms in operation in the area at that time. Findings were as follows:

- 60% were not aware of the presence of wind farms and 40% were aware
- Of those aware of wind farms circa half could not recall where they were
- 49% had seen the wind farms (which, prima facia, seems to contradict the 60% figure above)
- 71% had visited areas close to wind farms
- 43% said that wind farms had no effect on Argyll as a place to visit
- 8% said that wind farms had a negative effect as a place to visit
- 43% said wind farms had a positive effect on Argyll as a place to visit
- 91% said the presence of wind farms made no difference on intentions to visit in future
- 4% said they were more likely to return
- 2% said they were less likely
- 80% said they would be interested in visiting a visitor centre at a wind farm
- 54% said they would be very interested in visiting a visitor centre

4.27 The conclusion was that wind farms are not seen as having a detrimental effect on tourists' visitation and would not deter tourists from visiting the area in future. Moreover, the majority of tourists viewed the prospect of having a visitor centre at the site of wind farms favourably.

The Centre for Sustainable Energy (2002)

4.28 This study was carried out in and around Brean, Sedgemor, Somerset in relation to a proposed wind farm development nearby. Although access to this survey report was not complete there was partial access and it is included here because it was based on 331 face to face interviews with tourists in order to ascertain whether or not the proposed project would have a negative impact on the number of tourists coming to visit the area. The main conclusion was that there would be no significant difference to the number of tourists visiting the area. The specific findings were:

- 91.5% said that the proposed development would make no difference to how often they visit the area
- 3.6% said they would visit less often
- 3.9% said they would visit more often
- 0.9% had no opinion
- The majority of respondents supported wind technology, with a total of approximately 8 out of 10 in favour or strongly in favour of wind power
- Approximately 7 out of 10 respondents viewed the proposed wind farm as a positive development for the area

Campey et al (2003)

4.29 These Leeds Metropolitan University researchers were commissioned by the Friends of the Lake District to examine views of tourists, tourism organisations and businesses on three wind farms located on the borders of the Lake District National Park at Lambrigg near Kendal, Kirkby Moor near Ulverston and the proposed development at Wharrels Hill near Bothel. 143 tourists were surveyed at Ambelside, Cockermouth, Grizdale, Keswick, Killington Lake Service Station and Windermere. However, the majority of visitors were not aware of the subject wind farms (see the main findings below), thus the survey was not sufficiently well located 'in situ' to meet the methodological criteria set out in section 3. for the study to be included in Category A. The survey does, however, cover a sufficient number of visitors to be of some plausibility within the limitations of this Category. The main findings, specifically in relation to tourists, were:

- 87% were positive about renewable energy
- There was little or no effect of wind farms on tourism within Cumbria
- The majority of visitors were not aware of the wind farms and after being made aware they did not feel the wind farms would impact upon their future visits
- 75% said that increases in the number of turbines in the next few years would not have any effect on them visiting in future
- 6% said wind farms looked attractive in the landscape
- 58% said that wind farms were more attractive than mobile phone pylons and telegraph poles
- 22% said that if the number of wind turbines increased considerably over the next few years, they would be discouraged from visiting the area
- Most (over 100) would prefer wind farms to be located offshore
- 47% said that visitor centres would make no difference to their opinion of wind farms though 31% said they would make them more positive and 31% said visitor centres would make them more inclined to visit

4.30 The study concludes by saying that overall responses were positive towards wind farms but that 22% said they could be discouraged by future wind farm development. There are no up-dated figures on tourist visitation to either support or refute this latter figure.

NFO (2002 and 2003)

4.31 The 2002 study was commissioned by Visit Scotland and used face to face interviews in what has come to be known as the Hall Test. Briefly, this involved inviting tourists to a hall in location for a 30 minute semi structured discussion of the issue at hand – in this case the importance of scenery to the tourist experience. There are issues with the selectivity of this approach because it distilled those tourists who described landscape and scenery as of prime importance to their visit to become the subject grouping. Other tourists who may have been visiting for business, VFR and even golf and fishing were filtered out and excluded from the research.

4.32 The Northumbria University research team is cautious about the findings of this study because of this selectivity and are not convinced at all by the stage management of the research process. Moreover, wind farms were not indicated as being the prime focus of the research, and neither tourists or researchers mentioned them until well into the process when respondents were prompted toward giving opinions on wind farms via questioning that could justifiably be interpreted

as being of a rather leading nature. Other reports such as Aitchison (2012), Regeneris (2014) and GCU (2008) have expressed similar concerns.

4.33 In all, the 2002 study selected 180 tourists for interview via 6 Hall Tests in locations across Scotland that where in the proximity of existing wind farms or planned wind farms. The locations were: Galashiels, Portree, Oban, Huntly, Dumfries and Stornoway. When the overt focus was on scenery generally wind farms were not identified as significant until that focus became more apparent in the questioning, which suggests that respondents needed a degree of prompting or leading before wind farms became an issue in the research. This compromises the validity of the research and its findings because it skews the data toward negative outcomes, and it should be noted that the findings presented below were gathered from that point in the research process when the issues surrounding wind farms appear to have been prompted:

- 40% of respondents were from Scotland, 38% were from other parts of the UK, 23% from overseas
- Just under half had seen a wind farm in Scotland
- 75% were neutral or positive about wind farms
- 21% were negative
- 31% stated that scenery and landscape would be spoiled by wind farms and a further 7% described the impact as 'awful/dreadful/appalling'
- A similar figure to the above indicated that wind farms in the landscape may change their planned behaviour
- Tourists favoured more smaller wind farms than fewer large ones
- Tourist with experience of wind farms were marginally less negative about them
- 49% said wind farms should be located offshore
- 63% said further wind farm development would not influence their decision to revisit, a further 2% said the impact would be minimal and 15% would 'steer clear of the area', 0% said they would be more likely to revisit because of wind farms

4.34 The 2003 study by NFO was commissioned by the Welsh Tourist Board and used the same approach as the Scotland study. 266 respondents were interviewed via 8 Hall Tests across Wales. The locations were: Aberystwyth, Machynlleth, Knighton, Rhyl/Colwyn Bay, Porthcawl, Rhayader, Welshpool and Hay-on-Wye. Main findings were as follows:

- 70% were UK based, 20% domestic and 10% from overseas
- 66% had seen an onshore wind farm in Wales
- 78% were neutral or positive about wind farms
- 21% were negative
- 33% thought wind farms would impact negatively on landscape and scenery
- 23% thought negatively about wind farms with 48% saying the same for pylons and 37% for phone masts. Wind farms were eighth on this negativity list
- Tourists favoured more smaller wind farms than fewer large ones
- Tourists with experience of wind farms were marginally less negative about them
- 83% said the most appropriate location for wind farms was offshore
- 68% said further wind farm development would not influence their decision to revisit, a further 9% said the impact would be minimal and 11% would 'steer clear of the area', 0% said they would be more likely to revisit because of wind farms

4.35 In the round, the NFO studies do not conclude that wind farms have a negative impact on tourism. Indeed, in both respectively, 75% and 78% of tourists were neutral or positive about wind farms while 25% and 22% where negative. It is also noteworthy that these studies indicate how those tourists who had seen wind farms during their visit were marginally less negative about them than those who had not. The issue of size of wind farms contrasts with the findings of the GCU (2008) study which concludes that fewer larger wind farms is the better development strategy. However, given that the GCU (2008) study is by far more robust, its conclusions need to be given more weight.

Overall conclusion of this section by University of Northumbria researchers

4.36 Even though the NFO studies are, often selectively, cited by those opposed to wind farm development as being an authority on the issue, and are compromised by the research design, overall they do not support the view that wind farms negatively affect tourism in any significant way. Indeed, some of their detailed findings – for example, on wind farms against pylons – fall in line very much with other studies to indicate the relatively benign nature of wind farms regarding their impacts upon tourism. Even though the methods used in these studies are not robust or valid enough (for the reasons explained above) for us to rely upon their findings, they hardly challenge the conclusions of the studies in Category A. The other studies in this category, Category B, concur with this, though they too have their limitations as pointed out.

4.37 However, there is suggestion in the NFO studies worth taking note of that small wind farms are preferable to tourists than large ones. This seems, to this research team, too simplistic a conclusion that is partially derived. Moreover, given that all the studies in this Category are around twelve/thirteen years old, and that wind farm technologies and development trajectories have moved on since they were conducted, and that there is more recent and robust UK research available, any findings and conclusions need to be seen in that light.

Category C.

4.38 In this category relatively recent studies which add value to this report are discussed even though they fall outside the strict definitions set to distinguish research that is directly relevant to the report's purpose. There is no overall consistency in these studies in terms of authorship, methodologies and methods used, empiricism (or otherwise), and audience; but in their various ways they have valid things to say that are of significance to this report. The studies are:

> Eltham DC, Harrison GP, and Allen SJ (2008) 'Change in public attitudes towards a Cornish wind farm: Implications for planning'. *Energy Policy* 36 pp. 23-33
>
> Aitchison C (2012) 'Tourism Impacts of Wind farms: a discussion paper' Submitted to Renewables Inquiry Scottish Government.
>
> The Tourism Company (2012) 'The impact of wind turbines on tourism – a literature review' Prepared for Isle of Anglesey County Council
>
> Regeneris Consulting and the Tourism Co (2014) 'Study into the potential Economic Impact Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector'. Commissioned by the Welsh Government.

Eltham et al (2008)

4.39 This academic study is useful even though it did not survey or interview tourists for its primary evidence gathering. It does mention tourism, however, and is arguably the best study available on assessing public attitudes towards wind farm development in a setting potentially comparable to Northumberland **pre and post development**. It is therefore included for comment here.

4.40 Using face to face interviews, the study was designed to assess how and whether opinions of residents of St Newlyn East, Cornwall had changed on the development of the Carland Cross wind farm between 1991, prior to its development, and 2006, after they had lived with the development for 14 years. Press coverage of the development during the early 1990s was also consulted as a comparative reference point for the interviews. Eltham et al (2008, p. 25) describe the geographical circumstances of the 6 MW Carland Cross wind farm as 'offering a more rural location over other Cornish wind farms' and that:

> The wind farm has 15 turbines (each 30m high)constructed upon the highest hill in the area at an altitude of 149m and surrounded by sparsely vegetated moorland and downland. The village of St. Newlyn East, 2 and 1/4km from Carland Cross, with a population of 1230 (Cornwall County Council, 2000) was used for questioning due to uninterrupted vistas of the wind farm across the Lappa Valley.

4.41 The study's main findings and recommendations are as follows:

- No statistically reliable changes in the opinion of residents on the acceptance of the wind farm were ascertained
- The majority of the population was in support before and after the development in 1991 and 2006 respectively
- A significant decrease in the proportion of residents unable to identify a positive impact of the wind farm over the period was recorded
- Significant increase in residents finding wind turbines visually attractive and the wind farm being a valuable asset was recorded
- The above may imply that up to three times the total installed wind capacity in the UK between 1999 and 2002 was unnecessarily declined. On this the paper says:

> underpinning such objections is often a selection of social and institutional factors, such as disbelief in the planning system, distrust of the developer or the persuasive opinion of local opposition groups (p. 32).

4.42 The paper concludes by saying that local populations need to be engaged early in the decision making process so that concerns about wind farms can be addressed through dialogue between stakeholders. Furthermore, appropriate empirical evidence needs to inform/underpin such dialogue to mitigate the proportion of residents responding negatively to wind farm developments. Overall,

the study supports the 2007 White Paper *Planning for a Sustainable Future* proposals that community engagement should happen early in the project process and that the requirement for infrastructure be debated at the national level.

Aitchison (2012)

4.43 This is an analysis of primary and secondary studies to date relating to the wider evidence available on tourism impacts of wind farms. Aitchison (2012) outlines a number of conditions in terms of quality, validity and reliability that may determine the legitimacy of findings of previous research. She concurs with the approach taken in this report that face to face interviewing of tourists in situ is the most appropriate research method in this regard.

4.44 As this report does, Aitchison (2012) also concludes that the GCU (2008) study and the UWE (2004) study are the most reliable studies (up to the point when she wrote her report). She summarises the general issues with extant research as follows:

- Much primary research to date contains errors in survey methodology and sampling and the use of inappropriate and biased sampling has been identified.
- In some instances local businesses rather than tourists have been used as the sampling frame and therefore their views as proxy evidence for tourism impacts. This is inappropriate for assessing impacts on tourism but useful for gauging business owners' opinions on tourism impacts.
- The use of self-administered questionnaires is commonplaces but is problematic because they tend to have low response rates and be completed by those with strong (often negative) opinions. Therefore, such motivated responses can be more about (political) opinion than actual impacts.
- Many reports and various correspondences appear as valid analyses of secondary sources of data. However, the use of such data is often selective, poorly extrapolated or even biased.
- Some apparently credible primary studies have subsequently been discredited because of issues around bias and selectivity. A study for The Western Isles Tourist Board by *Hamilton: The Market Specialists* in 2005 is one such example but others too fall into this bracket such as the 2002 and 2003 NFO studies included in this report.

4.45 In conclusion the Aitchison (2012) report states that a managed and sustainable approach to wind farm development in Scotland is likely to have little or no impact on tourist numbers (volume), expenditure (value) or experience (satisfaction). Any impact is as likely to result in more tourist visitors as it is to result in fewer tourists. Although a very small number of current visitors might choose not to repeat their visit because of the presence of a wind farm, this number is likely to be off-set by additional tourists who visit irrespective of the presence of a wind farm, return because of the wind farm or visit for the first time because of the wind farm. Tourist numbers are likely to increase significantly if the wind farm is accompanied by a visitor attraction.

The Tourism Company (2012)

4.46 This study reviews literature on onshore wind farms and tourism both in the UK and abroad. It does not include a consistent analysis of methodologies but does identify the lack of peer reviewed (academic) literature and discusses results of non-academic studies. It also highlights issues around the impartiality of some research on the impacts of wind farms on tourism. It concludes with the following 'observations' of relevance:

- Most tourists are positive about green energy although this may change over time
- Only a minority of tourists appear to be negative about wind farms, although this is a significant minority
- Tourists prefer small wind farms to large ones but may prefer to see them in one place rather than everywhere
- Wind turbines are not seen as negatively as other structures in the countryside – notably pylons
- A relatively small minority of tourists may stay away because of wind turbines though this may be damaging to markets in certain locations
- The negative effect of existing wind farms on tourism may not be as great as people fear. More longitudinal evidence is needed, however.

Regeneris Consulting and the Tourism Company (2014)

4.47 This study undertakes an analysis of visitor economies in nine areas of Wales affected by wind farms. It looks at extant impacts from three case study areas already affected by wind farms via

local research where available and structured consultations with local tourism trade associations and local authority tourism officers. Key relevant findings are:

- Negligible impact on the national tourism sector
- Limited evidence of local tourism impacts to-date
- The majority of tourists are neutral about wind farm development and the presence of wind farms will not affect their visiting behaviour in future
- Even those tourists who say that wind farms do or would affect their tourist experience do not always change their visiting behaviour in practice
- Reactions to wind farms are complex and may change over time
- There is higher sensitivity to wind farms for certain visitor markets - e.g. older people
- No evidence that wind farms on visitor routes deter tourists
- No drop in visitor numbers during wind farm construction
- Pylons and other associated grid infrastructure more negatively viewed than wind farms

4.48 In conclusion, Regeneris (2014) states that areas under consideration are 'unlikely to experience a significant change in the volume and value of tourism' though some will be more sensitive to impact than others (p. 121). Even though there is little evidence of impact to date the most sensitive areas could be subject to large scale wind farm development over the next 10 years. These areas attract older visitors who come for the natural scenery, landscape and feelings of tranquillity, and it is these markets that may be most sensitive to large scale wind farm development. This said, the other visitors to these sensitive areas are not likely to change their visiting behaviour and therefore it is 'concluded that the overall change in visitor numbers in these [sensitive] areas would be low, but may be moderate for certain visitor markets' (p. 121). These moderate changes may be impactful upon businesses that rely on such visitors and there 'may be a particular challenge for them replacing those visitors which are deterred' (p. 121).

Concluding comments for this section by University of Northumbria researchers

4.49 While these studies vary to significant degrees, collectively they add weight to the pattern of findings from other sources that suggest that the impacts of wind farms have on tourism are nominal at most. There is strong suggestion that first hand familiarity of wind farms brings greater public acceptance of them. Here there is consistency with findings in other sections of the report

that suggests tourists who have been exposed to wind farms are less critical and are more accepting of them than those who have not – including potential tourists who have been surveyed remotely via online surveys. Once again, wind farms are viewed more positively than other grid infrastructures, such as pylons, in the landscape. However, when considering future developments a degree of caution is often expressed in studies and this tends to relate both to the extent and location of wind farm developments. Furthermore, the age of extant studies makes it even more problematic to speculate about future developments. Closely related to this is: understanding current and likely visitor markets in a given area and whether particular market segments may be affected by wind farm development, what the trade-offs are, and whether any displacement of certain tourists will be substituted and/or offset by others.

Concluding discussion of the desk-based meta-study by University of Northumbria researchers

5.1 The findings in this desk-based report are indicative rather than definitive because the research to date is far from mature, extensive, or much of it current. Methodologically, there is significant variation in the way much research has been conducted. Moreover, there is research that is overly selective or not well constructed and there is a plethora of comment that either deliberately or otherwise assembles empirical evidence teleologically to support a pre given position, usually one which is negative about wind farm development. Such reports and commentary are discounted here here by targeting and identifying the most reliable work available that is built on empiricism or what some would call firm evidence. For balance, however, some studies are included that some (lobbying) groups on either side of the argument often draw upon but they are used in an appropriate context by recognising and accounting for their limitations. The inclusion of such studies does not detract from the overall conclusion that to-date there is no evidence to suggest that the development of wind farms has either a significant negative or positive impact on tourism in UK destinations. For completeness, a third category is included of studies that do not hold together neatly but do, in their various ways, add significantly to an understanding of the potential impacts of wind farms and they too concur with the overall conclusion.

5.2 That is not to say there are no risks attached to wind farm development but where negative effects do occur these are often in the form of displaced tourism rather than an absolute loss of tourists to an area. This is particularly the case the larger the area under question. Therefore, at

regional or county level it could be more confidently expected that the impact of wind farms on tourism would be neutral.

5.3 The majority of tourists tend to be positive or indifferent about wind farm development and its effects on their ability to enjoy their visit. Their intentions to return are not significantly affected by wind farm development.

5.4 There is some evidence to suggest that older visitors who value remoteness, landscape and scenery are the most sensitive regarding the visual effects of wind farm development on the landscape. However, in locations where this market is significant the potential negative effect on overall visitor numbers may still be low or at worst moderate.

5.6 Young people and overseas visitors are generally well disposed toward wind farms and tourists exposed to wind farms are less negative about them than those who have not been exposed to them – such as potential tourists surveyed through internet studies (see section 6.). There is also evidence that the general public are more accepting of wind farms as they become accustomed to them, and that initial opposition to wind farm development can turn toward support after construction (also see Braunholz, 2003 on residents' greater acceptance of wind farms after construction in Scotland).

5.7 Moreover, wind farms are becoming more of a feature in the everyday lives of many people across the world, not least in Europe, and this may desensitize the issue further. By contrast, this factor also could enhance the tourist appeal of 'pristine' landscapes devoid of wind farms if such landscapes become something of a rarity.

5.8 There are indications that wind farms accompanied by visitor centres could not only allay the concerns of tourists, potential or otherwise, who express negative feelings toward wind farm development but positively attract others – such as, for example, young and overseas tourists. There is no empirical evidence to support this however, and as Regeneris (2014) state, there is little or no evidence from practice whether or not this would be the case

5.9 The size of wind farms both in terms of scale and number of turbines is a major issue in regarding impact mitigation. The most robust study on this, the GCU (2008) study, suggests that larger and fewer wind farms is optimal. This issue needs to be viewed in the context of what the evidence suggests is an absolutely central consideration: the siting of wind farms. In this regard, wind farms need to be sited in relation to the most appropriate topographical, landscape value and tourism economy contexts.

5.10 The scale and rate of wind farm development in future could change the value judgements of tourists, especially if a tipping-point is reached whereby valued landscapes are felt to be saturated by wind farm developments. There is no evidence in the research examined in this report to suggest this has happened or will happen in practice but this is a potential risk worth pointing out (see Regeneris, 2014).

5.11 With regard to the effects on main arterial routes, there is no evidence to suggest that there would be any significant change in visitor numbers because of tourists using routes in close proximity to large concentrations of turbines to reach their destinations. While small numbers of tourists might be discouraged others would be encouraged to use such routes. The GCU (2008) study, for example, states that long lasting views of wind farms, as those that may be had from a hotel bedroom window, are much more impactful than, say, views from a moving car's windscreen. As a consequence, tourist accommodation that faces on to significant wind farm developments might be the most negatively affected tourism infrastructure type and may have to use pricing strategies in mitigation of those impacts.

5.12 It is something of a truism to stress the importance of clear, open and effective planning on this issue and that the earlier the public are included in dialogue with the decision making process the better (also note Warren and McFadyen, 2010, on this issue). Robust evidence is the keystone to this, not least because it is necessary in order to bypass the unsubstantiated opinion and selective reporting that can easily mislead and disrupt consultative and effective decision making.

Limitations

5.13 The findings of the desk-based meta-study are limited with regard to Northumberland because of three key reasons: 1) there is a dearth of robust UK studies, particularly in recent years; 2) there is no empirical evidence-based research on Northumberland itself on onshore wind farms and tourism; 3) to extrapolate conclusions from extant UK research to the Northumberland setting is inappropriate because it is a unique location with its own geographical, historical, economic, social and cultural circumstances. We therefore do not recommend that concrete conclusions regarding Northumberland be drawn from any of the specific or general conclusions of the desk-based meta-study.

Recommendations

5.14 Given these limitations, empirical research in Northumberland itself that specifically addresses the impacts of wind farms on tourism there is needed. Such research would draw robust conclusions that would be timely, geographically specific, and therefore of significant use to planners and decision-makers in Northumberland on the relationship between wind farms and tourism there.

5.14 In relation to this, it is worth noting here that the research with local businesses and interest group representatives featured later in this report indicates that wind turbine size, and related issues, is an important consideration in today's Northumberland because recent technological advances allow much larger wind turbines to be erected than in the past. This is a material consideration for current and future impacts, but the retrospective view of this meta-study cannot directly address the issue of turbine size. This could, however, be a focus of any future research with tourists in Northumberland itself.

5.16 Furthermore, given that a good number of the studies consulted in this report are more than ten years old, it would be timely and useful for their conclusions to be 'tested' in the field by further empirical work in the locations they were conducted. Such longitudinal research would add significantly to current knowledge and offer perhaps more reliable guidance for future wind farm development in relation to the actual impacts or otherwise on tourism in the UK.

5.17 More immediately, a guideline framework is offered (rather than recommended) - which is a modification of the framework proposed by Regeneris (2014) - in order to aid planners in their decision making on proposed wind farm developments in Northumberland (see Table 5.). The framework is premised on the key considerations extrapolated from the most significant studies reviewed here as well as those identified by Regeneris (2014). The key considerations are synthesised by Regeneris (2014) into three grouped factors which provide something of a platform for assessing wind farm proposals in areas popular with tourists and are built into the framework. These factors are:

- Scale and characteristics of existing and proposed wind farm developments in the area
- Characteristics of the local visitor economy and its offer
- Characteristics of visitors

Table 5. **Framework for Considering Sensitivity Factors Regarding Potential Negative Impacts on Tourism from Wind Turbine Developments**

Type of Factor	Indicator	Explanation
Characteristics of Development	Scale of development – especially larger scale wind farms with more than 10 turbines Location of development	The scale of development is strongly linked to physical presence and visibility in and on the landscape. Topography will also affect visibility, and other location attributes will be an important consideration in determining the most appropriate scale of development.
	Clustering of multiple wind farms in close proximity to main tourist hubs and facilities.	As above
	Proximity to major routes to tourist hubs	As above, although evidence suggests that physical and visible presence is more tolerated while people are in transit and that people, generally, do become accustomed to the sight of wind farms with first-hand experience of them, and over time.
	Extent to which wind farms are located within or close to highly valued landscapes	Valued landscapes in this context tend to be unencumbered by development rural landscapes which have widely accepted scenic value. Locating wind turbines in and around such landscapes would need to be extra carefully considered. Important factors are the predominant tourism market in the locality and the ability of the wider area to accommodate tourists substituting one affected location for others. Other landscapes that draw tourists – e.g. beaches, heritage sites etc. – need similar levels of consideration.
Characteristics of Tourism Areas	The extent to which an unencumbered rural landscape is central to the tourist experience.	Visual attribute can be the major draw in key tourist areas and therefore siting of wind turbines in such areas may need to be considered a 'last resort' in a broader location strategy. Offshore locations may provide an alternative.
	Diversity of the tourism offer	The greater the diversity of attractions and therefore tourists visiting an area the less potential sensitivity regarding wind turbines impacting upon tourism

	The popularity and capacity of the tourism area	As above plus such areas may have a greater ability to adapt to wind turbines and any perceived negative impacts. If large enough, such areas could offer attractions away from wind turbines/farms without loss to the tourist economy.
Characteristics of Tourists	The diversity of tourist types. Particularly with regard to proportion of older tourists who may be less tolerant of wind farms, young and/or overseas tourists who may be more tolerant or appreciative of wind farms	Linked to the diversity of the offer in an area and its size. A mix of tourists in such an area may contain those who are negatively sensitive to wind turbines, those who are positive, and those who are indifferent. The overall effect, therefore, may range from indifferent to mildly positive.
	Long standing visitors and repeaters	Regular tourists may be more sensitive to change and if the area is heavily reliant on such visitation extra caution may be needed when considering wind turbine/farm development. Some of these tourists may welcome wind turbine/farm development and a good proportion may be indifferent. However, the demographic and origin (whether local, UK or overseas) of such tourists/visitors needs to be set alongside their propensity to visit.

(Adapted from Regeneris, 2014)

5.18 All the factors, indicators and explanations in the framework are to a greater or lesser extent interrelated and/or interdependent but worth separating out in it so the level of importance given to each can be seen to be applied consistently and clearly on a case by case basis.

Public Knowledge survey of potential visitors

6. Research approach and main findings

6.1 Northumberland County Council commissioned this study with Public Knowledge consultants to evaluate the effect of existing and planned onshore wind turbines on potential visitors to the county. The study identified potential visitor views on whether the existence of wind farms has an impact on their decision to come to a rural tourist area (and to Northumberland in particular). Areas the research covered are:

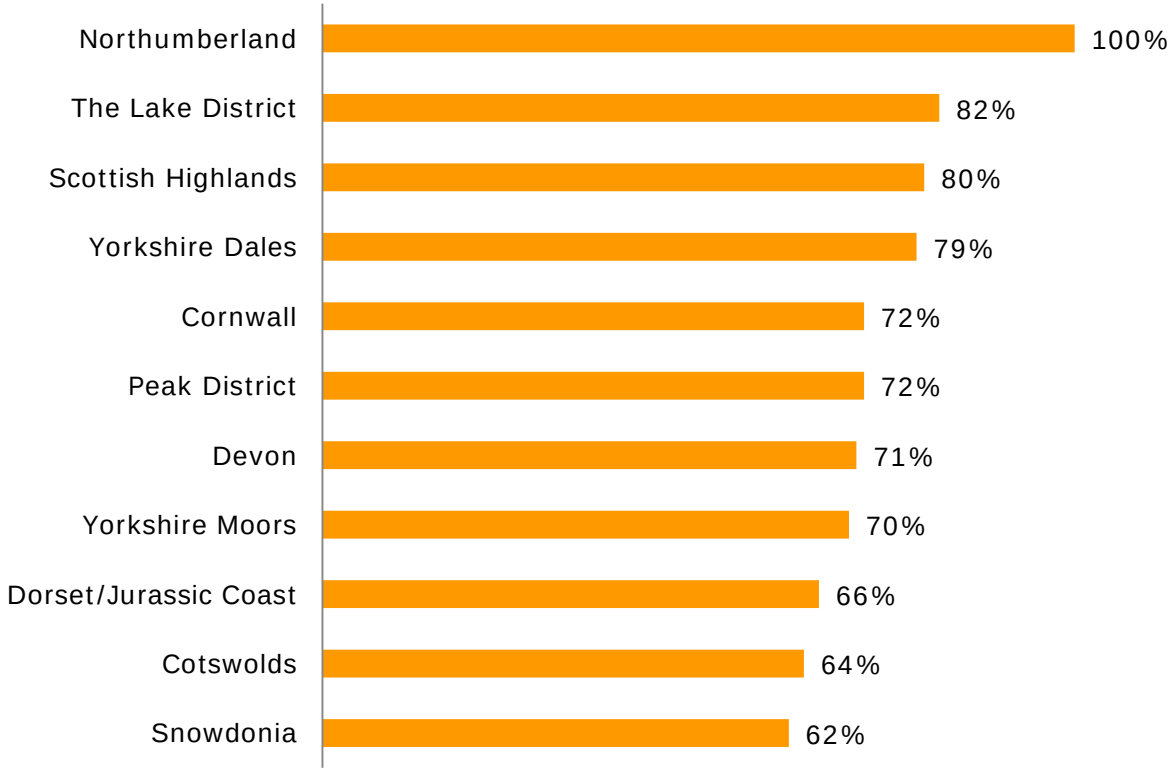
- Whether the respondent is familiar with large-scale wind turbine development.
- The importance of natural scenery and landscape to potential visitors.
- The factors affecting a potential visitor's decision to visit or stay in the county.
- Where else in the UK potential visitors have stayed/plan to visit.
- Whether the presence of wind farms would affect a potential visitor's decision to visit or stay in the county.
- Whether wind farms would be viewed as an added attraction for visiting the county.
- Whether the presence of wind farms in a destination has had an effect on their holiday decision-making process to date and why.

To evaluate the effect of existing and planned onshore wind turbines on the tourism industry within Northumberland, quantitative data was collected via an online methodology. A questionnaire (approximately 10 minutes in length) was designed in collaboration between Public Knowledge and Northumberland County Council.

6.2 Online data was collected via Public Knowledge's in-house online panel, panelbase.net, which has over 200,000 registered members and this resulted in 410 interviews. A sample of 410 is considered to be robust with a margin of error of +/-4.84% at the 95% confidence level. The survey ran from the 27th March to 7th April 2014.

6.3 In order to qualify to take part in the survey all participants were required to select Northumberland as a place they would consider visiting in the next 2 years.

Figure 1: Destinations considered



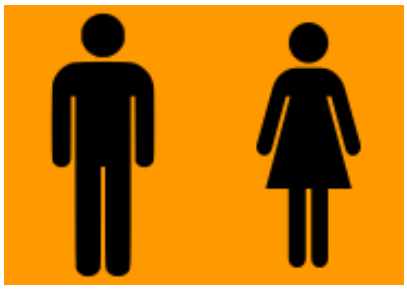
S1. Which of the following areas would you consider going on holiday to/visiting in the next 2 years?
Base: 410

Other places participants would consider visiting in the next two years in addition to Northumberland include the Lake District (82%), the Scottish Highlands (80%), and the Yorkshire Dales (79%).

6.4 Quotas were imposed on the sample to ensure that 20% were from the North East (excluding Northumberland) with the remaining 80% from a spread of regions across the UK. Quotas were also

imposed on the sample to ensure a spread of responses is achieved according to age and gender. The final sample profile according to age and gender is shown in Figure 2 and Table 1.

Figure 2: Sample Gender



50% **50%**

As Figure 2 shows, the sample was split equally between genders. Age was also fairly evenly spread across the sample, although fewer 16-24 year olds were represented.

Table 1: Sample by Age

Age	N	%
16-24	24	6%
25-34	67	16%
35-44	78	19%
45-54	84	20%
55-64	86	21%
65+	71	17%

Table 2: Regional Breakdown

Region	N	%
North East	79	19%
South East	51	12%
London	40	10%
North West	38	9%
West Midlands	33	8%
Yorkshire	32	8%
East Anglia	32	8%
South West	32	8%
Scotland	28	7%
East Midlands	24	6%
Wales	17	4%
Northern Ireland	4	1%

There was a maximum quota set against respondents being from the North East of 20% and nobody lived within Northumberland. The breakdown of North East respondents' home areas is shown in Table 3.

Table 3: North East Breakdown

Region	N	%
County Durham	21	27%
Newcastle upon Tyne	14	18%
Sunderland	13	16%
North Tyneside	7	9%
Gateshead	6	8%
South Tyneside	3	4%
Middlesbrough	3	4%
Stockton	3	4%
Redcar and Cleveland	2	3%
Hartlepool	2	3%
Other	5	6%

6.3 Below the findings of the Public Knowledge survey are summarised to evaluate the attitudes of potential tourists (those who would consider visiting Northumberland in the next two years) towards onshore wind turbines/farms development in Northumberland (see Appendix A. for the full report).

6.4 The main findings were:

Visit requirements

- The most popular type of holiday amongst participants, all of which would consider visiting Northumberland in the next 2 years, were seaside and coastal holidays (29%) followed by countryside holidays (27%).
- Respondent's main considerations when booking a holiday are scenery (31%), price (25%), activities (20%), weather (20%), distance (18%), and accommodation (17%).
- The main reasons for considering a visit to Northumberland is the scenery (24%) followed by the coastline (16%).
- It is the countryside, coastline beaches, historic sites and peace and quiet that drew people to Northumberland in the past.

Impact of wind farms on visiting decisions

- 11% of respondents would be discouraged from visiting Northumberland due to wind farms and of those two thirds are male.
- 19% of respondents select that their decision to visit Northumberland is likely to be affected by wind farms.
- 42% of the sample support onshore wind farm development, a further 22% claim to have no real opinion leaving 21% to be opposed and 5% not knowing what to think.
- 87% of respondents would feel comfortable seeing some form of wind farm in Northumberland.
- There is dispute with regards to wind farms but it is agreed by more than half that if correctly sited they do not intrude or ruin the landscape and that the farms are a necessary means of generating renewable energy.
- When prompted with a list of barriers, electricity pylons and quarrying are more of a deterrent than wind farms. Of the 11% who select wind farms, two thirds of them are males in comparison to only a third being females. There is no significant variance across the age groups of those selecting wind farms.
- There are more respondents who agree that wind farms add character to an area (31%) and can enhance the natural landscape (29%) than there are agreeing that wind farms would discourage them from visiting an area (26%).
- 4% of respondents have been discouraged to visit Northumberland in the past due to wind farms, the same percentage have however visited the area because of the wind farms.
- 30% of respondents will definitely or may be encouraged to book a holiday/visit to somewhere other than Northumberland in the future because of the presence of wind farms.
- 41% of respondents think Northumberland has a sufficient number of wind farms, 43% believe that the area could support more wind farms, leaving 16% who think Northumberland already has too many.

Conclusions of the survey:

6.5 The main reasons for visiting Northumberland are the scenery and the coastline and it is recognised that these two areas will be affected most by the development of wind farms. A minority group believe that Northumberland already has too many wind farms but generally opinion is divided as to whether there are sufficient already or whether the area can support more.

6.6 The impact of additional wind farms on visitor numbers to Northumberland is present but the majority feel that wind farms are not having an influence on their likelihood to visit the area. Only 11% said that the presence of wind farms would affect their decision to visit Northumberland. For those whose decision to visit would be affected this was primarily because of the impact on scenery and because they are unattractive but overall 61% of the total sample agree that a correctly sited wind farm does not ruin or intrude on the landscape.

6.7 Power stations and electricity pylons and wires were likely to have a greater impact on respondents' decision to visit Northumberland than wind farms. 6.8 There are demographic variances in opinions about wind farms, males and the eldest age group of 65 years plus are more negative towards wind energy. The presence of wind farms has more of an effect on these two groups.

Concluding comments by University of Northumbria researchers in relation to the Public Knowledge survey

6.7 The first observation to make regarding the Public Knowledge survey is that, notwithstanding the limitations of such work as indicated earlier in this report that such surveys are too remote to determine actual impacts, the findings here are, overall, consistent with those of the extant research reviewed. Furthermore, when allowances are made for the tendency of remote surveys such as this to deliver more sceptical, cautious and negative views on wind farm development than those that interview tourists in situ, the consistencies are even more evident.

6.8 There is nothing to suggest in this survey that Northumberland is in anyway a special case with regard to the effects of wind farm development on tourism in comparison to the other UK regions where research on this issue has been carried out. The only new finding in the survey, compared to other research consulted, is that male respondents tended to be more negative toward wind energy, this appears significant in the context of this particular study, but whether that would hold up more

generally would need to be verified by further research and its significance or otherwise be assessed in light of that.

Survey of tourism-related businesses in Northumberland

7. Introduction

7.1 As an adjunct to the desk-based study the Northumbria University research team undertook an online survey with tourism-related businesses in Northumberland to ascertain their views on the impact of wind turbines on their businesses. This was in response to the project brief that states:

> the study will also require contact with local tourism businesses to obtain evidenced based views on:
>
> - Whether there has already been an impact on tourism from the wind farms currently in Northumberland (in terms of visitor numbers, occupancy rates, turnover etc).
> - Whether the presence and anticipated presence of wind farms will affect their investment decisions.

The survey was distributed via Northumberland County Council's newsletter in May 2014 and 159 responses were received overall. It should be noted that, as Aitcheson (2012) indicates, surveying tourism-related businesses does not address the issue regarding the impacts wind farms have on tourism. Rather, such a survey reveals only how businesses assess the effects wind farms have had or are having on them. Furthermore, assuming that many, if not most, respondents will live in Northumberland, as well as run businesses there, it is uncertain to what extent responses are purely business-related responses, residency-related or a balance between the two. The following should, therefore, be read in the above contexts.

Q 1. 1. What type of business do you own in Northumberland?				
#	Answer		Response	%
1	Hotel		13	8%
2	Self-Catering accommodation		56	36%
3	Guest House/Bed & Breakfast		36	23%
4	Camping & Caravanning		5	3%
5	Pub or Inn		4	3%
6	Restaurant or cafe		5	3%
7	Visitor Attraction		18	12%
8	Activity Operator/Provider		7	4%
9	Retail		17	11%
10	Other (please specify)		18	12%

Other (please specify)
• guide book publishing
• tourist guide
• Crafter at craft fairs/shows/events
• Hostel
• Design and marketing
• Gallery & Pottery
• Guide
• Youth Hostel
• Tourist Information Centre
• Web Publishing
• golf club
• adventure activity guide
• inn with rooms
• estate with various attractions/activities/accommodation
• Blue badge guide
• giftware supplier
• Craft
• Booking agency self catering accommodation

2. How long has your business been running in Northumberland?				
#	Answer		Response	%
1	Less than one year		5	3%
2	1-5 years		30	19%
3	6-10 years		42	26%
4	11 or more years		82	52%
	Total		159	100%

3. Has your business turnover in the last 3 years?

#	Answer		Response	%
1	Increased		54	34%
2	Decreased		47	30%
3	Stayed the same		58	36%
	Total		159	100%

4. If your turnover has increased, what do you attribute this to? Please rank in order of importance by dragging and dropping the options.

#	Answer	1	2	3	4	5	6	7	8	9	10	11	Total Responses
1	Investment in your business	31	13	0	4	2	2	0	0	0	0	0	52
2	Quality/accreditation attainment	5	10	14	2	6	3	4	1	4	1	2	52
3	Investment in staff	0	5	6	7	5	4	3	6	10	3	3	52
4	Business marketing	7	12	16	5	5	2	2	3	0	0	0	52
5	Cost of overseas holidays	0	0	1	4	11	7	12	8	7	2	0	52
6	Presence of wind turbines in Northumberland	0	1	1	0	0	6	3	5	4	23	9	52
7	Northumberland marketing campaigns	0	2	6	6	10	9	12	3	4	0	0	52
8	Knock-on effects of nearby popular attractions	1	2	3	9	3	6	8	10	6	4	0	52
9	Increased significance of social media	2	3	2	6	2	8	6	5	11	6	1	52
10	Northumberland TV/media exposure	2	3	3	7	8	5	2	11	4	7	0	52
11	Other (please specify)	4	1	0	2	0	0	0	0	2	6	37	52
	Total	52	52	52	52	52	52	52	52	52	52	52	-

Other (please specify)
• High retail standards
• Our great property and our sea views
• Providing services others don't
• Repeat business building up
• Providing value for money
• Quality provision
• High retail standards
• The Weather

5. If your business turnover has decreased, what do you attribute this to? Please rank in order of importance by dragging and dropping the options.

#	Answer	1	2	3	4	5	6	7	8	9	10	Total Responses
1	Bad weather	10	10	6	8	6	1	1	0	1	0	43
2	Recession	20	11	7	3	0	0	1	0	1	0	43
3	Competition from other UK destinations	2	6	10	9	5	6	1	1	2	1	43
4	Cheap holidays abroad	2	2	6	9	7	9	5	3	0	0	43
5	Broadband speeds	0	1	1	5	8	5	4	12	6	1	43
6	Lack of public transport	0	1	0	1	5	13	13	6	3	1	43
7	Presence of Wind turbines in Northumberland	7	4	5	2	2	3	6	3	9	2	43
8	Cost of fuel	1	3	5	3	5	4	4	15	3	0	43
9	Lack of low season visitors	0	2	3	1	5	1	8	3	18	2	43
10	Other (please specify)	1	3	0	2	0	1	0	0	0	36	43
	Total	43	43	43	43	43	43	43	43	43	43	-

Other (please specify)
• Difficult to tell as we supply other tourist bodies
• We are taking it a bit easier, both getting old!
• Lots of fellow jewellers/competition
• Lack of National advertising
• Bad weather forecasting
• Only recession
• Wind Turbines will have an effect. I travel Europe widely and the areas where tourists go to are not the areas where wind turbines dominate. For instance the flatlands of northern Germany are covered in wind turbines, this is seen as a corridor to the tourist destinations which incidentally do not have wind turbines. Areas near the Mosel have wind turbines but you will not see them from the Mosel, this cannot be said about Northumberland which it seems is 'becoming that corridor'!!!
• Competition due to an increase in the number of self-catering
• Money to spend
• Local competition
• Customers closing or cutting back on demand

6. Have your visitor/customer numbers in the last 3 years:

#	Answer		Response	%
1	Increased		50	31%
2	Decreased		49	31%
3	Stayed the same		60	38%
	Total		159	100%

7. If your visitor/customer numbers have increased, what do you attribute this to? Please select all that applies.

#	Answer	1	2	3	4	5	6	7	8	9	10	11	Total Responses
1	Investment in your business	30	10	1	1	1	1	0	1	0	0	0	45
2	Quality/accreditation attainment	2	23	6	2	3	1	2	4	2	0	0	45
3	Investment in staff	0	2	12	8	2	7	3	3	4	2	2	45
4	Business marketing	5	3	13	14	4	1	4	0	1	0	0	45
5	Cost of overseas holidays	0	0	1	3	12	10	5	6	7	1	0	45
6	Presence of wind turbines in Northumberland	1	1	0	0	3	7	2	2	2	19	8	45
7	Northumberland marketing campaigns	1	1	3	3	9	7	16	4	1	0	0	45
8	Knock-on effects of nearby popular attractions	1	2	2	3	2	7	7	14	4	3	0	45
9	Increased significance of social media	1	0	3	2	2	4	4	9	15	5	0	45
10	Northumberland TV/media exposure	1	2	3	9	7	0	2	2	9	9	1	45
11	Other (please specify)	3	1	1	0	0	0	0	0	0	6	34	45
	Total	45	45	45	45	45	45	45	45	45	45	45	-

Other (please specify)
• Repeat business building up
• Investment in business
• Positive reputation
• Customer loyalty and word of mouth
• 1 and 2
• Quality of the landscape
• The Weather

8. If your visitor/customer numbers have decreased, what do you attribute this to? Please select all that applies.

#	Answer	1	2	3	4	5	6	7	8	9	10	Total Responses
1	Bad weather	15	9	7	5	0	1	1	2	2	0	42
2	Recession	17	14	4	2	2	0	2	0	1	0	42
3	Competition from other UK destinations	2	4	15	11	1	8	1	0	0	0	42
4	Cheap holidays abroad	2	2	4	12	9	6	5	2	0	0	42
5	Broadband speeds	0	0	2	1	9	5	7	8	8	2	42
6	Lack of public transport	0	0	0	1	3	14	13	9	1	1	42
7	Presence of wind turbines in Northumberland	6	4	3	1	2	4	9	2	8	3	42
8	Cost of fuel	0	6	5	4	6	3	1	15	1	1	42
9	Lack of low season visitors	0	1	2	1	10	1	3	4	20	0	42
10	Other (please specify)	0	2	0	4	0	0	0	0	1	35	42
	Total	42	42	42	42	42	42	42	42	42	42	-

Other (please specify)
• We are slowing down
• Everything closes in winter
• Lack of National and International Advertising
• Bad weather forecasting
• Just recession
• Lack of County based marketing
• Competition from increase in number of self-catering
• vvv
• Local competition

9. Have your staffing levels in the last 3 years:

#	Answer		Response	%
1	Increased		18	11%
2	Decreased		15	9%
3	Stayed the same		126	79%
	Total		159	100%

10. If your staffing levels have increased, what do you attribute this to? Please select all that applies and rank in order of importance by dragging and dropping the options.

#	Answer	1	2	3	4	5	6	7	8	9	10	11	Total Responses
1	Investment in your business	10	3	0	0	0	0	0	0	0	0	0	13
2	Quality/accreditation attainment	0	5	2	2	1	0	1	0	2	0	0	13
3	Investment in staff	1	4	3	2	3	0	0	0	0	0	0	13
4	Business marketing	0	1	3	5	3	1	0	0	0	0	0	13
5	Cost of overseas holidays	2	0	0	1	4	2	0	2	0	2	0	13
6	Presence of wind turbines in Northumberland	0	0	1	0	0	3	0	0	1	4	4	13
7	Northumberland marketing campaigns	0	0	1	1	0	4	7	0	0	0	0	13
8	Knock-on effects of nearby popular attractions	0	0	2	2	0	0	4	4	1	0	0	13
9	Increased significance of social media	0	0	0	0	1	1	1	4	6	0	0	13
10	Northumberland TV/media exposure	0	0	1	0	1	2	0	2	3	4	0	13
11	Other (please specify)	0	0	0	0	0	0	0	1	0	3	9	13
	Total	13	13	13	13	13	13	13	13	13	13	13	-

Other (please specify)
Investment in business

11. If your staffing levels have decreased, what do you attribute this to? Please select all that applies and rank in order of importance by dragging and dropping the options.

#	Answer	1	2	3	4	5	6	7	8	9	10	11	12	Total Responses
1	Bad weather	4	5	0	0	2	0	0	0	1	0	0	0	12
2	Recession	7	3	2	0	0	0	0	0	0	0	0	0	12
3	Competition from other UK destinations	0	1	6	4	0	0	1	0	0	0	0	0	12
4	Cheap holidays abroad	0	0	1	4	4	2	0	1	0	0	0	0	12
5	Broadband speeds	0	0	0	0	3	3	2	2	1	0	1	0	12
6	Lack of public transport	0	0	1	2	0	4	3	1	1	0	0	0	12
7	Presence of wind turbines in Northumberland	1	3	0	1	0	0	3	0	1	1	2	0	12
8	Cost of fuel	0	0	1	0	2	1	1	7	0	0	0	0	12
9	Lack of low season visitors	0	0	1	1	0	1	1	0	6	1	0	1	12
10	Availability of suitable training opportunities	0	0	0	0	0	1	1	0	2	8	0	0	12
11	Difficulty in attracting skilled staff	0	0	0	0	1	0	0	1	0	2	8	0	12
12	Other (please specify)	0	0	0	0	0	0	0	0	0	0	1	11	12
	Total	12	12	12	12	12	12	12	12	12	12	12	12	-

Other (please specify)
• Cut in budget by NCC
• Moving from area

12. Do you consider that the presence of onshore wind turbines in Northumberland has benefitted your business?

#	Answer		Response	%
1	Yes		10	7%
2	No		143	93%
	Total		153	100%

13. Do you consider that the presence of onshore wind turbines in Northumberland has negatively impacted your business?

#	Answer		Response	%
1	Yes		59	37%
2	No		99	63%
	Total		158	100%

14. Please explain any negative impacts in your opinion

Text Response
• visual impact
• Visitors do not like wind turbines in such an area of outstanding beauty they are noisy and ugly to look at
• Visitors have commented that it is very sad to see such large turbines in the area and they all say how sad it is that the view from the Farne Islands has been spoilt
• Visitors do not want to come to Northumberland because of Wind Turbines blighting the previous beatiful landscape and the noise
• People say they don't like them and we are ruining the countryside. They can't believe it.
• Most people we meet hate wind turbines
• TOURISTS come to Northumberland for beautiful unspoilt countryside, not to see huge wind turbines in every direction.
• People are still coming but are less satisfied with the natural environment because of all the turbines
• Construction traffic and road closures restricted visitor access to the business premises, during construction. Part of the visitor experience was coming to unspoilt countryside, the turbines have changed visitors perception of the area.
• Last year 99% of my guests were against wind turbines defacing the Northumbrian landscape and 50% said they would be reluctant to return to Northumberland and the Borders as a holiday destination if the building of wind turbines continued. I find this very worrying as my business relies on returning guests, tourism in Northumberland will end if they continue to build wind turbines.
• People interested in booking my properties have indicated that if there was a development of turbines near property they would not have booked the property
• Northumberland is now notorious in the UK for its excess of wind turbines
• Potential visitors are put off because the inland areas they visit have been blighted by wind turbines
• Customer feedback
• At least 2 tourism businesses that were planning to start have cancelled projects due to the potential effect of nearby windfarms - Wingates & Greenrigg. The overburden of onshore windfarms is damaging the asset of the county as a tranquil and unspoilt area.
• People's perception of Northumberland is of a wild and beautiful place and the wind terbines have immediately destroyed this perception and are an ugly intrusion into the lone of the last wildernesses in England
• As our Bird of Prey Centre is a small local charity, our numbers are difficult to quantify and we do not employ staff. However, many of the visitors to us who are almost invariably tourists, comment very adversley on the proximity of online wind turbines, and their very large presence in Northumberland generally. One couple said that they would never come back to the County after 30+ years as annual visitors because they were so distressed by the plethora of turbines north of Alnwick. Many comments are along the lines of an amazement that we do not appreciate the amazing landscape that we have and seem prepared to intrude turbines into many of the most iconic views.
• This county's assets - namely tranquility/peace/landscapes is blighted by more than fair share of windfarms. Def a turn off for visitors
• Has spoilt the landscape
• It hasn't impacted yet - but there are proposals to site enormous turbines just near us and we are already getting feedback from visitors who are appalled by the proposal and consider it would ruin

the landscape around here, so would not be coming back.
• Customers have commented on amount of turbines in this county
• The recession has played a part in the decrease. However, repeat business is adversely affected by the sight of an almost unbroken line of wind turbines from Morpeth to the Scottish Border.
• People comment on the fact that they are there and impact on the area visually
• A lot of negative comment from customer feedback
• Regular guests have said they won't return because of the number of wind turbines has spoiled the landscape
• Visitors as a whole remark how the wind turbines are spoiling the Northumberland countryside - particularly close to us at Ellington
• Horse holidays - I surveyed visitors in advance of local windfarm development, they said they wouldn't come if turbines came. Turbines came. The horse element of our business has folded.
• Who wants to see wind farms when on holiday
• The question is too simplistic given the number of reasons people do and don't choose where to holiday. Last year people started to comment in a surprised and negative way on the wind farms at Middlemoor. It's clear that teh enthusiasm they would usually recommend the area to friends will be tempered and this will lead to fewer people coming.
• Visitors do not like wind turbines in such an area of outstanding beauty they are noisy and ugly to look at
• Cannot answer this question as in our area turbines are only recent and impact is yet to be ascertained. A new development on our door step at Barmoor is being built as I write and it's impact will be carefully observed by local businesses such as B&B and self-catering cottage owners.
• The number of bookings have decreased over this period
• vv
• Cannot give actual figures, but the visitors who came ALL complaint about the turbines along the A68!!
• Repeat business customers now going elsewhere, and new business customers have heard about the impact of OWTs on Northumberland

Statistic	Value
Total Responses	37

15. Is your business near an onshore wind turbine?

#	Answer		Response	%
1	Yes, within 1 mile		20	13%
2	Yes, within 5 miles		61	38%
3	Yes, within 10 miles		45	28%
4	No		33	21%
	Total		159	100%

No
• Will be soon!
• 20 miles
• Will be within a mile when the Barmoor development is built
• But will be in a year also 5 miles
• 15 miles
• From an unblemished Holy Island horizon - they appear like ugly, menacing distant Triffids...
• Not yet - but will be soon (within 5 miles)

16. If you have answered 'Yes' to question 8 and your business is near an onshore wind turbine, do you know when the onshore wind turbine was constructed?
Text Response
• last 24 months
• 2011
• Approximately 18 months ago
• 2013
• no
• 3Yrs ago
• 2 years ago
• 2013, near Bellingham turn off on the A68
• 2012
• 2013
• Not sure
• Within the past 2 years.
• 2012
• In the last five years
• 2013
• 2 years
• It was constructed in April 2014
• 2012-3
• 1yr
• ?
• no
• 2013
• 2011
• not exactly
• One a couple of years ago, the other a very long time ago
• 2012
• Approx 12 months
• 2013
• 2012/13
• year jan 2013
• 2 years ago
• One is curently waiting planning approval for 1.5 miles away
• 2013
• no
• our own 12 years ago the others nearby 18 months
• 2011/2012
• 2012
• approx 2 -3 years ago
• 2014
• 2012
• 2103
• no
• last 5 years
• Last year
• around when Alcan closed. Q10 & Q11 needs a not sure option as I am not sure as depends where they are or are build.
• 2013
• Not sure
• 4 YEARS AGO
• 2013
• Yes - within the last year & a half we've had turbines constructed at Bellingham and for the last couple

of years we have been fighting a proposal to site turbines much nearer here.
• Connected May 2014
• No
• Within last 6 months
• 2011
• Within the last two years
• 2011
• no
• 2013
• Within the last two years
• 18 mths agp
• 2011
• 2013
• Within the last 2 years
• 2012
• One year ago. And one in construction now.
• 2013
• 2013

Statistic	Value
Total Responses	67

17. Will the existence of onshore wind turbines in Northumberland affect your future business investment decisions?

#	Answer		Response	%
1	Not at all likely		36	28%
2	Unlikely		24	19%
3	Neither likely nor unlikely		27	21%
4	Likely		14	11%
5	Very likely		28	22%
	Total		129	100%

18. Will any future development of further onshore wind turbines in Northumberland affect your future business investment decisions?

#	Answer		Response	%
1	Not at all likely		33	26%
2	Unlikely		23	18%
3	Neither likely nor unlikely		24	19%
4	Likely		13	10%
5	Very likely		36	28%
	Total		129	100%

19. If you have answered 'likely' or 'very likely' to any of the above two questions, please explain how onshore wind turbines will affect your future investment decisions with regards to your business?
Text Response
• mm
• visual impact
• Already have the self-catering business up for sale
• Detracts from the inherent natural beauty and hence discourages tourism
• We will have to wait and see what the impact of the Barmoor turbines are
• I will not invest in something where visitors do not want to come because of the prescence of wind turbines
• Impact on views and therefore the selling point of our location.
• It they continue, we will consider selling and moving to another part of the U.K
• Will not invest
• Obviously, our business relies on tourism which is not compatible with the development of windfarms.
• Ruins the beauty of the area
• We are considering selling our business because of the proposed wind farm in Redesdale
• Without onshore wind turbines we will not have the electricity we all need, we would rather see more turbines and less climate change as the long term impacts of climate change will far exceed any visual impact from wind turbines, for instance imagine the effect of just 0.5 metre sea level rise on Holy Island and the coastal birdlife.
• If tourists dont like them and numbers decrease why invest? I would rather invest in a Gite business in France!
• Further turbines will totally change the landscape in which the attraction is located, and will be of detriment to the visitor experience, as some visitors have already stated
• As previously stated visitors have voiced their concerns, as a small business I could not afford to invest should visitor numbers diminish
• No point investing in our property if values will be affected.
• People booking holidays in rural areas are looking for peace and quiet. The biggest risk with wind turbines is noise pollution the noise levels provided by developers are frequently inaccurate and unreliable.
• If there was a wind turbine near my business, I think the business would suffer
• I am likely to relocate elsewhere, to follow former visitors. Northumberland has been blighted.
• My guests come here for its peace, tranquility, silence and fantastic vistas. Ugly, useless turbines spoiling that will not help to attract business
• Will direct investment to other parts of the country
• we are highly dependent on tourists appreciating the countryside
• Any business next to or visually within range will be decimated and quite likely to close
• We have built our business primarily by marketing the county to customers. Our clients include the Alnwick Garden, Bamburgh Castle, Doddington Dairy, Katherine Tickell, Shepherds Walks, etc. etc. etc. As well as a multitude of small tourism businesses such as B&Bs and self-catering cottages. We have also attracted national clients by communicating the unique aspect of the county - the wide open spaces, "Far horizon" etc. This has given us a unique place in a crowded marketplace that clients from London have bought into. We have bought and renovated a redundant farm building in the heart of the county as our base. By eroding the very asset of the region by the needless industrialisation of the countryside, we have discussed seriously the merit in remaining in our rural location. We have built our business over 16 years in a high-tech industry located in a very rural area with poor communication infrastructure, terrible roads, no public transport, needing to attract and recruit talent from a distance, winter travel problems, etc. and despite all of these negatives, it has made business sense because of the unique asset of our landscape. By industrialising this asset it makes little business sense to put up with ANY of the problems stated let alone all of them!
• The problem is it depends on where they are build and so whether they would impact on the area where we operate. The correct answer to Q10 and Q11 would be not sure. The problem is Northumberland is a very big county so a development near Wooler would probably not impact on Amble or Hexham for example. Personally I think your questions have simplified the problem and so

will not give a true picture.

- People come to Northumberland tp see the fabulous undeveloped countryside not look at vulgar man made monstrosities
- We have reached a stage where the turbines are affecting the landscape, more will make this a less desirable destination not worth investing in!
- Further development of turbines will make me consider moving my business elsewhere. There are already too many.
- We have no intention of expanding our bird of prey centre whilst we are surrounded by land subject to planning applications for onshore wind turbines, eg.: Parkhead/Raeburn. We all feel too unsettled to plan expansion for what is essentially a countryside attraction when it is possible that turbines at least 3 x the size of The Angel of the North are the subject of a Planning Application. These would overlook our current site and may well lead to us closing down completely.
- My business is audio CD drive guides to lesser known but beautiful places in the county. Windfarms will be impossible to avoid and are an anachronism to those coming to enjoy big skies and landscapes.
- There's absolutely no point in putting money into a holiday property indeed into our own home as we'll never get the value back when we sell if an array of turbines are built as proposed near our village.
- Turbines are unsightly like tall buildings in the countryside
- We don't plan to incest further in the business until we see if the latest application os approved. This will put us within a mile of another development, on top of the two already in place within 5 to 10 miles.
- Onshore wind farms are ruining the natural beauty of Northumberland, our guests will go elsewhere for a proper rural escape
- They are an eyesore as we live in the country at the moment we have fabulous views. if a wind farm was to set up. We would close our wedding business, sell up and 22 jobs would be lost. This would be because no one would want to get married with a view to those ugly things. You would kill our business off, devalue our property and ensure that jobs are lost in an area where there are few jobs to begin with. The knock on effect of our business on other local businesses such as B&B's would be devastating. There is little tourism in Otterburn. The B&B's are full because of my wedding guests staying. I oppose any further development of wind farms other than off shore on perhaps old disused platforms.
- Sale of holiday cottages likely to be hit by purchasers not wanting to see turbines in a beautiful holiday area
- Spoils landscape, no proven benefits
- There is a giant wind turbine in the planning process, just a mile from our 15 holiday cottages, and we will be forced to sell the business and lay off all of our staff if it is approved.
- We would consider buying property elsewhere to develop as tourism accommodation but not in any area where there is a windfarm.
- Signed survey from horse riding visitors stating they will not come if turbines nearby.
- We were going to develop a second self-catering holiday home, but cannot risk the investment now until the turbine development 1 mile from us complete and the impact it has on business is carefully monitored
- More difficult to promote the area as a tourist destination if the landscape is blighted by turbines
- If there will be more onshore wind turbines planned in this area, we don't know if we want to stay here anymore/move the business elsewhere.
- North Northumberland no longer offers the OWT free landscape required by many visitors

20. Are you or your business connected in any way to the onshore wind energy industry?				
#	Answer		Response	%
1	Yes		4	3%
2	No		125	97%
	Total		129	100%

21. If you have answered yes to the above question and are connected to the onshore wind energy industry please state how?
Text Response
• mo
• We have a small turbine at another business site.
• The wind turbine powers the hostel electricity
• Our holiday cottage is on our farm which may receive one turbine (subject to planning)

Statistic	Value
Total Responses	4

Concluding comments by University of Northumbria researchers

7.2 According to these responses the impact of wind turbines on business turnover over the last three years has been neutral. With 34% of businesses saying turnover had increased and 36% saying turnover had stayed the same this suggests that tourism in the county is at least stable overall. The increases and stability ratios in terms of visitor numbers and staffing levels are also consistent with a stable (at least) tourism sector in Northumberland and the figures suggest that the development of wind farms has been broadly neutral in these regards.

7.3 37% of respondents did, however, state that wind farms had negatively impacted upon their businesses. This is a significant figure and the qualitative comments indicate the depth of feeling that wind farms blight the landscape and reduce tourist numbers. These responses and their magnitude do not correlate with the responses on business turnover, visitor numbers and staffing levels that suggest wind farm effects are broadly neutral, nor do they concur with the findings of the desk-based meta-study.

7.4 63% of respondents said that wind farms had not impacted upon their businesses, This said, as stated in 7.3, the remaining 37% is a significant minority.

7.5 When considering investment decisions a similar pattern emerges by which 68% of respondents said that their investment decisions will not be affected by the existence of wind turbines in

Northumberland. When adding the prospect of future wind turbine development that figure drops a to 63%. Again, comments by those 33% who said their future investment decisions will be affected by future wind turbine development reveal the concern that exists within this significant minority of the Northumberland business community. Once more, concerns about negative impacts on landscape and scenery and the effects of this on tourists are uppermost in these comments.

7.6 It is clear that Northumberland tourism-related businesses are more negative about wind farm developments than the potential tourists to Northumberland surveyed online by Public Knowledge.

Summary results of the 'special interest' focus group

8.1The focus group was conducted on June 10th 2014 at Northumberland County Hall with twelve representatives from a variety of interest groups ranging from the North Pennines AONB, the Northumberland National Park, the National Trust to local community groups, businesses and others with an interest in Northumberland's landscape and heritage. The focus group constituted a discussion of issues raised by members of the group on the impacts of wind farms and wind turbines on tourism in Northumberland and lasted for a little over two hours.

Summary of issues and viewpoints (in no particular order)

8.2 A major concern was a lack of systematic evidence and knowledge about the actual and potential impacts of wind farms on tourism in Northumberland and comparable locations. There was also a certain scepticism relayed by some members regarding the findings of research that had been done in the UK to-date. This was because findings from studies that suggest the relationship between wind farm development and tourism is benign do not accord either with the expressed opinions of many tourists in Northumberland or through local survey work some members had conducted. Some members of the group also expressed concern about the methodological rigour of publicly available research on this issue in the UK and were keen to understand how this particular study had been approached in that context.

8.3 There was also scepticism among some members about the efficacy of wind energy in terms of its ability to deliver clean, efficient and sustainable power, believing that if tourists were disabused of the common belief that wind energy is sustainable their responses to surveys in the extant research would be more appropriately balanced. Others in the group were less exercised by this issue but wanted information on wind farms that is reliable so they could make informed decisions on how wind farm/turbine development would (not) or could (not) impact upon their business.

8.4 Some reference was made to learning from experiences in other countries although it was also recognised that drawing meaningful comparisons beyond the UK could prove difficult. Similarly, the view was expressed that Northumberland is unique, even in a UK context, and that it is particularly sensitive to wind farm development because of the quality of its landscape and the value of its

natural and cultural heritage. Therefore, research findings gleaned from elsewhere in the UK would not necessarily speak for Northumberland.

8.5 There was concern about the increasing size of wind farms and of wind turbines themselves with a general belief that the larger the development the greater the negative impacts. Much concern was voiced that the more visible the turbines are the greater the negative impact on the Northumberland landscape with concomitant negative impacts on tourism and the rural economy more generally. Concern was expressed beyond these factors however, with comments stressing that the landscape, the natural and cultural heritage are worthy of protection in and of themselves beyond any economic or touristic value they may have.

8.6 The cumulative impact of individual wind farms/turbines was a concern and it seemed to some members that development decisions in Northumberland might be too piecemeal and not strategic enough.

8.7 There was considerable concern expressed about existing wind turbine developments in the north of the county where there is a curtain of turbines. This, it was felt, is very visually intrusive, and there was further concern that there seems to be a march toward such development in the county.

8.8 In similar vein, what might be termed as the 'parallax of development' needs more attention because the view of wind farms from one locational perspective can be quite different to that of another. By way of example, the cumulative visual effect of wind farm/turbine developments might be less obvious or intrusive while viewing them from inland but looking at the same developments from the coast or the Farne Islands the visual impact is much worse and therefore more damaging to tourism there.

8.9 There was particular concern that highly valued landscapes were being impacted by wind farm/turbine developments in and around them. This is partly so because Northumberland has so much landscape of high quality that a significant portion of it is overlooked for special designation and wind turbine development is allowed to take place in and around places that should be development free.

8.10 There was a good degree of scepticism about grants and the commercialism of wind energy. Some members were particularly critical about short term business and economic gains overriding

the sustainability of Northumberland's environment and economy. On this the case was strongly made, and repeated a number of times during the session, that preservation and/or conservation of the environment equates to economic wellbeing.

8.11 Again it was mooted that Northumberland is special and its uniqueness needs to be taken into account when wind farm development decision are made. Indeed, Northumberland's landscape was seen as a national asset and that land owners had a duty to manage the land for future generations.

8.12 Some questioned whether the planning system truly appreciates the above and that senior planners do not realise or appreciate the full extent of the issues, and that more understanding of the connectivity between landscape quality, the use of landscape, the cultural and natural heritage, quality of life in the region and economic prosperity needs to be better planned for.

8.13 Again it was repeated that tourists in Northumberland do not like the idea of being surrounded by wind farms and that visitor numbers will suffer as more wind farm/turbine development takes place. Indeed, the statement was made that it is not about whether wind farms impact negatively on tourism in Northumberland, because they do, but about the degrees of adversity. This view was not unanimous in the group however.

8.14 Group members did recognise that climate change is a major issue and that wind turbines are not necessarily permanent structures. However, it was expressed that planners need to be cautious and take informed decisions because it seemed that Northumberland could not take more density and that the cumulative effect of wind farm/turbine is greater here than elsewhere.

8.15 The point was also made that given the capital and fixed costs of many tourism-related businesses that even small drops in visitor numbers would result in significant cost to these businesses and on that count special caution needed to be exercised about the development of wind farms/turbines in the county.

8.16 It was said by one member with some expertise in business that local level economic impacts quickly aggregate up to county level impacts and that losses will not be off-set by tourists substituting one locality for another or by one visitor market replacing another in areas affected by wind farms.

8.17 In general, but to varying degrees, opinion in the group ranged from uncertainty about the impacts of wind farms/turbines on tourism to downright certainty that wind farm/turbine development in Northumberland could only be bad for tourism. What was unanimous is that more robust information is needed on this issue that would be of use both at a local and county level.

Concluding comment by University of Northumbria researchers on the focus group

8.18 While this focus group cannot be considered as being representative in any statistical sense, it does represent the voice of concern regarding the impacts of wind farms/turbines on tourism in Northumberland. The value of the focus group is therefore the way it articulates and records that voice so it, and the range of opinions within it, can be heard alongside the findings in the other studies that make up this report.

Conclusion

9.1 The separate pieces of research that make up this report do not tie together to make a neat conclusion. Rather, they illustrate the lack of robust studies on the issue both in a Northumberland and a UK context. Tourists to UK destinations where wind turbines are present, as well prospective tourists to Northumberland, appear to be more positively disposed toward onshore wind farms than Northumberland tourism-related businesses. Moreover, they are certainly more positive toward onshore wind farms than the voices from Northumberland that speak with the greatest concern, and which insist they are also speaking on behalf of Northumberland tourists as well others in the county. However, none of the tourist voices in this report have come from Northumberland tourists because to-date they have not been systematically and independently surveyed on issues relating to wind farms and tourism there. Furthermore, the local opinions from Northumberland itself, as reported here, are at variance in a number of ways to the extant UK research that suggests over time members of the public are more accepting of wind farm development.

9.2 Given such complexities, and the dearth of reliable research available, as well as the limitations of this report and its component parts, the overarching conclusion is that more work needs to be done on the relationship between current and proposed onshore wind farm development and tourism in Northumberland - and elsewhere in the UK. The nature of that work needs to be thoroughly thought through and well proposed in order to overcome the weaknesses and gaps in knowledge identified here.

References

Aitchison, C. (2012). Tourism Impacts of Wind farms: Submitted to Renewables Inquiry Scottish Government. The University of Edinburgh.

Braunholtz, S. (2003) Public Attitudes to Wind farms: A Survey of Local Residents in Scotland. MORI Scotland, for Scottish Executive, Edinburgh

Campey, V. et al (2003) [Star Consultants] A Study into the Attitude of Visitors, Tourists and Tourism Organisations towards Wind farms on the Boundaries of the Lake District National Park, Leeds Metropolitan University, Oct 2003

Centre for Sustainability (2002) Martin's Hill Wind Farm Tourism Survey undertaken on behalf of Wind Prospect.

Eltham, D., Harrison, G., & Allen, S. (2008). Change in Public Attitudes toward a Cornish Wind Farm : Implications for Planning. Energy Policy, 36, 23-33.

Glasgow Caledonian University. (2008). The Economic Impact of Wind farms on Scottish Tourism: Summary report for the Scottish Government. Glasgow.

Higgins, PT. and Green, S. Cochrane Handbook for Systematic Reviews of Interventions". Handbook.cochrane.org. retrieved February 2014.

MORI Scotland (2002) 'Tourist Attitudes Towards Wind Farms', Research Study Conducted for Scottish Renewables Forum and British Wind Energy Association

NFO System Three (2002), 'Investigation into the Potential Impact of Wind Farms on Tourism in Scotland' Final Report, prepared for Visit Scotland, 2002

NFO (2003) 'Investigation into the potential Impact of Wind Farms on Tourism in Wales' for Wales Tourist Board, 2003

Northumberland County Council invitation to tender document (2013) 'Desk Research and Business Research'. Accessed via the Institute of Local Governance (ILG)

Northumberland Economic Strategy (2010-2015) accessed via http://www.northumberland.gov.ukTMS (The Market Specialists) (2005) *Western Isles Tourist Board Wind Farm Research; Final Report*WITB March 2005

Public Knowledge (2014) 'Effect of wind farms on tourism in Northumberland' for Northumberland County Council

Riddington G, McArthur D, Harrison T and Gibson H (2010) 'Assessing the Economic Impact of Wind Farms on Tourism in Scotland: GIS, Surveys and Policy Outcomes' International Journal of Tourism Research 12 pp. 237-252.

Regeneris Consulting and the Tourism Co (2014) 'Study into the potential Economic Impact Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector'. Commissioned by the Welsh Government.

The Tourism Company (2012) 'The impact of wind turbines on tourism – a literature review' Prepared for Isle of Anglesey County Council

University of West of England (UWE) (2004) 'The Potential Impact of Fullabrook Wind Farm Proposal, North Devon: Evidence Gathering of the Impact of Wind farms on Visitor Numbers and Tourist Experience'. Commissioned by North Devon Wind Power.

Warren C and McFadyen M (2010) 'Does community ownership affect public attitudes to wind energy? A case study of south-west Scotland' Land Use Policy 27 pp. 204-213

Appendix A: Findings of the survey of potential visitors

Public Knowledge
connecting you with your community

NORTHUMBERLAND
COUNTY COUNCIL

Effect of Wind Farms on Tourism in Northumberland

May 2014

Report prepared by:

Dr Judith Welford, Head of Public Knowledge

Public Knowledge

Part of Dipsticks Research Limited
The Mill
Hexham Business Park
Burn Lane
Hexham
Northumberland
NE46 3RU

Contents

1. Executive Summary

- The most popular type of holiday amongst participants, all of which would consider visiting Northumberland in the next 2 years, were seaside and coastal holidays (29%) followed by countryside holidays (27%).
- Respondent's main considerations when booking a holiday are scenery (31%), price (25%), activities (20%), weather (20%), distance (18%), and accommodation (17%).
- The main reasons for considering a visit to Northumberland is the scenery (24%) followed by the coastline (16%).
- It is the countryside, coastline beaches, historic sites and peace and quiet that drew people to Northumberland in the past.
- 11% of respondents would be discouraged from visiting Northumberland due to wind farms and of those two thirds are male.
- 19% of respondents select that their decision to visit Northumberland is likely to be affected by wind farms.
- Opinion towards renewable energy is positive with just 9% selecting that they feel negatively towards it.
- Males and the eldest age group of 65 years plus are significantly more likely to feel negatively towards renewable energy sources.
- Wind farms are regarded as the second best form of renewable energy, second to hydroelectricity. Males and the two eldest age groups 55 years plus prefer hydroelectricity.
- 42% of the sample support on shore wind farm development, a further 22% claim to have no real opinion leaving 21% to be opposed and 5% not knowing what to think.
- 87% of respondents would feel comfortable seeing some form of wind farm in Northumberland.
- Most choose for them to be off shore so that they do not spoil the scenery, coastline or wildlife.
- There is dispute with regards to wind farms but it is agreed by more than half that if correctly sited they do not intrude or ruin the landscape and that the farms are a necessary means of generating renewable energy.
- There are more respondents who agree that wind farms add character to an area (31%) and can enhance the natural landscape (29%) than there are agreeing that wind farms would discourage them from visiting an area (26%).
- 4% of respondents have been discouraged to visit Northumberland in the past due to wind farms, the same percentage have however visited the area because of the wind farms.

- 30% of respondents will definitely or may be encouraged to book a holiday/visit to somewhere other than Northumberland in the future because of the presence of wind farms.
- 41% of respondents think Northumberland has a sufficient number of wind farms, 43% believe that the area could support more leaving 16% who think Northumberland already has too many.

2. Background and Methodology

Northumberland County Council commissioned a study to evaluate the effect of existing and planned onshore wind turbines on the tourism industry within the county with specific regard to visitor perception in the medium and long term.

To ensure that robust policies can be developed to guide future decisions on wind farm planning applications, the study identified potential visitor views on whether the existence of wind farms has an impact on their decision to come to a rural tourist area (and to Northumberland in particular). Areas the research covered are:

- Whether the respondent is familiar with large-scale wind turbine development.
- The importance of natural scenery and landscape to potential visitors.
- The factors affecting a potential visitor's decision to visit or stay in the county.
- Where else in the UK potential visitors have stayed/plan to visit.
- Whether the presence of wind farms would affect a potential visitor's decision to visit or stay in the county.
- Whether wind farms would be viewed as an added attraction for visiting the county.
- Whether the presence of wind farms in a destination has had an effect on their holiday decision-making process to date and why.

(Source: Northumberland County Council's brief)

To evaluate the effect of existing and planned onshore wind turbines on the tourism industry within Northumberland, quantitative data was collected via an online methodology. A questionnaire approximately 10 minutes in length (see Section 7 for reference) was designed in collaboration between Public Knowledge and Northumberland County Council.

Online data was collected via our in-house online panel, panelbase.net, which has over 200,000 registered members and this resulted in 410 interviews. A sample of 410 is considered to be robust with a margin of error of +/-4.84% at the 95% confidence level. The survey ran from the 27th March to 7th April 2014.

3. Data Processing and Analysis

Throughout the report the research findings have been illustrated using easy to read colour charts, which provide an immediately accessible graphical overview of the answers given by respondents. The charts are clearly labelled and the corresponding question from the questionnaire included at the bottom of each chart for ease of reference, in addition to the 'base' or sample size for each question.

Within this report any mention of 'significance' refers to statistical significance. Statistical significance is used to refer to a result that is unlikely to have occurred by chance and in this case is tested using Pearson's chi-square. Significance can be calculated to different percentages, with higher percentages representing more noteworthy responses.

Survey data was assessed for statistical significance according to the following variables:

- Gender
- Age
- Regional location of respondent
- Previous holidays/trips to Northumberland in the last 3 years

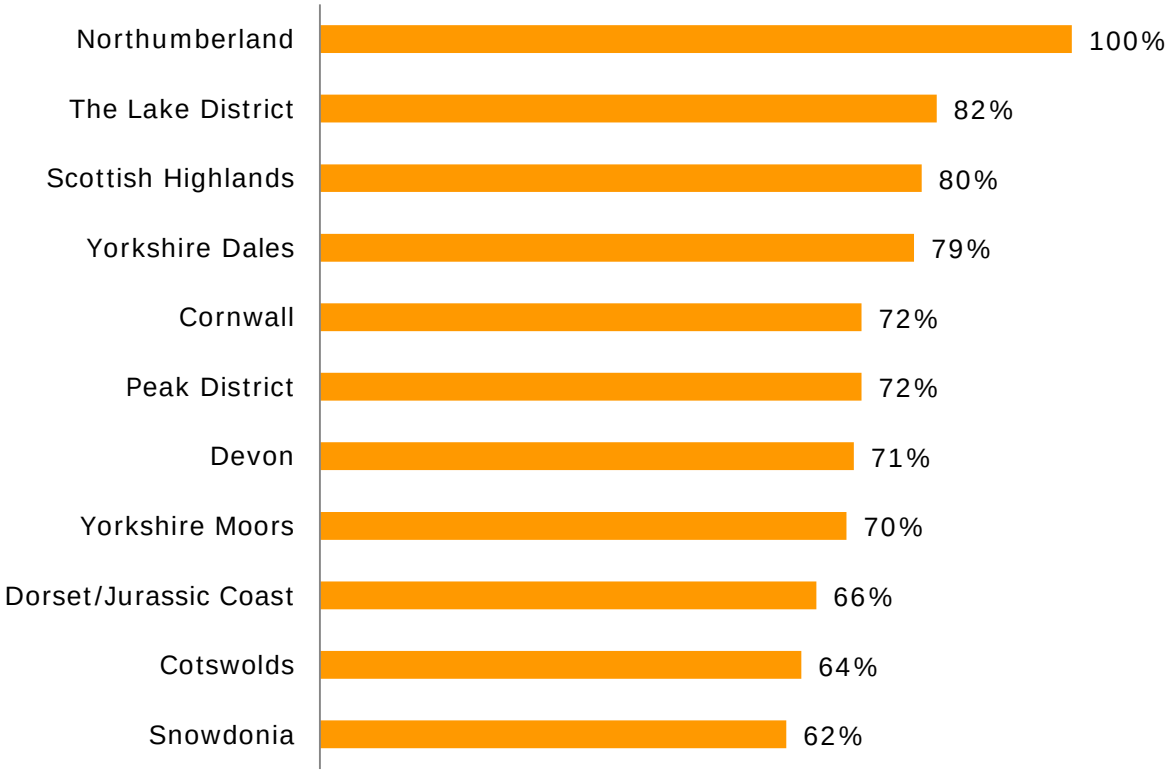
Please note, where 0% is charted this represents a number of respondents less than 1% of the sample.

This report is accompanied by data tables and raw data files where further information can be found, if required.

4. Sample Profile

In order to qualify to take part in the survey all participants were required to select Northumberland as a place they would consider visiting in the next 2 years.

Figure 1: Destinations considered

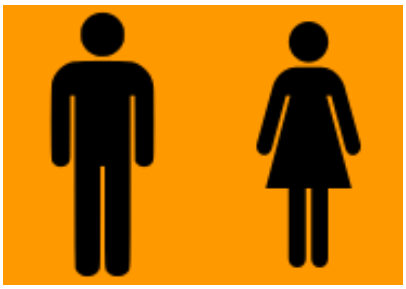


S1. Which of the following areas would you consider going on holiday to/visiting in the next 2 years?
Base: 410

Other places participants would consider visiting in the next two years in addition to Northumberland include the Lake District (82%), the Scottish Highlands (80%), and the Yorkshire Dales (79%).

Quotas were imposed on the sample to ensure that 20% were from the North East (excluding Northumberland) with the remaining 80% from a spread of regions across the UK. Quotas were also imposed on the sample to ensure a spread of responses is achieved according to age and gender. The final sample profile according to age and gender is shown in Figure 2 and Table 1.

Figure 2: Sample Gender



As Figure 2 shows, the sample was split equally between genders. Age was also fairly evenly spread across the sample, although fewer 16-24 year olds were represented.

Table 1: Sample by Age

Age	N	%
16-24	24	6%
25-34	67	16%
35-44	78	19%
45-54	84	20%
55-64	86	21%
65+	71	17%

Table 2: Regional Breakdown

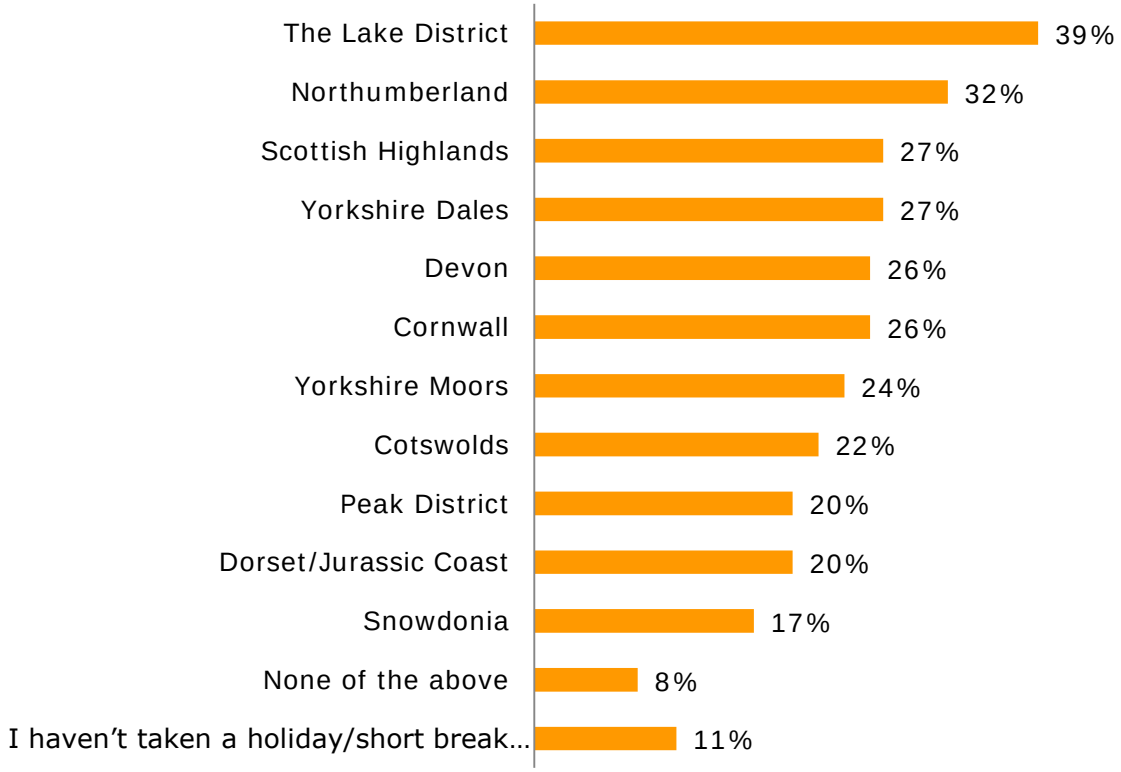
Region	N	%
North East	79	19%
South East	51	12%
London	40	10%
North West	38	9%
West Midlands	33	8%
Yorkshire	32	8%
East Anglia	32	8%
South West	32	8%
Scotland	28	7%
East Midlands	24	6%
Wales	17	4%
Northern Ireland	4	1%

There was a maximum quota set against respondents being from the North East of 20% and nobody lived within Northumberland. The breakdown of North East respondents' home areas is shown in Table 3.

Table 3: North East Breakdown

Region	N	%
County Durham	21	27%
Newcastle upon Tyne	14	18%
Sunderland	13	16%
North Tyneside	7	9%
Gateshead	6	8%
South Tyneside	3	4%
Middlesbrough	3	4%
Stockton	3	4%
Redcar and Cleveland	2	3%
Hartlepool	2	3%
Other	5	6%

Figure 3: Destinations visited



S2. Which of the following areas of the UK have you visited/been on holiday to in the last 3 years?
Base: 410

There are regional variances on where people are visiting depending on their home location. Respondents in the North East are significantly more likely to have visited The Lake District (58%), Northumberland (66%), Yorkshire Dales (41%) and the Yorkshire Moors (38%) whereas those living outside of the North East are significantly more likely to have visited

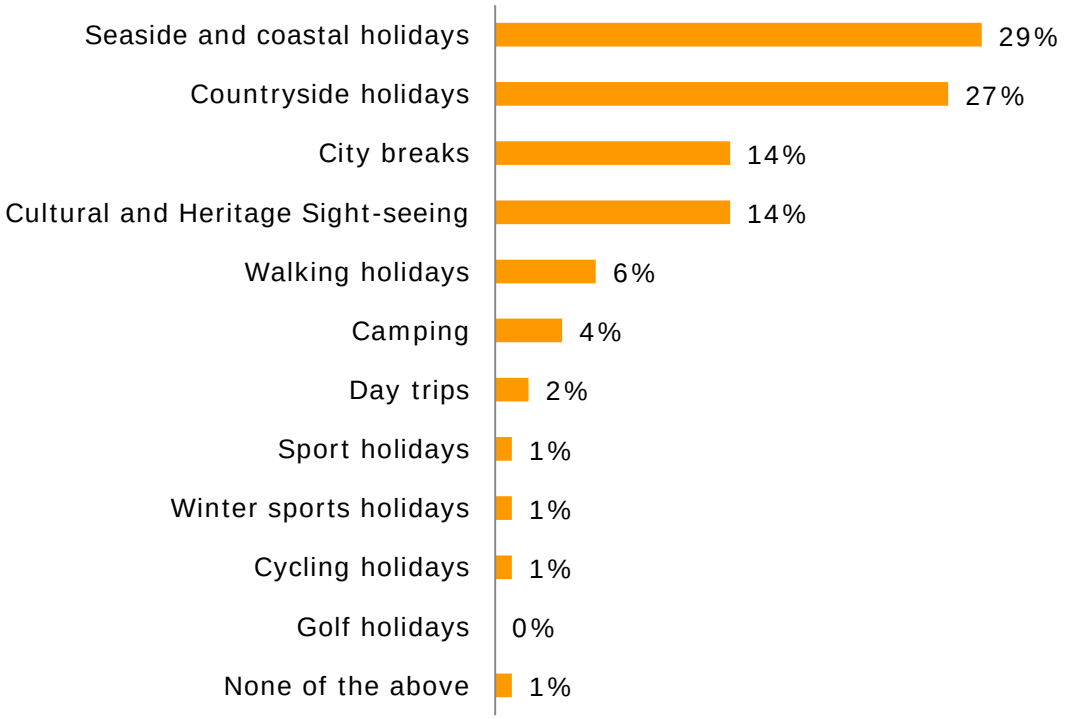
Devon (29%), Cornwall (29%), Dorset/Jurassic Coast (23%) and Snowdonia (20%) in the last three years.

5. Key Findings

5.1. Typical Holiday Profile and Booking Considerations

Before introducing questions on renewable energy and wind farms in Northumberland specifically, participants were initially asked a range of questions about their holiday preferences beginning with their preferred type of holiday as shown in Figure 4.

Figure 4: Preferred Holiday Type



Q1. Which of the following best describes your preferred type of UK holiday?
Base: 410

The most popular type of holiday amongst participants, all of whom would consider visiting Northumberland in the next 2 years, were seaside and coastal holidays (29%) followed by countryside holidays (27%). Smaller proportions preferred city breaks (14%) and cultural and heritage sightseeing (14%). The only gender variance is for 'seaside and coastal holidays' where women are significantly more likely to select this holiday type; 34% for females and 23% for males. Within the age groups, 25 to 34 year olds are significantly more likely to select 'city breaks' at 25%, 45 to 54 years olds select 'cultural and heritage sight-seeing' at a significantly higher rate of 24% and the eldest group of 65 years plus are significantly more likely to select 'countryside holidays' at 38%. The sub-sample from the North East were significantly more likely to choose 'city break' than the respondents from other regions of the UK, as their preferred type of UK holiday; a level of 24%, probably influenced by a slightly younger profile of respondents in the North East.

Of those who selected 'seaside and coastal holidays' they would predominantly visit Cornwall (30%), Devon (19%), Dorset (9%), Pembrokeshire (6%), Wales (6%) and Northumberland (5%). There are regional variances in the places respondents would visit for a 'seaside and costal holiday'; respondents from the North East were significantly less likely to visit Cornwall (5%) whereas as those from London were significantly more likely at 53%.

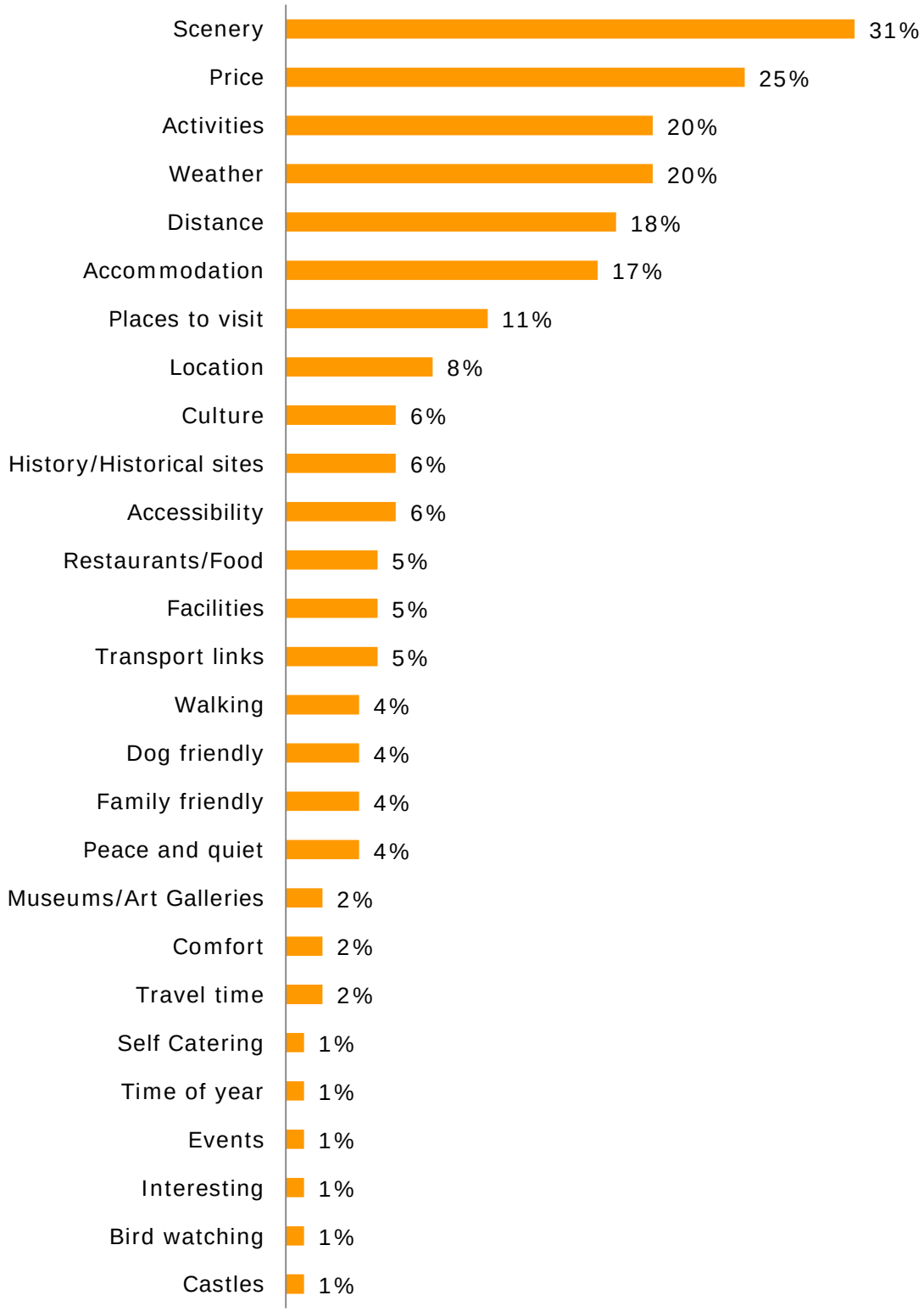
Those who selected 'countryside holidays' would predominantly visit the Lake District (22%), Scotland (19%), Yorkshire (11%), Cornwall (7%), Northumberland (7%) and Wales (7%). There are no variances dependent on the home location of respondents.

Northumberland was also specifically named by a small number of respondents as a place they would visit for walking holidays and cultural and heritage sight-seeing.

Participants were next asked what their main considerations were when booking a holiday in the UK using an open format question. Coded responses are shown in Figure 5 on the following page.

Respondents' main considerations when booking a holiday are scenery (31%), price (25%), activities (20%), weather (20%), distance (18%), and accommodation (17%). Respondents from the North East are looking for activities (30%) more than others and less likely to consider the scenery (22%). Although East Anglian respondents are a small sub-group of 32, significantly more respondents at 32% consider distance as important compared to those from other regions. Distance is less of a consideration for Londoners at 8%. Females are significantly more likely to consider accommodation: 21% females, 12% males.

Figure 5: Main booking considerations

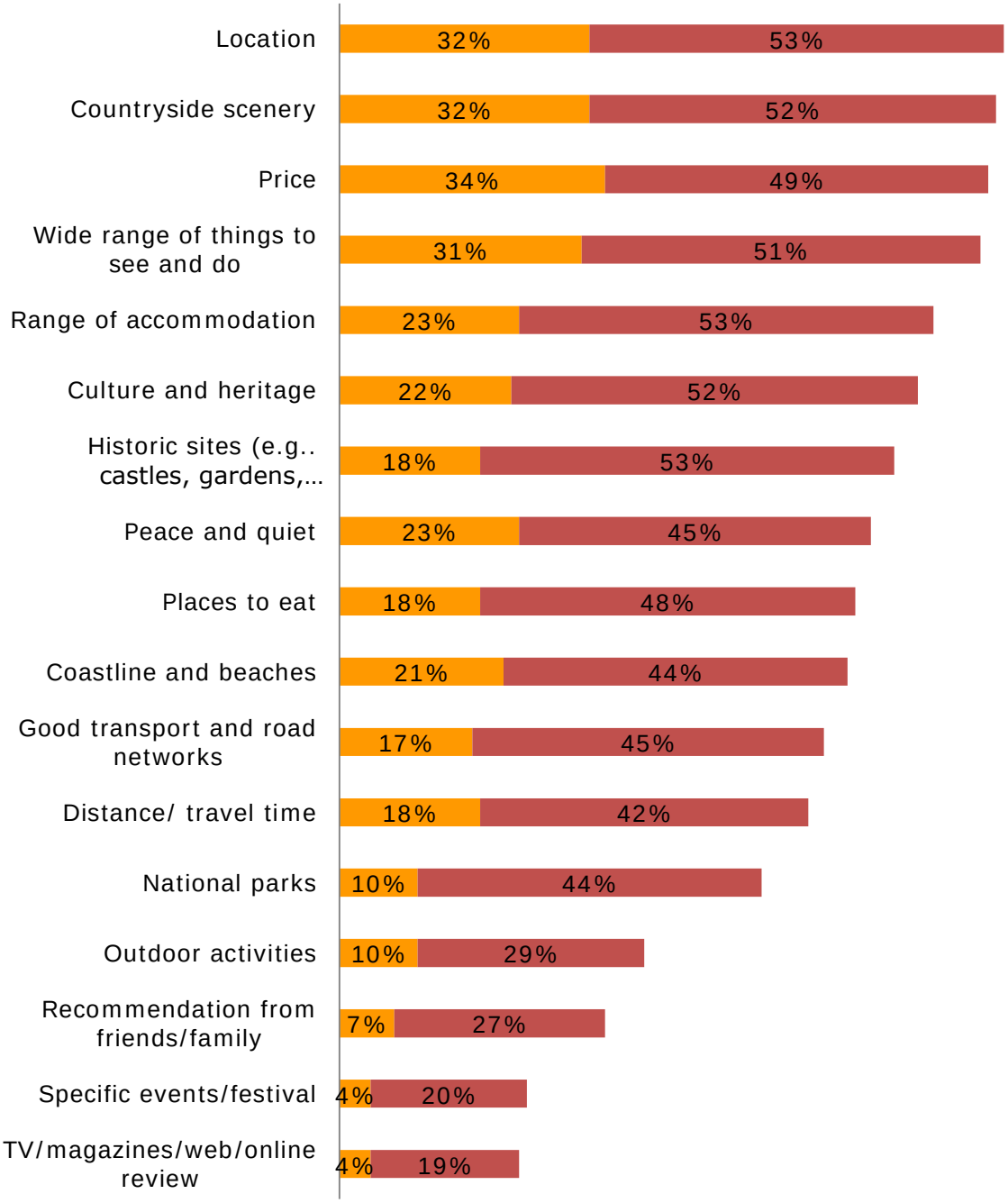


Q3. What are your main considerations when booking a holiday in the UK?

Base: 410

When presented with a list of factors to rate with importance on a scale of 1 to 5 (only 'important' and 'very important' responses are shown), location, countryside scenery and price are the most important factor when planning trips/holidays. People are also looking for a wide range of things to see and do.

Figure 6: Main booking considerations



Q4. Please rank how important each of the following factors are in your decision when planning trips/holidays?

Base: 410

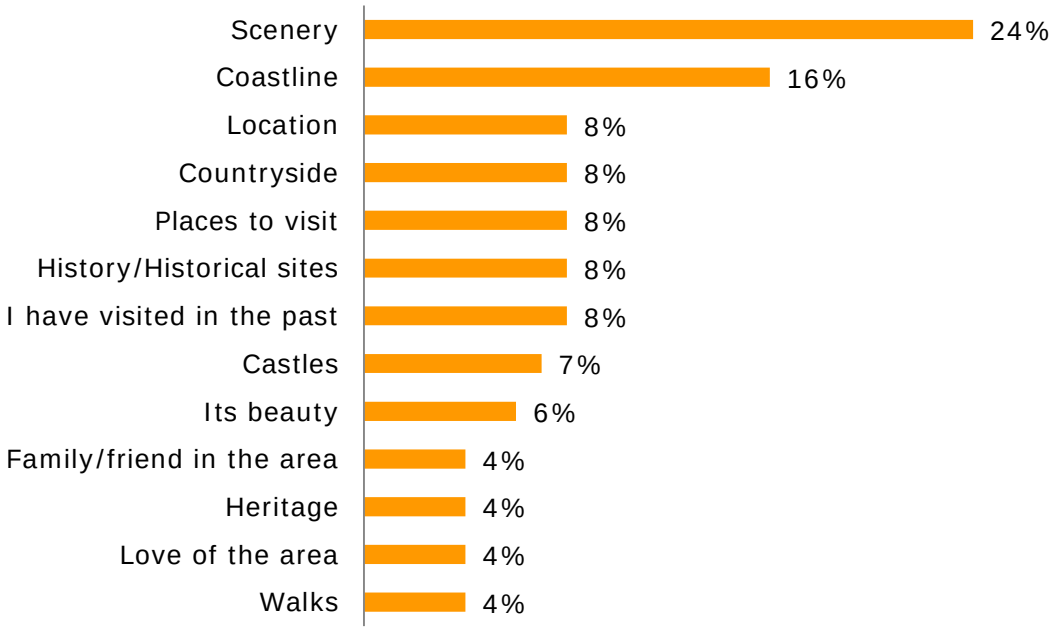
Again females are significantly more likely to assign accommodation to very important at 28% (males 18%). Females are also significantly more likely to assign location to very important at 37% (males 27%), good transport and road networks as important at 51% (males 44%) and distance/time travelled as important at 48% (males 36%). Females also regard TV/magazines/web/online reviews more importantly than males with 24% assigning them as important in contrast to 14% of males. When asked to rate coastline and beaches the men are significantly more likely to select that they are neither important nor unimportant at 34% (females 24%).

There are only a few variances when looking at age, understandably the eldest age group are less interested in activities and more important for them is peace and quiet. It is the age group of 25 to 34 year olds who rate price more importantly than other age groups (49% very important).

5.2. Consideration of Northumberland

The survey then focused specifically on Northumberland asking all respondents what reasons would make them consider visiting Northumberland in the future. As displayed in Figure 7 below, the main reason is the scenery (24%) followed by the coastline (16%). The oldest age group of 65 years plus are significantly more likely to mention the coastline (25%).

Figure 7: Reasons for considering Northumberland - Unprompted

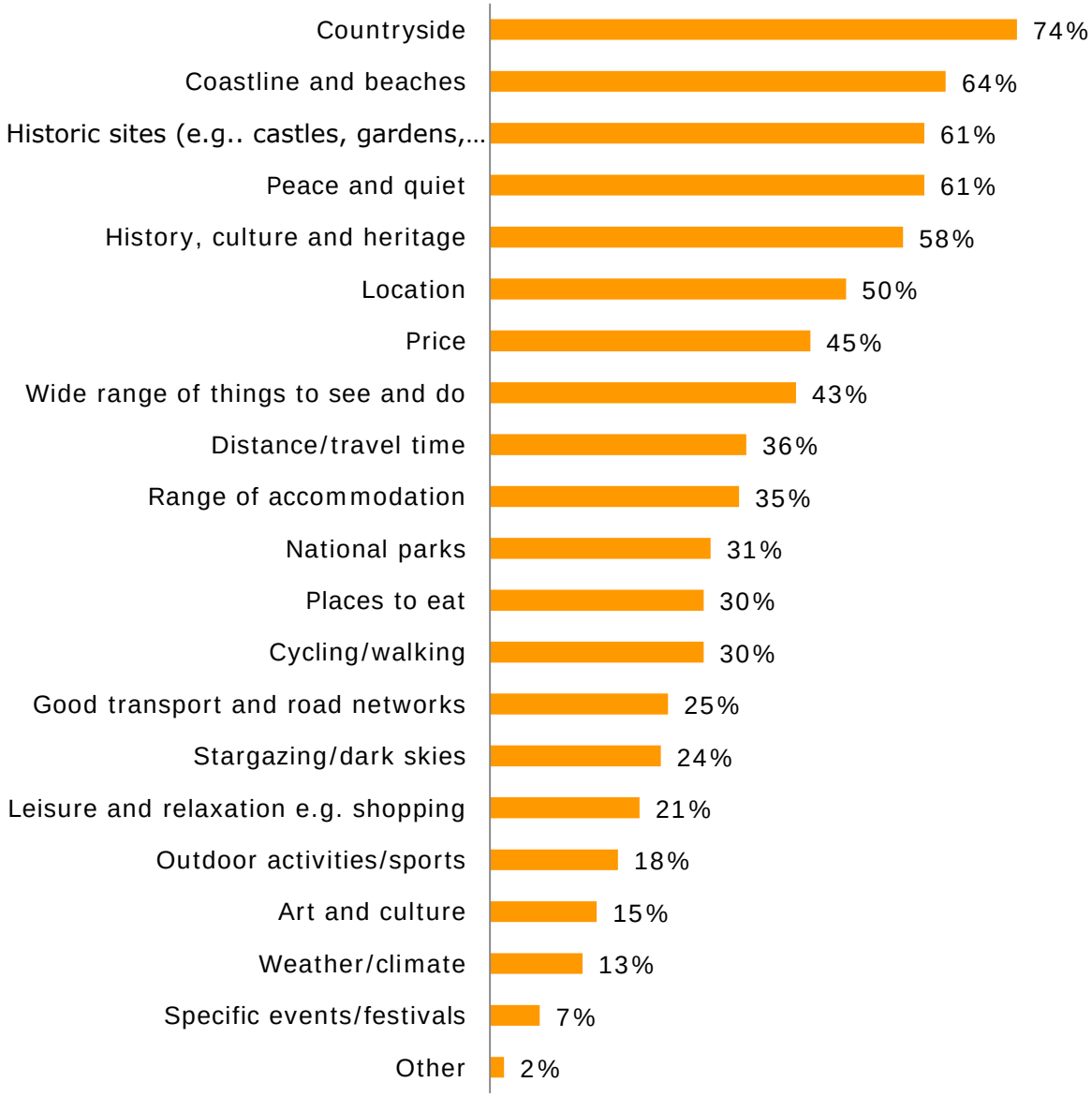


Q6a. What reasons would make you consider visiting Northumberland in the future?

Upon prompting it is the countryside that is selected as being the most popular reason for visiting Northumberland in the future. Understandably it is respondents from the North East (68%) Scotland (57%) and Yorkshire (59%) who select distance/travel time.

The eldest group of respondents select coastline and beaches (86%), peace and quiet (77%) and history, culture and heritage (69%) significantly more than other age groups. The only statistical significant variance between the genders is peace and quiet where it is the males who are significantly more likely to select this as a reason to consider, males 66%, females 56%. The prompted responses are shown in Figure 8 on the following page.

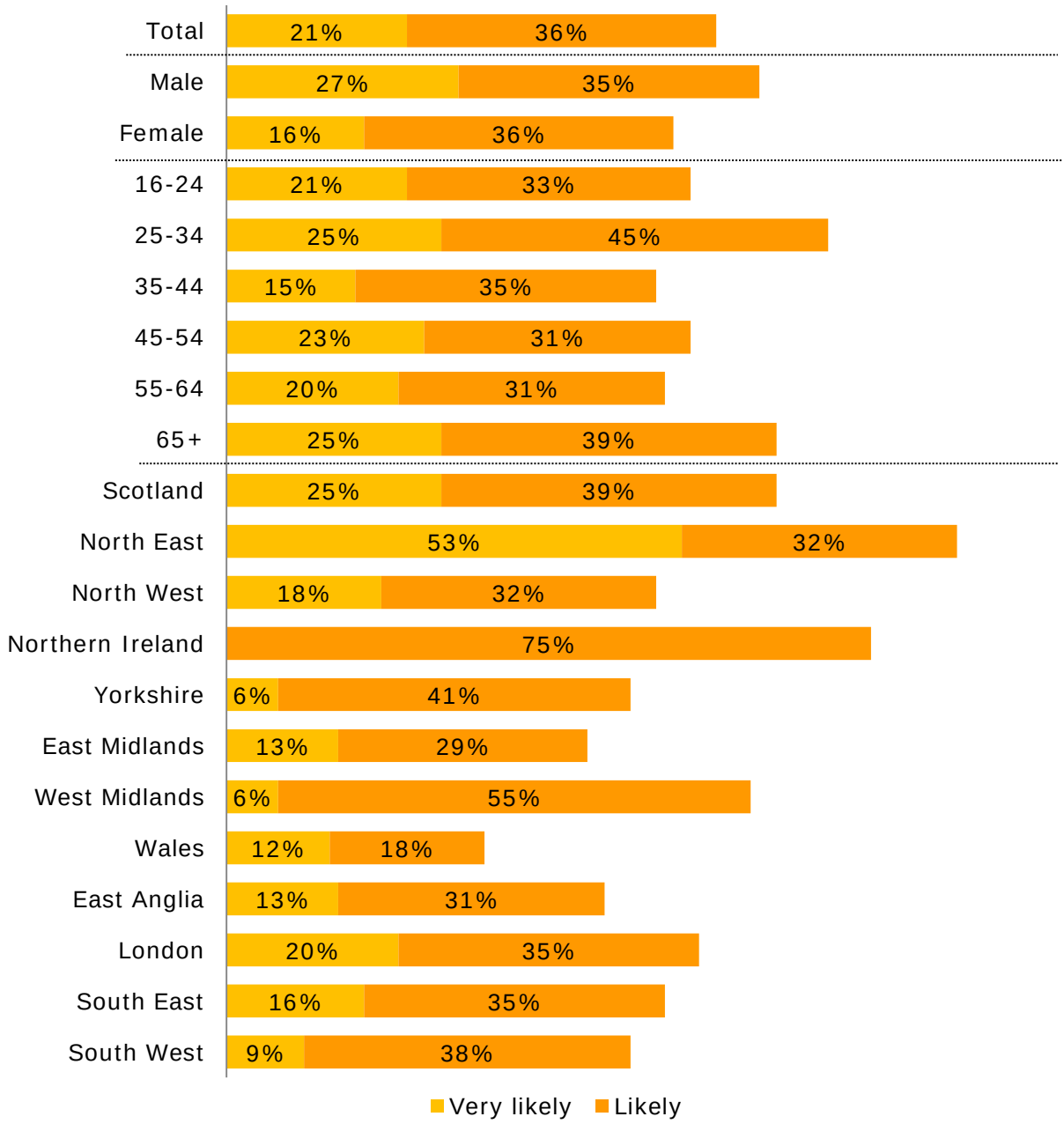
Figure 8: Reasons for considering Northumberland - Prompted



Q6b. Which of the following best describes why you would consider Northumberland for a visit in the future?

Whilst 100% of the sample said they would consider visiting Northumberland within the next two years, more than half (57%) thought it was actually 'very likely' or 'likely' that they would visit during that period. The breakdown of who is 'very likely' or 'likely' to visit in the next two years is shown in Figure 9.

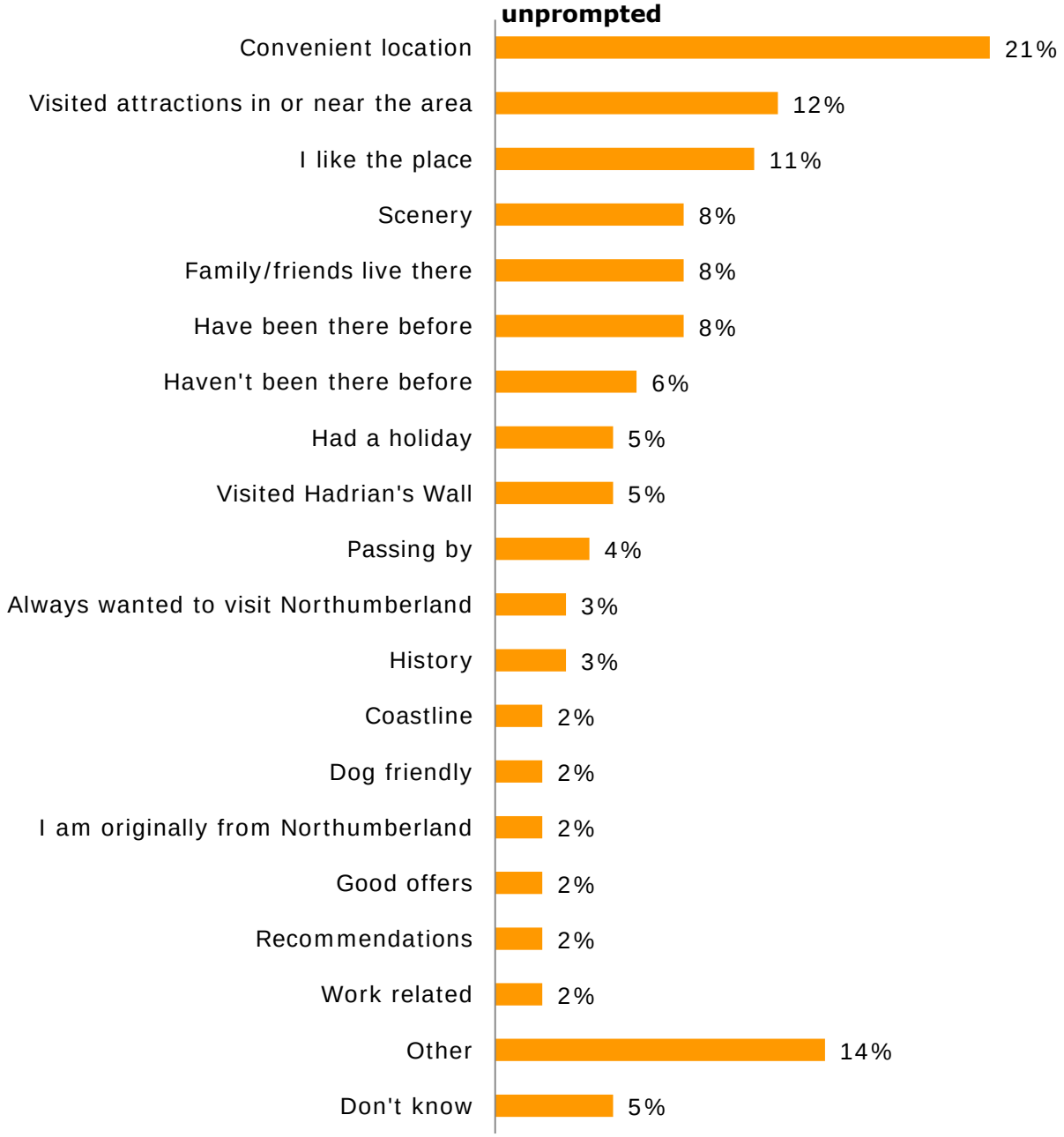
Figure 9: Visit likelihood



Q7. How likely are you to visit Northumberland within the next 2 years?
Base: 410; for individual bases see p9

The respondents that have visited Northumberland in the last 3 years (n=131) have done so as it is a convenient location. The coded responses for why respondents visited are shown in Figure 10.

Figure 10: Reasons for visiting Northumberland in the past - unprompted

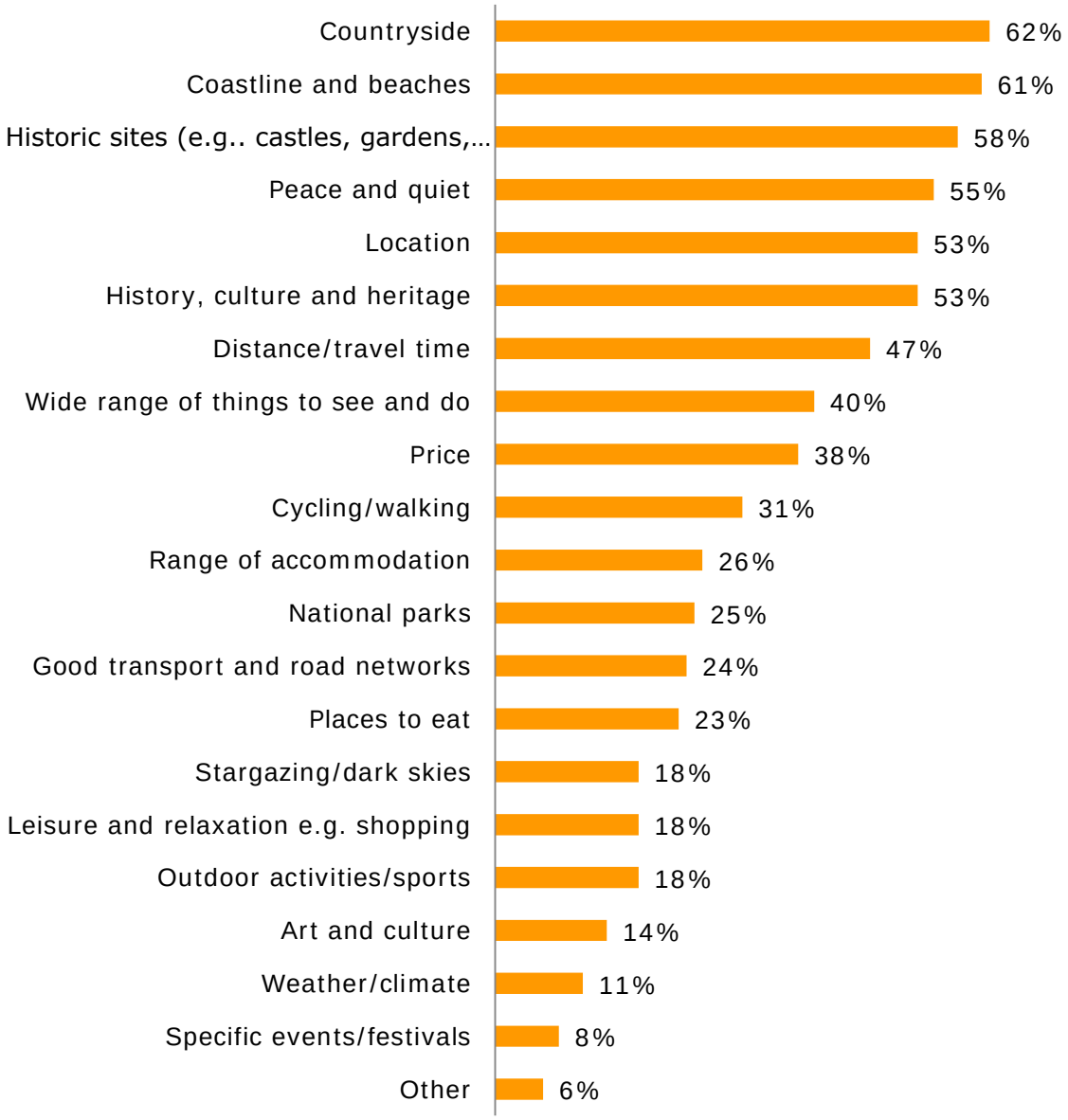


Q8a. Why did you decide to visit Northumberland in the past 3 years?

Base: All who said they had visited Northumberland in the past 3 years - 131

Upon prompting it is the countryside, coastline beaches, historic sites and peace and quiet that drew people to Northumberland, see Figure 11 below.

Figure 11: Reasons for visiting Northumberland in the past - prompted



Q8b. Which of the following best describes your reasons for visiting Northumberland in the past?

Base: All who said they had visited Northumberland in the past 3 years - 131

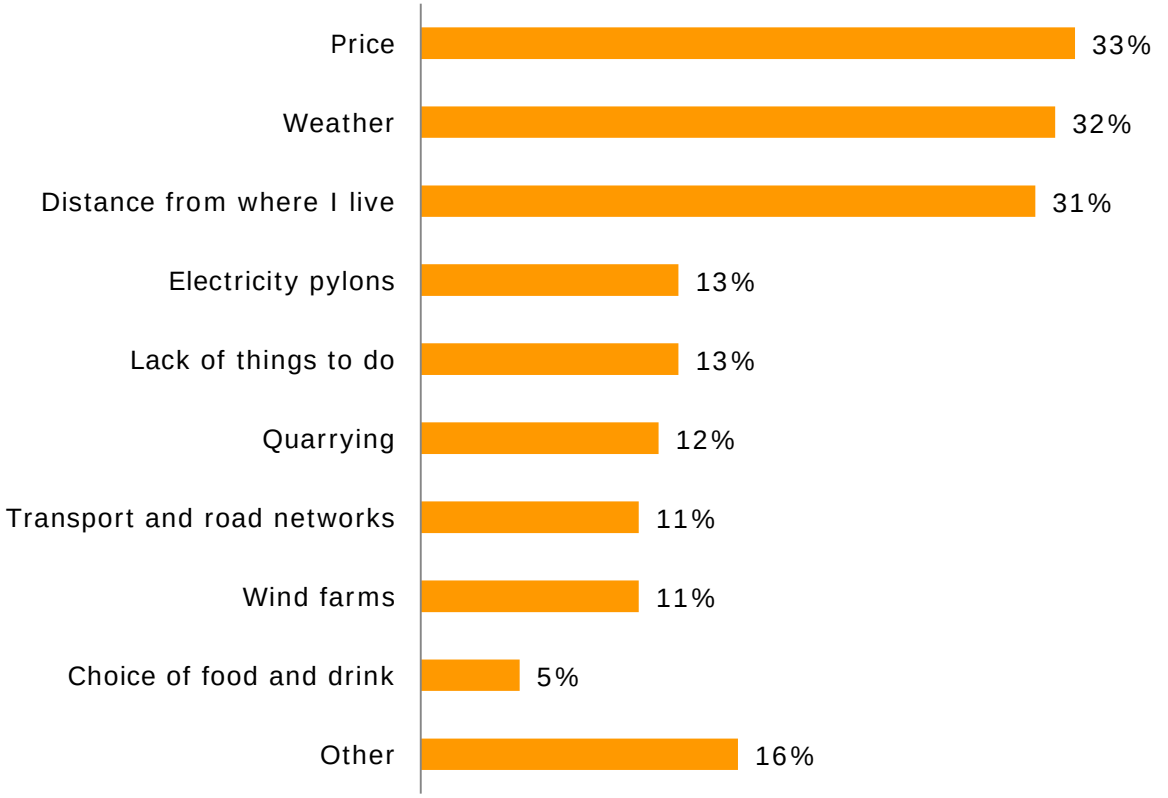
In-line with the importance factors, females have visited because of the coastline and beaches (79%) and the good transport and road networks (37%).

All respondents were then asked about barriers to visiting Northumberland; it is the weather that is the most selected barrier with one third of respondents being deterred by weather. Interestingly North East residents are significantly more likely to select weather suggesting

that they are possibly reluctant to stay local and are in search of better weather rather than those who are outside of the North East choosing not to visit because of the weather (North East 42%, others 30%). This may also be influenced by the slightly younger sample in the North East since we are seeing that younger respondents are generally more inclined to be put off by the weather.

When prompted with a list of barriers, electricity pylons and quarrying are more of a deterrent than wind farms. Of the 11% who select wind farms, two thirds of them are males in comparison to only a third being females. There is no significant variance across the age groups of those selecting wind farms. Figure 12 shows the barriers to visiting Northumberland.

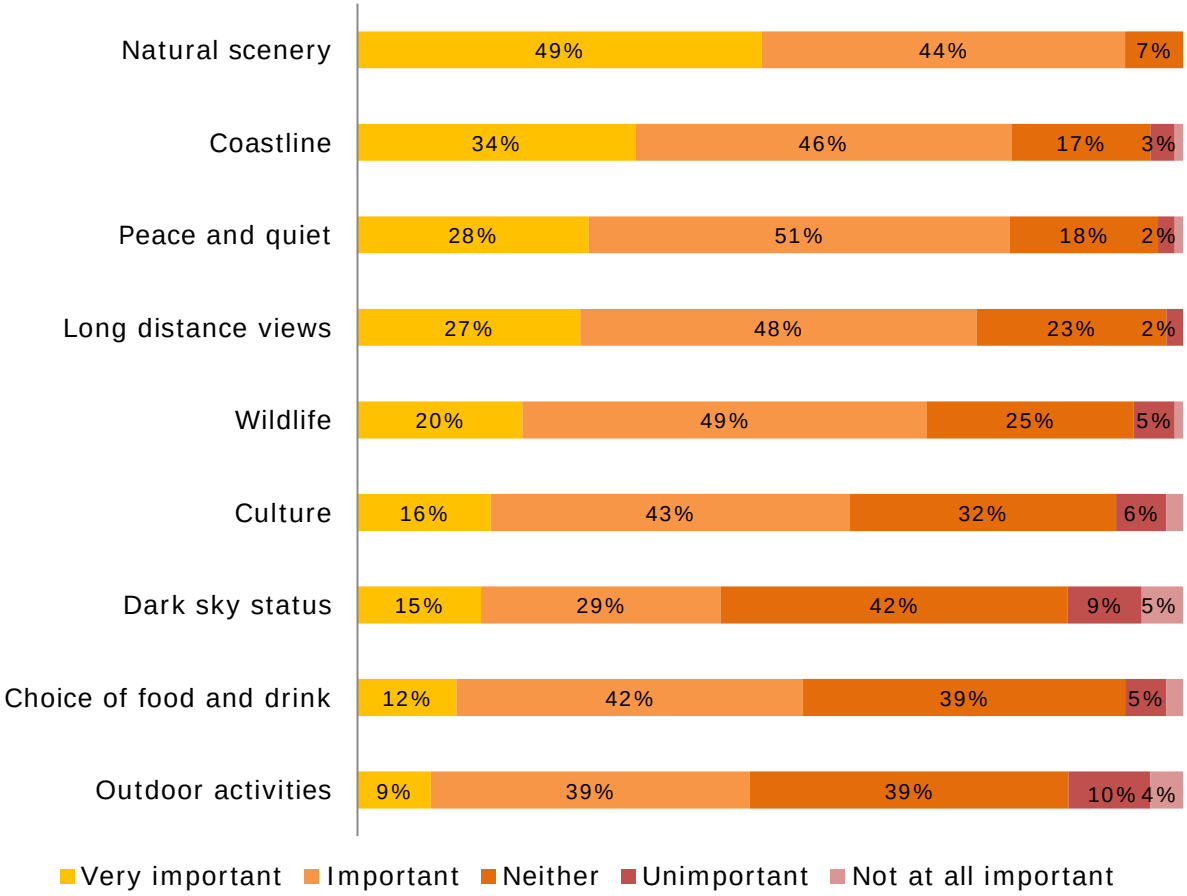
Figure 12: Barriers to visiting Northumberland- prompted



Q9b. Which of the following would deter you from considering a visit to Northumberland in the future?
Base: 410

When assessing the character of Northumberland it is the natural scenery that is considered the most important with just under half (49%) claiming it to be very important to the character of Northumberland, please see Figure 13 below.

Figure 13: Character of Northumberland



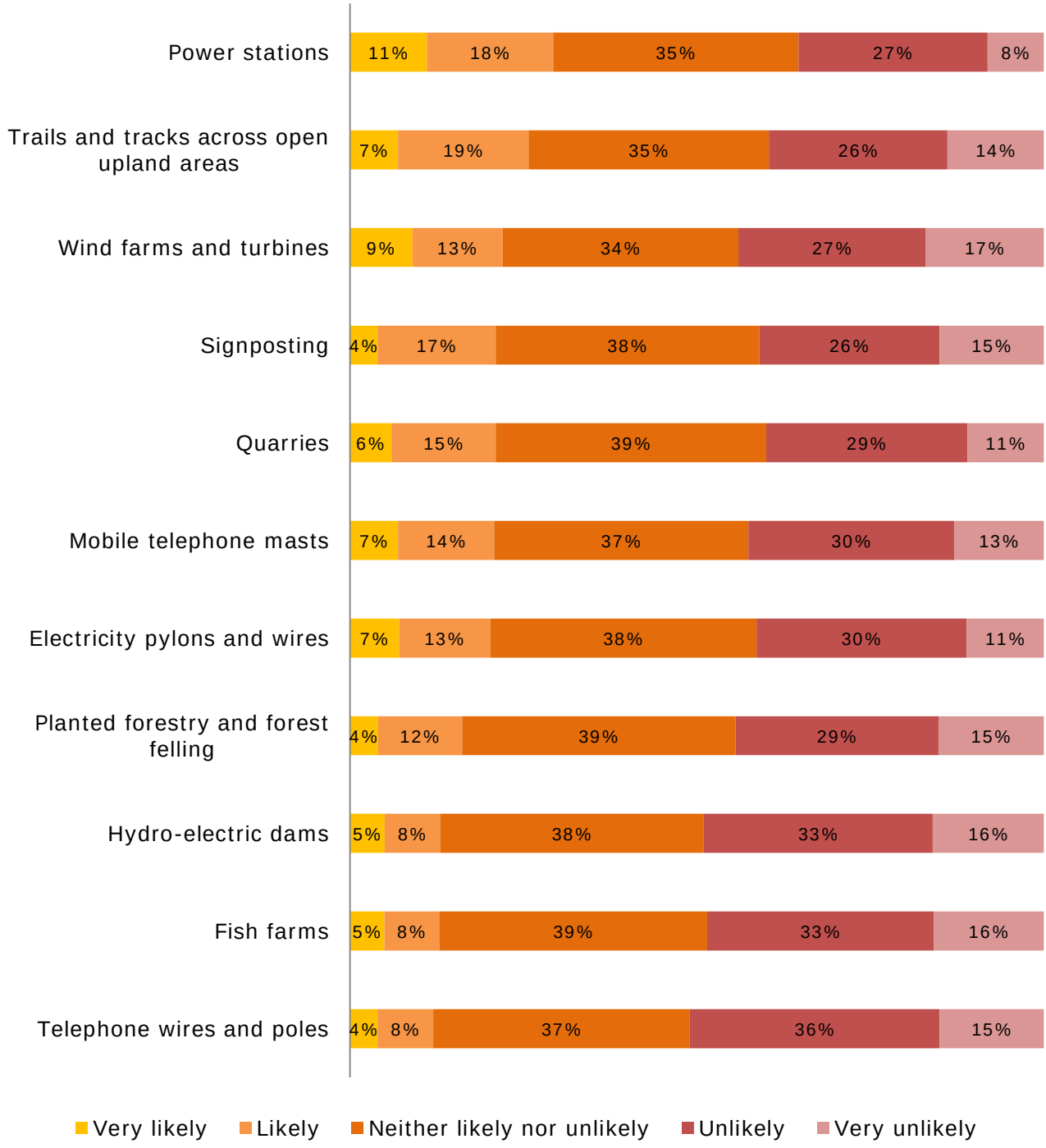
Q10. How important do you feel the following are to the overall character of Northumberland?

Base: 410

Looking at factors that affect respondents visiting the countryside or scenic areas, it is the presence of power stations that are the most likely to impact upon decisions to visit an area. Wind farms and turbines are unlikely to affect 44% of the respondents and a further 34% select that they are neither likely nor unlikely to affect decisions leaving 22% saying that they are likely to affect decisions. The order of impact is shown in Figure 14.

Of the 38 respondents that are very likely to be affected by wind farms and turbines 74% are males and 26% females meaning that males are significantly more likely to select very likely. Age is not showing as having a significant variance.

Figure 14: Considerations when visiting scenic area/countryside

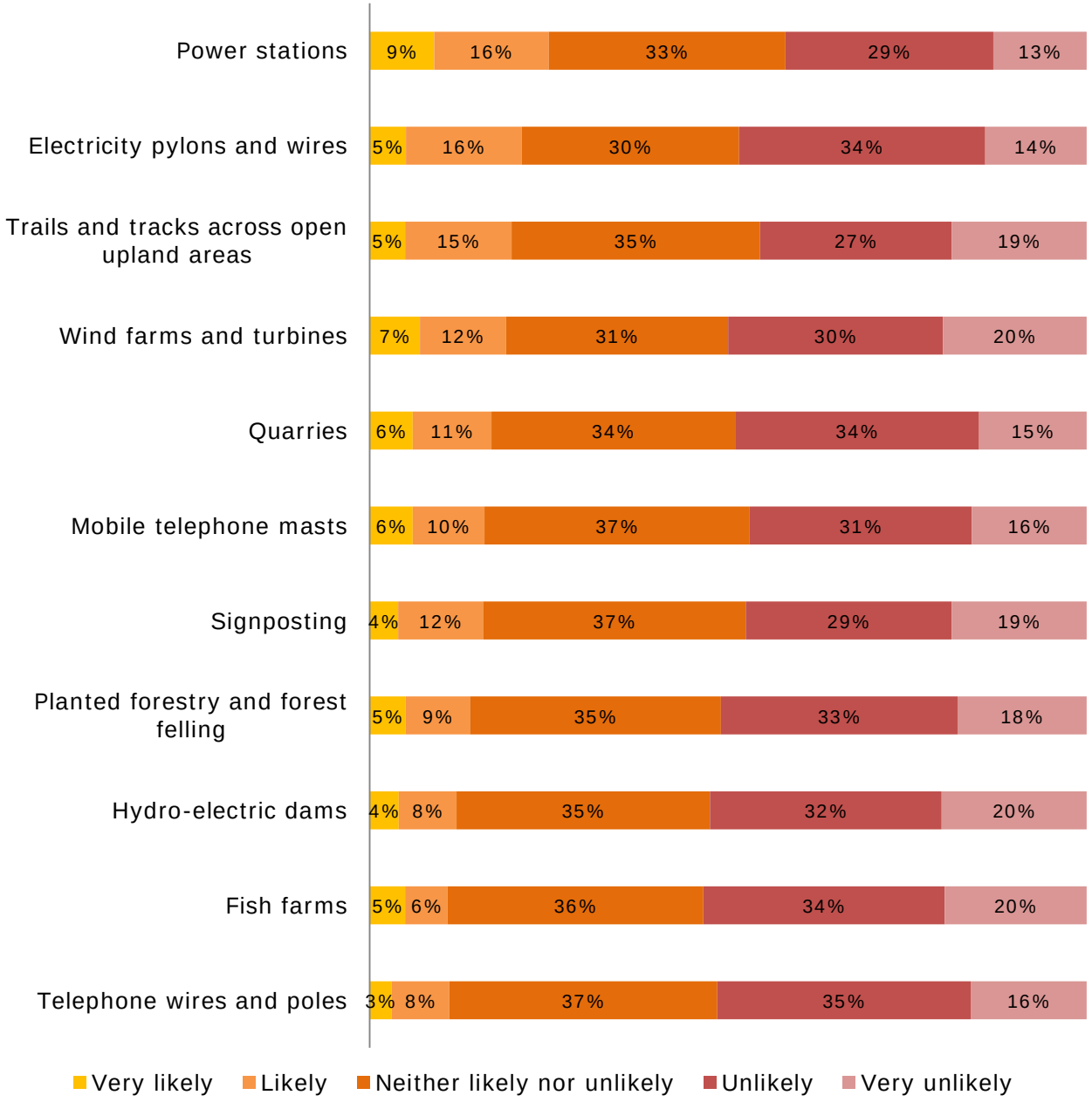


Q11. How likely is it that the following would affect your decision to visit a countryside/scenic area?
Base: 410

When specifically looking at Northumberland, power stations and electricity pylons and wires are more likely to affect respondents' decisions to visit the area. Respondents are slightly less likely to be affected by wind farms and turbines when deciding to visit Northumberland than

they are when thinking of general countryside and scenic areas (19% likely for Northumberland, 22% general countryside/scenic areas). The order of impact when considering Northumberland is shown in Figure 15. The main reason given by respondents that are likely to be affected by the presence of wind farms and turbines when considering visiting Northumberland is that they spoil the scenery (34%) and are unattractive (15%).

Figure 15: Considerations when visiting Northumberland



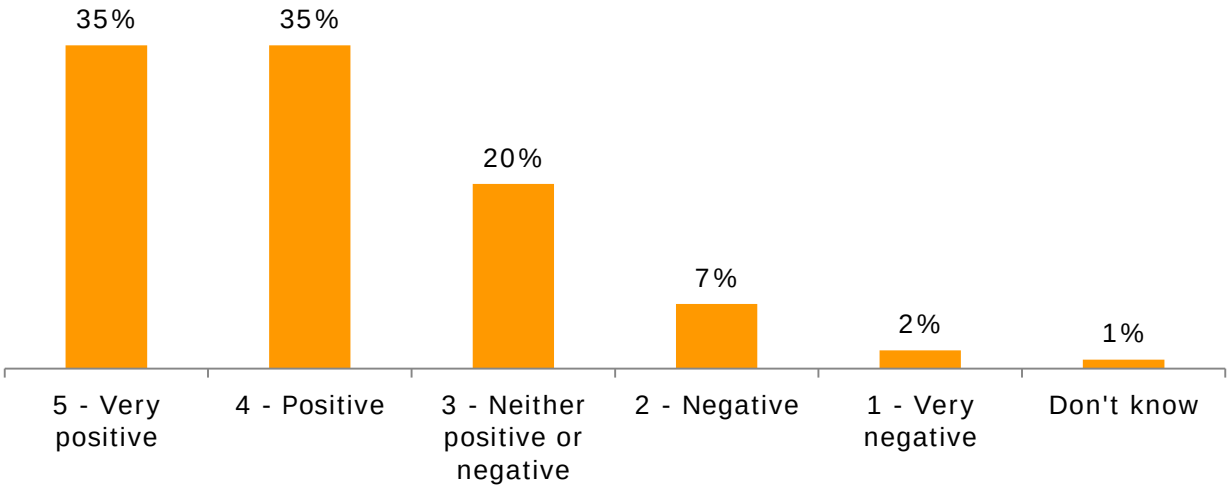
Q12. How likely is it that the following would affect your decision to visit Northumberland?

Base: 410

5.3. Renewable Energy

Opinion towards renewable energy is positive with just 9% selecting negative or very negative. This small sub-sample of respondents that are negative consists of 72% being male and 28% being female. From the age groups of 65 years plus, 14% select that their views are negative towards renewable energy, this is significantly higher than the average.

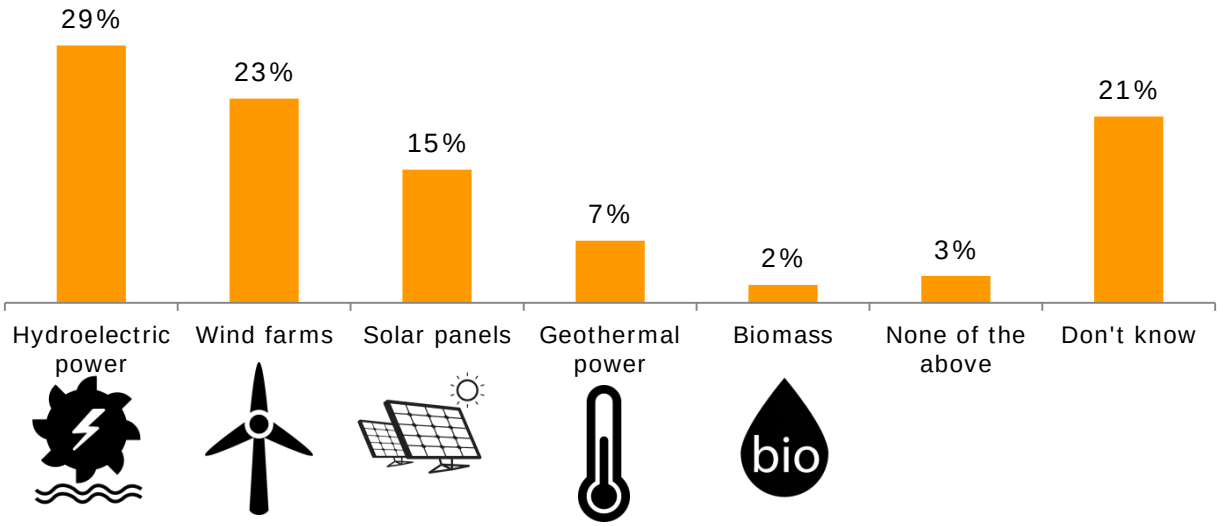
Figure 16: Attitute towards renewable energy



Q13. How do you feel in general about renewable energy?
Base: 410

Respondents' opinions towards the different forms are divided; hydroelectricity (29%) is regarded as the best form of renewable energy followed by wind farms (23%). Males are significantly more likely to select hydroelectricity (34%) compared to females (24%) whereas females (28%) are significantly more likely to select wind farms than males (19%). Males are also more likely to select geothermal power compared to females, 9% and 4% respectively. Age also has an impact with the two eldest age groups significantly more likely to choose hydroelectric power as the best form (55-64 years 41%, 65 years plus 42%). Respondents from the South West are also significantly more likely to select hydroelectricity at 47%. The order that respondents regard renewable energy is shown in Figure 17.

Figure 17:Hierarchical order of renewable energy types



Q14. What do you feel is the best form of renewable energy production?
Base: 410

42% of the sample support on-shore wind farms development, a further 22% claim to have no real opinion leaving 21% opposed and 5% not knowing their thoughts about on-shore wind turbine development. The age group of 25 to 34 years olds are significantly more likely to support them at 64% whereas the eldest age group are significantly more likely not to support their development at 52%. Males are also significantly more likely to oppose on-shore wind farms at 28% with 15% of females opposed.

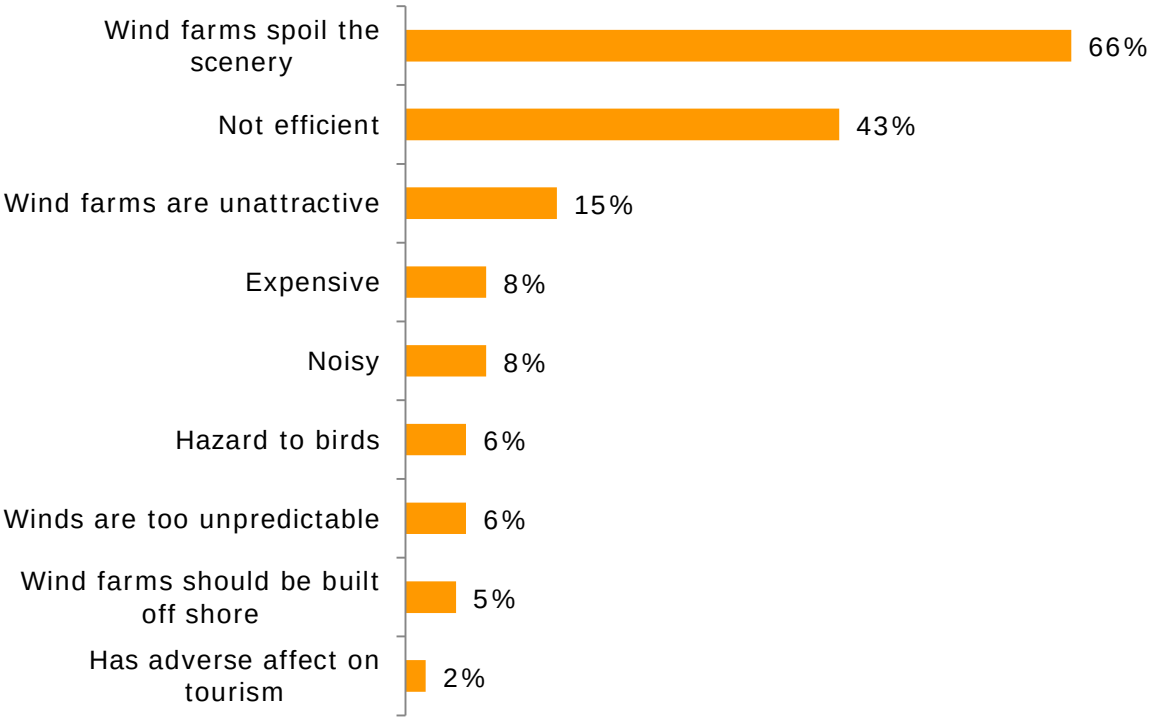
42% of the respondents that support on-shore wind farm development believe that environmentally friendly renewable energy forms are needed/necessary. 19% state that they like the appearance of wind farms and 11% believe that they are a better alternative to coal, gas and nuclear power. In addition it is the understanding of 5% of those who support the farms that fossil fuels are running out and 5% see the potential of this power source in the UK.

There is uncertainty and a lack of knowledge with regards to wind farms and hence a fifth of the total sample has no opinion towards their development.

The most dominant explanation as to why respondents are opposed to on-shore wind farm development is because they spoil the scenery with two thirds citing this reason. It is also believed by 43% of the sample that are opposed that they are not efficient. As well as spoiling

the scenery 15% say that they are unattractive. 8% believe that wind farms are expensive and 8% believe that they are noisy. The explanations for opposition are illustrated in Figure 18.

Figure 18: Explanations for opposition to wind farms

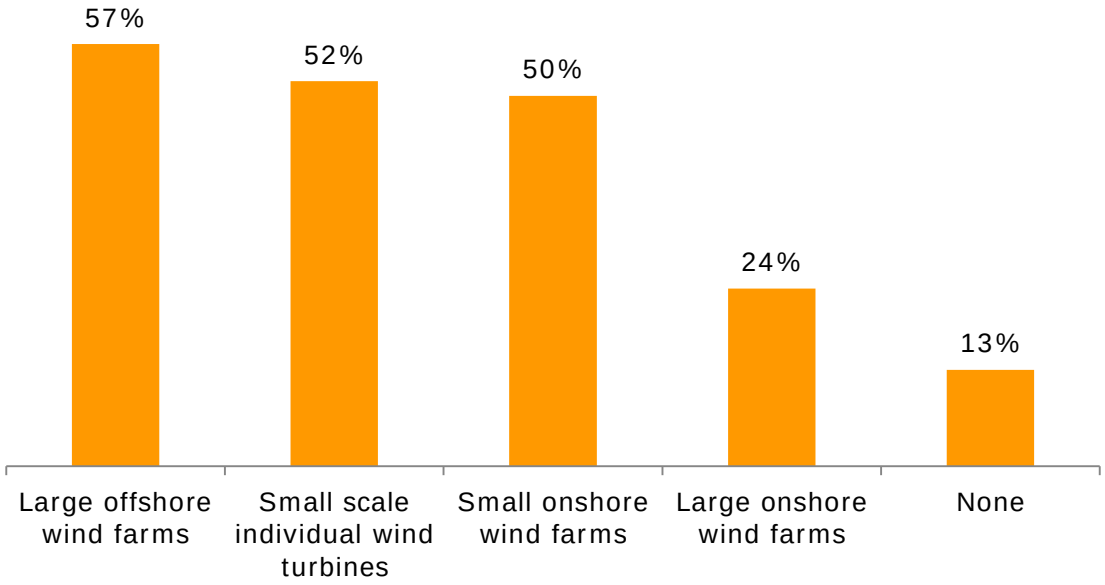


Q15a. Why do you say 'I oppose on-shore wind farm development'?

Base: 87

When asked to select which type of wind farm respondents would be most comfortable seeing in an area like Northumberland there are mixed opinions with just 13% saying none. It is the off shore farm that is preferred but small on-shore farms are acceptable to half of the respondents. Figure 19 documents these opinions. It is the eldest age group that are significantly more likely to say none at 24%.

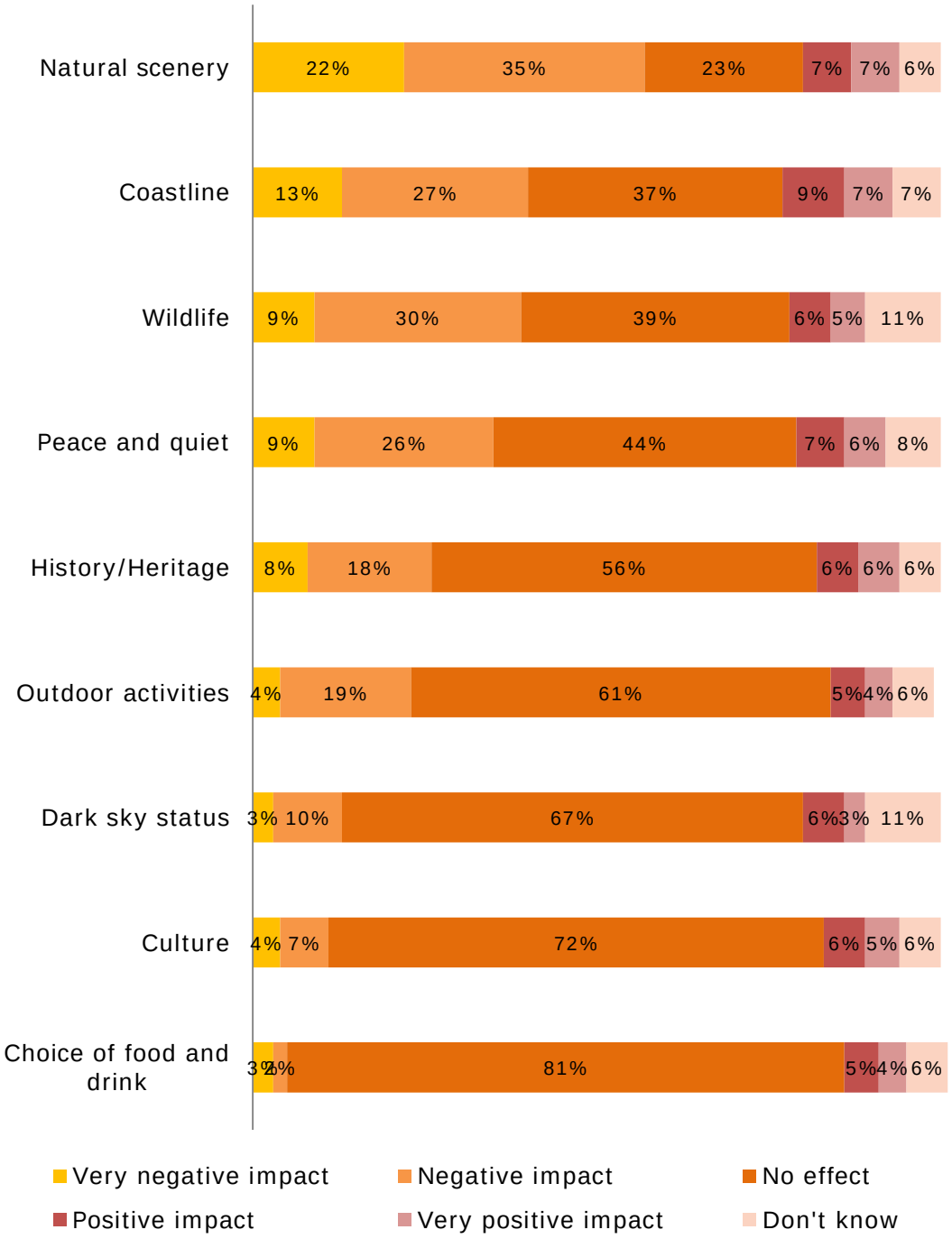
Figure 19: Types of wind farm



Q14ai. What type of wind farms would you be comfortable seeing in an area such as Northumberland?
Base: 410

Despite the majority choosing to select a type of wind farm that they would feel comfortable seeing in Northumberland there is agreement by some that there would be a negative impact upon the natural scenery, the coastline, wildlife and the peace and quiet. However over a third believe that the presence of wind farms would have no effect on the coastline, wildlife and the peace and quiet and 14% believe that their presence will have a positive impact on the natural scenery and 16% believe that their presence will have a positive impact on the coastline. The extent of the impact wind farms will have on various factors is shown in Figure 20. The eldest age group of 65 years plus are significantly more likely to select a very negative impact for natural scenery (45%), history/heritage (21%), wildlife (18%), coastline (31%) and peace and quiet (21%).

Figure 20: Impact of wind farms to Northumberland



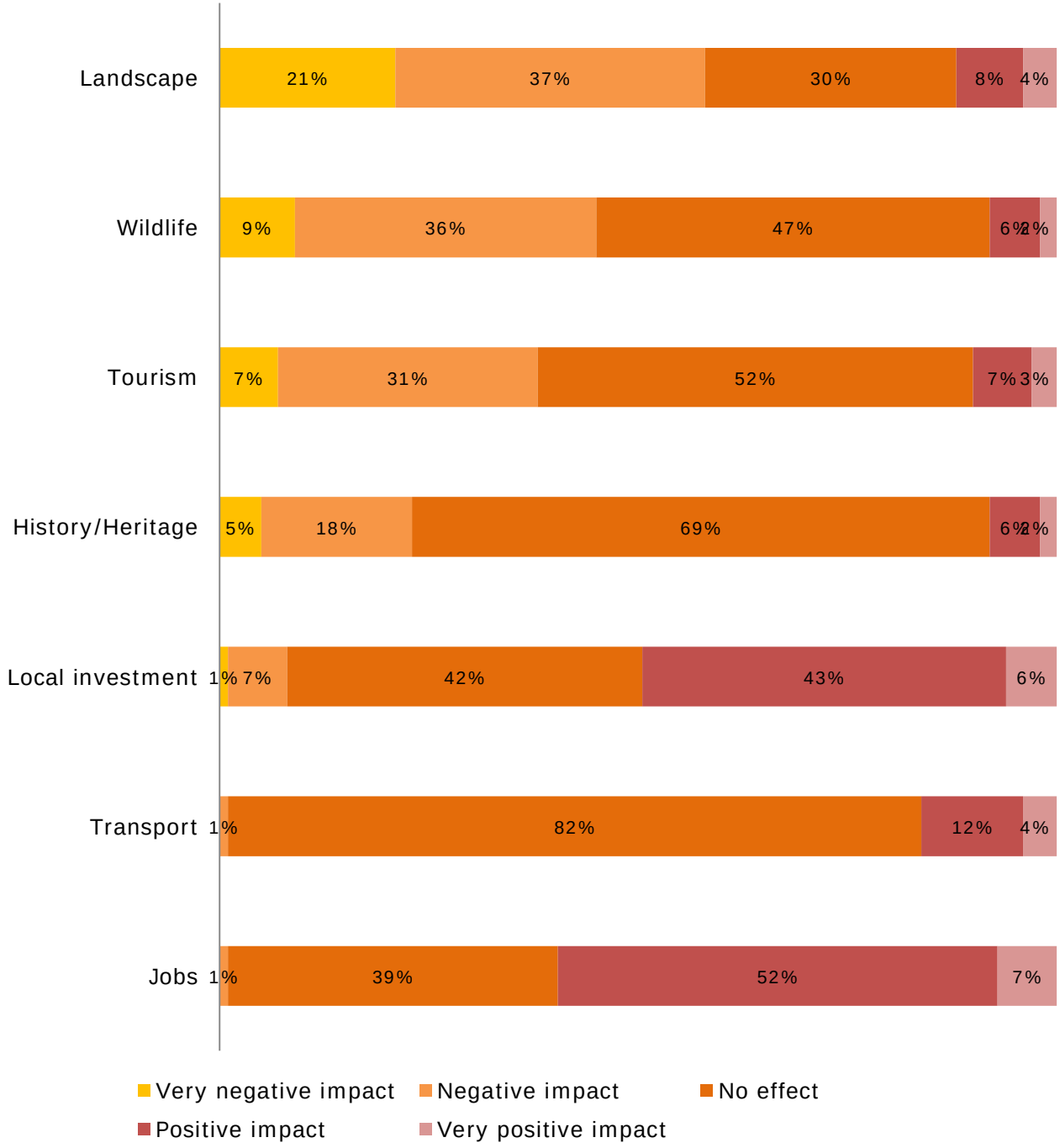
Q16. Which of the following would be impacted by the presence of wind farms in Northumberland?

Base: 410

Furthermore, respondents were asked what would be the impact of wind farms on economical factors and tourism, the results are shown in Figure 21. There is agreement by over half (58%) that there would be a negative impact to the landscape but for all other areas the majority of respondents believe that wind farms will either have no effect or a positive impact.

Once again the eldest age group stand out statistically showing significant variances in their negative responses to the impact upon the landscape (strong negative impact 42%) and tourism (strong negative impact 13%).

Figure 21: Impact of wind farms on tourism and economics

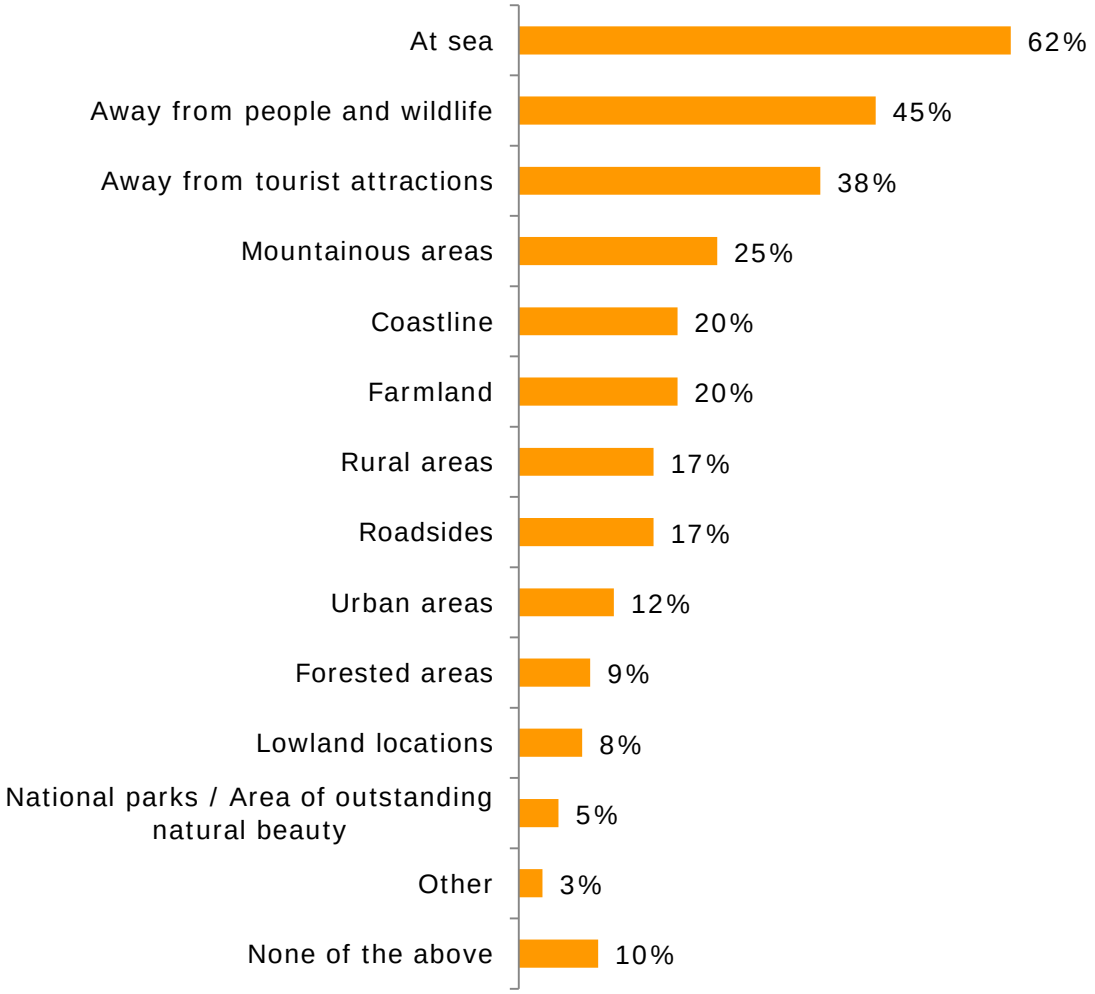


Q17. How do you think wind farms will affect the following in Northumberland?

Base: 410

It is agreed by a third of respondents (32%) that the best place for wind farms to be built in Northumberland is off shore and this increases to nearly two thirds (62%) of respondents when they are given a list of locations to choose from. The responses are shown in Figure 22.

Figure 22: Wind farm location - prompted



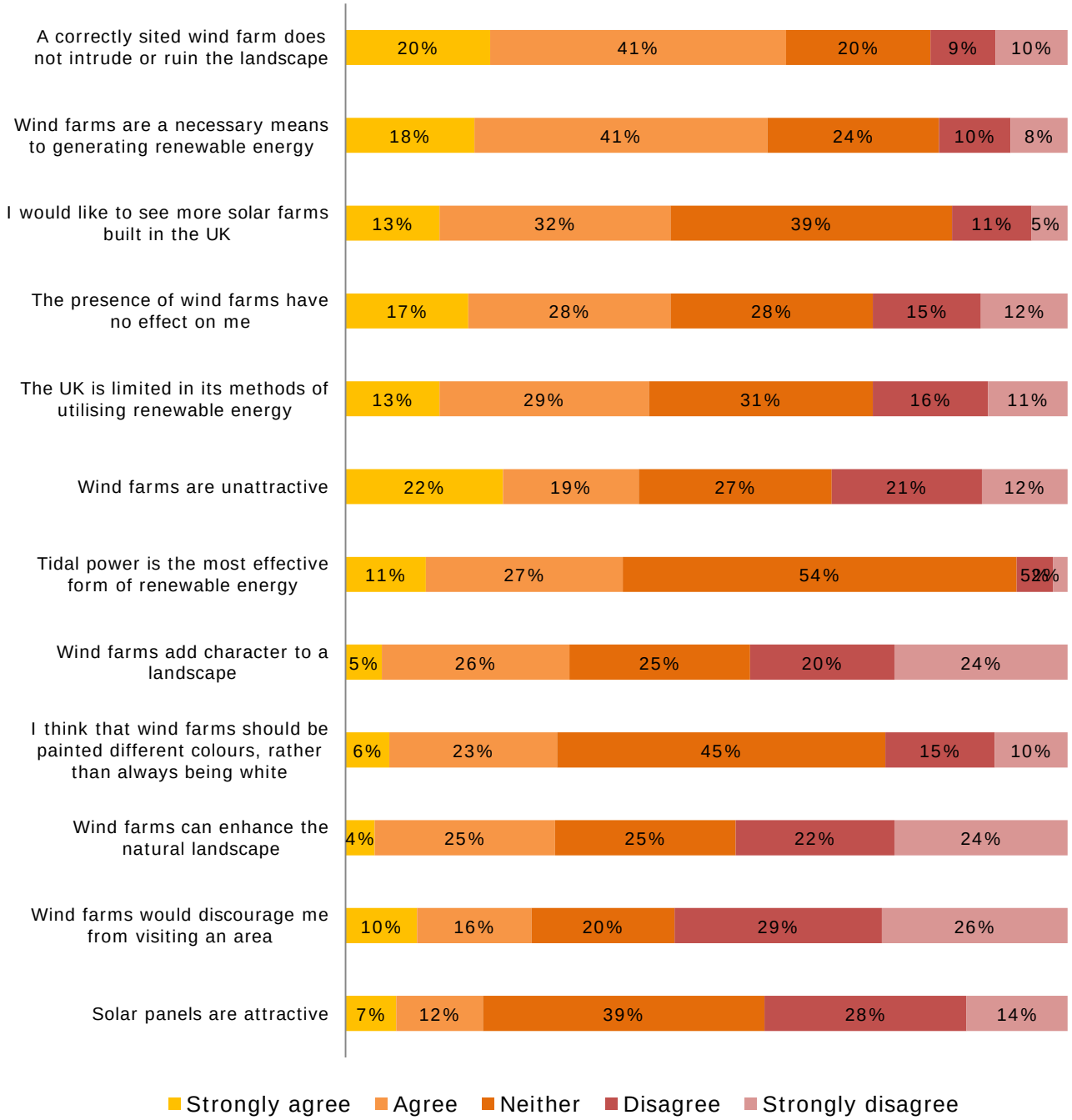
Q18a. Which of the following locations do you think are the best places for wind farms to be built in Northumberland?
Base: 410

The main reason for respondents' answers is to have a minimal impact upon the scenery, people and wildlife.

There is dispute with regards to wind farms but it is agreed by more than half that if correctly sited they do not intrude or ruin the landscape and that the farms are a necessary means to generating renewable energy. 45% of respondents agree that the presence of wind farms has no effect on them, 27% neither agree nor disagree with this leaving only a third (33%) disagreeing. There are also more respondents who agree that wind farms add character to an

area (31%) and can enhance the natural landscape (29%) than there are agreeing that wind farms would discourage them from visiting an area (26%). The perceptions towards wind farms and renewable energy sources are shown in Figure 23.

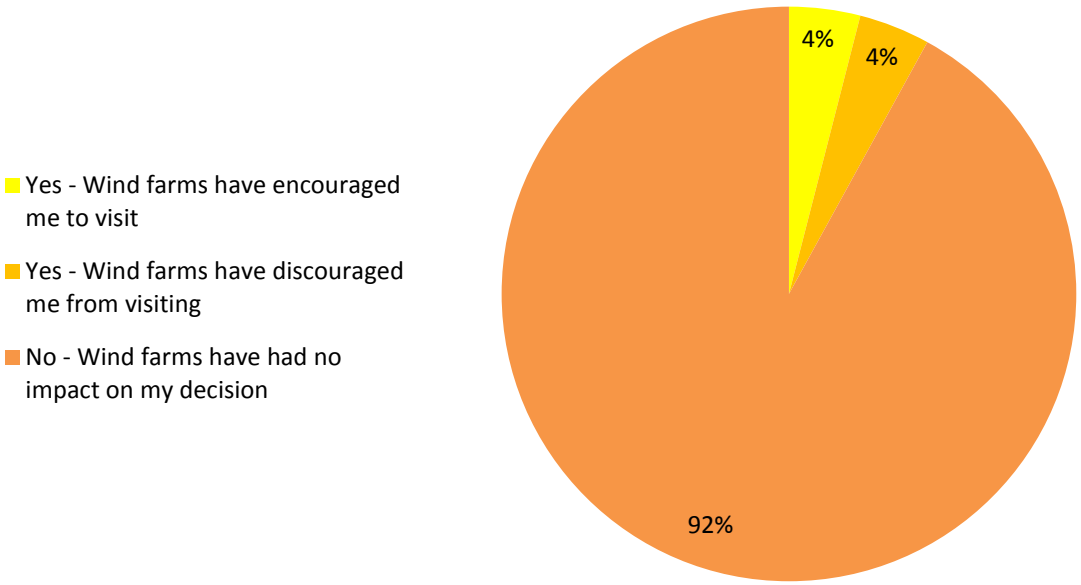
Figure 23: Perceptions of renewable energy



Q19. How much do you agree with the following statements?
Base: 410

In general wind farms are not having an influence on respondents' decisions to visit Northumberland. As few that have been discouraged to visit have also been encouraged to visit, 4% in both instances. Despite the eldest age group showing significant variances negatively towards wind farms in previous questions, they are significantly more likely than the other age groups to select that wind farms have had no impact on their decision to visit Northumberland (97%); they have not been discouraged.

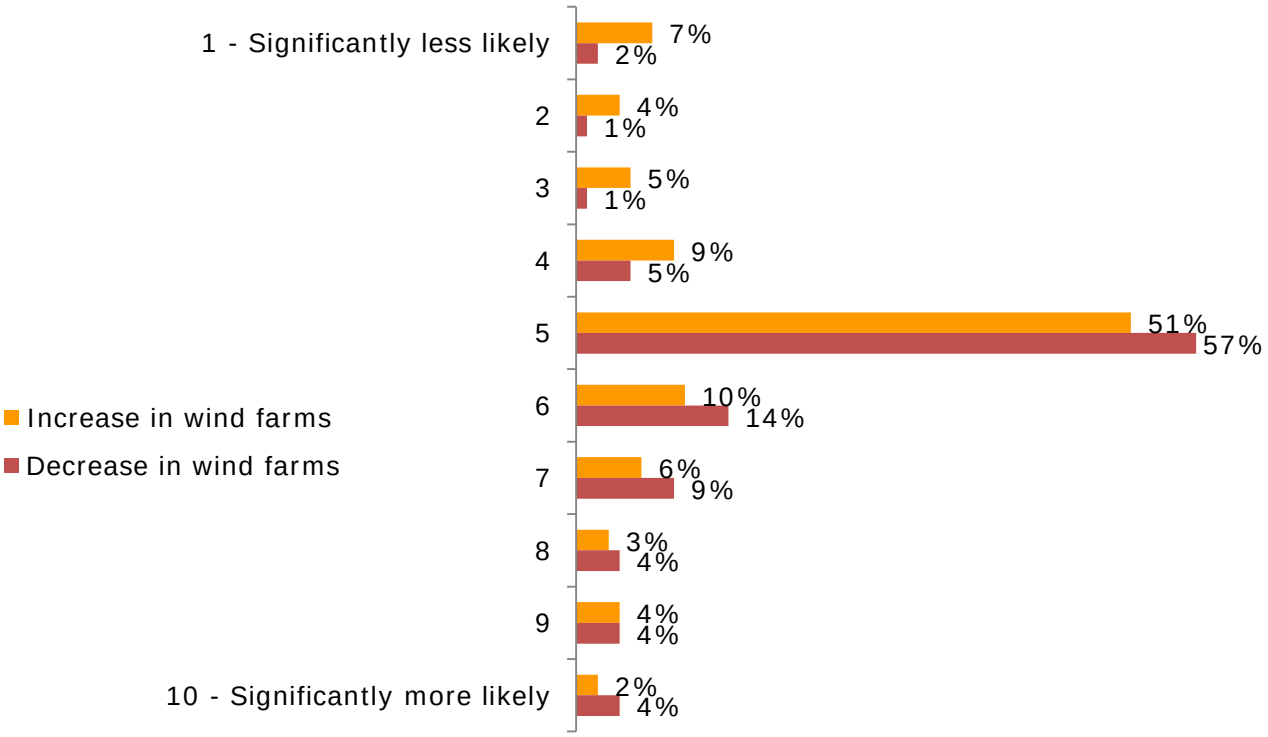
Figure 24: Wind farm influence



Q20. Has the presence of wind farms influenced your decision to visit Northumberland previously?
Base: 410

If the amount of wind farms in Northumberland were to increase significantly, the likelihood to visit Northumberland would not change and the reduction of wind farms would see a slight increase in likelihood to visit, the responses are shown in Figure 25.

Figure 25: Saturation point



Q21a/b. If the amount of wind farms in Northumberland were to significantly increase/decrease how would this affect your likelihood to visit?

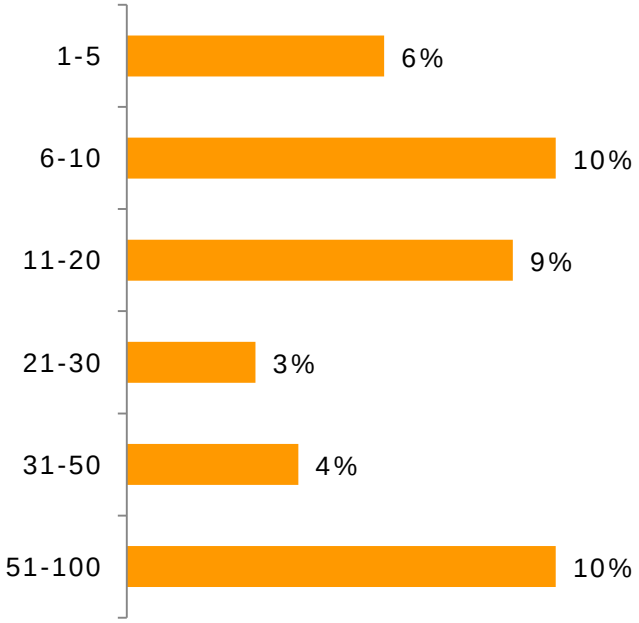
Base: 410

Only 10% respondents (n=39) said they would definitely be encouraged to book a holiday/visit to somewhere other than Northumberland in the future because of the presence of wind farms, whilst 20% said they may be. More than two thirds (64%) said the presence of wind farms in Northumberland would not encourage them to book a holiday/visit elsewhere.

Whilst 41% of respondents think Northumberland has a sufficient number of wind farms, 43% believe that the area could support more. The remaining sample of 16%, think Northumberland already has too many. Of those that think Northumberland has too many already nearly two thirds (63%) are males, meaning 37% are female. The youngest group of 16 to 24 year olds are less likely to believe Northumberland could support more (17%), don't necessarily believe that they have too many (8%) but are significantly likely to believe they have a sufficient number (75%). The oldest age group of 65 years plus are significantly likely to believe that Northumberland has too many (30%) and whilst they are not any less likely to support more (41%) they are significantly less likely to agree that there are sufficient (30%). There are no statistical significant variances across the opinions of the regional groups towards the number of wind farms in Northumberland.

When asking the respondents who think Northumberland could support more wind farms, the mean number of additional wind farms is 37 before they would be discouraged to visit, see Figure 26.

Figure 26: Saturation point



Q21f. What increase in the number would start to discourage you from visiting?

Base: All who believe Northumberland could support more wind farms, 176

6. Conclusions

The vast majority feel positively towards renewable energy, with respondents selecting hydroelectricity and wind power as the best types of renewable energy. Power stations and electricity pylons and wires were likely to have a greater impact on respondents' decision to visit Northumberland than wind farms. However when assessing wind energy, off shore farms are favoured over on shore in general and specifically in Northumberland.

There are demographic variances in opinions about wind farms, males and the eldest age group of 65 years plus are more negative towards wind energy. The presence of wind farms has more of an effect on these two groups.

The main reasons for visiting Northumberland are the scenery and the coastline and it is recognised that these two areas will be affected most by the development of wind farms. A minority group believe that Northumberland already has too many wind farms but generally opinion is divided as to whether there are sufficient already or whether the area can support more.

The impact of additional wind farms on visitor numbers to Northumberland is present but the majority feel that wind farms are not having an influence on their likelihood to visit the area. Only 11% said that the presence of wind farms would affect their decision to visit Northumberland. For those whose decision to visit would be affected this was primarily because of the impact on scenery and because they are unattractive but overall 61% of the total sample agree that a correctly sited wind farm does not ruin or intrude on the landscape.

7. Questionnaire

Thanks for agreeing to take part in this survey.

This survey is about your holiday preferences and we would like you to answer a few questions. The survey will take no more than 8 minutes of your time and we would really appreciate your views.

All information received is strictly confidential, and will be dealt with in accordance with the Market Research Society Code of Conduct.

If you are happy to continue, please click 'Next' to continue

ALL

S1. Which of the following areas would you **consider** going on holiday to/visiting in the next 2 years?
MULTICODE, ROTATE

1. Devon
2. Cornwall
3. Yorkshire Dales
4. Yorkshire Moors
5. Northumberland – **MUST SELECT TO CONTINUE**
6. The Lake District
7. Scottish Highlands
8. Snowdonia
9. Cotswolds
10. Peak District
11. Dorset/Jurassic Coast
12. None of the above **– EXCLUSIVE - THANK AND CLOSE**

S2. Which of the following areas of the UK have you visited/been on holiday to in the **last 3 years**?
MULTICODE, ROTATE

1. Devon
2. Cornwall
3. Yorkshire Dales
4. Yorkshire Moors
5. Northumberland
6. The Lake District
7. Scottish Highlands
8. Snowdonia
9. Cotswolds
10. Peak District
11. Dorset/Jurassic Coast
12. None of the above
13. I haven't taken a holiday/short break in the UK in the last three years

DEMOGRAPHICS

ALL

S3. Please select your gender
SINGLECODE

1. Male
2. Female

50% Female, 50% Male

ALL
S4. Can you please indicate which of the following age bands applies to you?
SINGLECODE

1.	Under 16 years	**THANK AND CLOSE**
2.	16-24 years	13%
3.	25-35 years	18%
4.	36-44 years	18%
5.	45-54 years	18%
6.	55-64 years	18%
7.	65+ years	15%

Soft quotas

ALL
S5. Where do you live?
FLASH MAP – UK

ALL WHO SELECT 'NORTH EAST' AT S5
S5a. Can you please indicate which area you live?
SINGLECODE

1. Northumberland **THANK AND CLOSE**
2. County Durham
3. Newcastle upon Tyne
4. Sunderland
5. North Tyneside
6. South Tyneside
7. Gateshead
8. Middlesbrough
9. Redcar and Cleveland
10. Stockton
11. Hartlepool

12. Other

Quota to be 20% of North East excluding Northumberland, remaining 80% to be Nat Rep

TOURISM QUESTIONS

ALL
Q1. Which of the following best describes your preferred type of **UK holiday**?
SINGLECODE ROTATE

1. City break
2. Countryside holiday
3. Winter sports holiday
4. Walking holiday
5. Cycling holiday
6. Seaside and coastal holiday
7. Golf holiday
8. Sport holiday
9. Day trip
10. Camping holiday
11. Cultural and Heritage Sight-seeing holiday
12. None of the above **DO NOT ASK Q2A**

Q2a. Where in the UK would you predominantly visit for a <**PULL THROUGH SELECTED RESPONSE AT Q1>**?

ALL
Q3. What are your main considerations when booking a holiday in the UK?
For example weather, activities, scenery, culture, how far away it is? etc.
Please be as specific as possible in your response

ALL
Q4. Please rank how important each of the following factors are in your decisions when planning trips/holidays. Please indicate this on a scale of 1 to 5, with 1 being not at all important and 5 being very important
ROTATE

1. Price
2. Range of accommodation
3. Culture and heritage
4. Coastline and beaches
5. Countryside scenery
6. National parks
7. Specific events/festivals
8. Location

9. Good transport and road networks
10. Places to eat
11. Outdoor activities
12. Wide range of things to see and do
13. Peace and quiet
14. Distance/ travel time
15. Historic sites (eg. castles, gardens, historic houses)
16. Recommendation from friends/family
17. TV/magazines/web/online review

Options (left to right):
1 – Not at all important
2 – Not important
3 – Neither important nor unimportant
4 – Important
5 – Very important

ALL
Q5. Is there anything else that influences your decision when booking a holiday/planning a visit to an area?

Earlier in the survey you said you would consider **Northumberland** as a place to visit. The following questions are specifically relating to **Northumberland**.

ALL
Q6a. What reasons would make you consider visiting Northumberland in the future?
Please be as specific as possible in your answer

ALL
Q6b. Which of the following best describe why you would consider Northumberland for a visit in the future?
Please select all that apply
MULTICODE, ROTATE

1. Price
2. Range of accommodation
3. History, culture and heritage
4. Coastline and beaches
5. Countryside
6. National parks
7. Specific events/festivals
8. Location
9. Good transport and road networks
10. Places to eat

11. Leisure and relaxation e.g. shopping
12. Outdoor activities/sports
13. Stargazing/dark skies
14. Wide range of things to see and do
15. Peace and quiet
16. Distance/travel time
17. Historic sites (eg. castles, gardens, historic houses)
18. Weather/climate
19. Art and culture
20. Cycling/walking
21. Other – please specify

ALL
Q7. How likely are you to visit Northumberland within the next 2 years?

1. Not at all likely
2. Unlikely
3. Neither likely nor unlikely
4. Likely
5. Very likely

ALL WHO SELECT 'NORTHUMBERLAND' AT S2
Earlier in the survey you said you had visited **Northumberland** in the past **3 years.**

Q8a. Why did you decide to visit Northumberland in the past 3 years?
Please be as specific as possible in your answer

ALL WHO SELECT 'NORTHUMBERLAND' AT S2
Q8b.Which of the following best describes your reasons for visiting Northumberland in the past?
Please select all that apply
MULTICODE, ROTATE

1. Price
2. Range of accommodation
3. History, culture and heritage
4. Coastline and beaches
5. Countryside
6. National parks
7. Specific events/festivals
8. Location
9. Good transport and road networks
10. Places to eat
11. Leisure and relaxation e.g. shopping
12. Outdoor activities/sports
13. Stargazing/dark skies

14. Wide range of things to see and do
15. Peace and quiet
16. Distance/travel time
17. Historic sites (eg. castles, gardens, historic houses)
18. Weather/climate
19. Art and culture
20. Cycling/walking
21. Other – please specify

ALL
Q9a. What would deter you from visiting Northumberland in the future?
Please be as specific as possible in your answer

ALL
Q9b. Which of the following would deter you from considering a visit to Northumberland in the future?
Please select all that apply
MULTICODE, ROTATE

1. Weather
2. Lack of things to do
3. Transport and road networks
4. Distance from where I live
5. Wind farms
6. Price
7. Quarrying
8. Electricity pylons
9. Choice of food and drink
10. Other - please specify

ALL
Q10. Please indicate on a scale of 1 to 5, with 1 being not very important at all and 5 being very important how important you feel the following are to the overall character of Northumberland
ROTATE

	1 – Not very important	2 – Unimportant	3 - Neutral	4 - Important	5 – Very important
Natural scenery					
History					
Wildlife					
Dark sky status					
Coastline					
Culture					
Choice of food and drink					
Outdoor activities					
Peace and quiet					
Long distance views					

ALL
Q11. On a scale of 1-5 where 1 is 'very unlikely' and 5 is 'very likely' how likely is it that the following would affect **your decision** to visit a countryside/scenic area?
ROTATE

	1- Very unlikely	2- Unlikely	3- Neither likely nor unlikely	4- Likely	5- Very likely
Electricity pylons and wires					
Wind farms and turbines				**ASK Q15b**	**ASK Q15b**
Mobile telephone masts					
Planted forestry and forest felling					
Telephone wires and poles					
Hydro-electric dams					
Power stations					
Fish farms					
Quarries					
Trails and tracks across open upland areas					
Signposting					

ALL
Q12. On a scale of 1-5 where 1 is 'very unlikely' and 5 is 'very likely' how likely is it that the following would affect **your decision** to visit **Northumberland?**
ROTATE

	1- Very unlikely	2- Unlikely	3- Neither likely nor unlikely	4- Likely	5- Very likely
Electricity pylons and wires					
Wind farms and turbines				**ASK Q15c**	**ASK Q15c**
Mobile telephone masts					
Planted forestry and forest felling					
Telephone wires and poles					

Hydro-electric dams					
Power stations					
Fish farms					
Quarries					
Trails and tracks across open upland areas					
Signposting					

Following EU guidelines the British government is committed to ensuring that 15% of the UK's energy demand is produced from renewable sources by 2020.

ALL

Q13. How do you feel in general about renewable energy?

1. Very negative
2. Negative
3. Neither positive or negative
4. Positive
5. Very positive
6. Don't know

ALL

Q14. What do you feel is the best form of renewable energy production?

1. Wind farms
2. Hydroelectric power
3. Geothermal power
4. Solar panels
5. Biomass
6. None of the above
7. Don't know

ALL

Q15. How do you feel about on shore wind farm development in general?

1. I support on shore wind farm development
2. I have no real opinion
3. I oppose on shore wind farm development
4. Don't know **GO TO Q15b dependent an answer at Q11**

ASK IF RESPONSE 1, 2, 3 AT Q15

Q15a. Why do you say this?

ALL

Q14ai. What type of wind farms would you be comfortable seeing in an area such as Northumberland?
MULTICODE

- Large offshore wind farms
- Large onshore wind farms

- Small onshore wind farms
- Small scale individual wind turbines

IF SELECT 'LIKELY' OR 'VERY LIKELY' FOR 'WIND FARMS AND TURBINES' AT Q11
Q15b. You previously stated that the presence of wind farms would affect your decision to visit countryside/scenic area. Why is this?
Please be as specific as possible

IF SELECT 'LIKELY' OR 'VERY LIKELY' FOR 'WIND FARMS AND TURBINES' AT Q12
Q15c. You previously stated that the presence of wind farms would affect your decision to visit Northumberland. Why is this?
Please be as specific as possible

ALL
Q16. Which of the following would be impacted by the presence of wind farms in Northumberland?
RANDOMISE

	1- Very negative impact	2- Negative impact	3- No effect	4- Positive impact	5- Very positive impact	Don't Know
Natural scenery						
History/Heritage						
Wildlife						
Dark sky status						
Coastline						
Culture						
Choice of food and drink						
Outdoor activities						
Peace and quiet						

ALL
Q17. How do you think wind farms will affect the following **in the Northumberland?**
RANDOMISE

	1- Strong negative impact	2- Negative impact	3- No effect	4- Positive impact	5- Strong positive impact
Wildlife					
History/Heritage					
Landscape					
Transport					
Local investment					
Tourism					

Jobs					

ALL
Q18a. What sort of location do you think is the best place for wind farms to be built in Northumberland?
Please be as specific as possible

ALL
Q18b. Which of the following locations do you think are the best places for wind farms to be built in Northumberland?
Please select all that apply
MULTICODE RANDOMISE

1. Coastline
2. Urban areas
3. Rural areas
4. Forested areas
5. National parks /Area of outstanding Natural Beauty
6. Farmland
7. Lowland locations
8. Away from tourist attractions
9. Away from people and wildlife
10. Mountainous areas
11. Roadsides
12. At sea
13. Other
14. None of the above **EXCLUSIVE**

ALL
Q18c. Why do you think that this?
Please be as specific as possible

ALL
Q19. Please indicate on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree how much you agree with the following statements
ROTATE

	1 – Strongly disagree	2 – Disagree	3 – Neither agree nor disagree	4 - Agree	5 – Strongly agree
Wind farms add character to a landscape					
Wind farms can enhance the natural landscape					
Wind farms would discourage					

me from visiting an area					
Tidal power is the most effective form of renewable energy					
Wind farms are a necessary means to generating renewable energy					
Wind farms are unattractive					
The presence of wind farms has no effect on me					
Solar panels are attractive					
I think that wind farms should be painted different colours, rather than always being white					
I would like to see more solar farms built in the UK					
A correctly sited wind farm does not intrude on or ruin the landscape					
The UK is limited in its methods of utilising renewable energy					

ALL
Q20. Has the presence of wind farms influenced your decision to visit Northumberland previously?
ROTATE

1. Yes – Wind farms have encouraged me to visit
2. Yes – Wind farms have discouraged me from visiting
3. No – Wind farms have had no impact on my decision

ALL
Q21a. If the amount of wind farms in Northumberland were to significantly **increase** how would this affect your likelihood to visit?

DM USE 10 POINT LIKELIHOOD SCALE WITH 1 SIGNIFICANTLY LESS LIKELY AND 10 SIGNIFICANTLY MORE LIKELY

ALL
Q21b. If the amount of wind farms in Northumberland were to significantly **decrease** how would this affect your likelihood to visit?

DM USE 10 POINT LIKELIHOOD SCALE WITH 1 SIGNIFICANTLY LESS LIKELY AND 10 SIGNIFICANTLY MORE LIKELY

ALL
Q21c. Would the presence of wind farms in Northumberland encourage you to book a holiday/visit elsewhere instead?

1. Yes, definitely
2. Yes, maybe
3. No

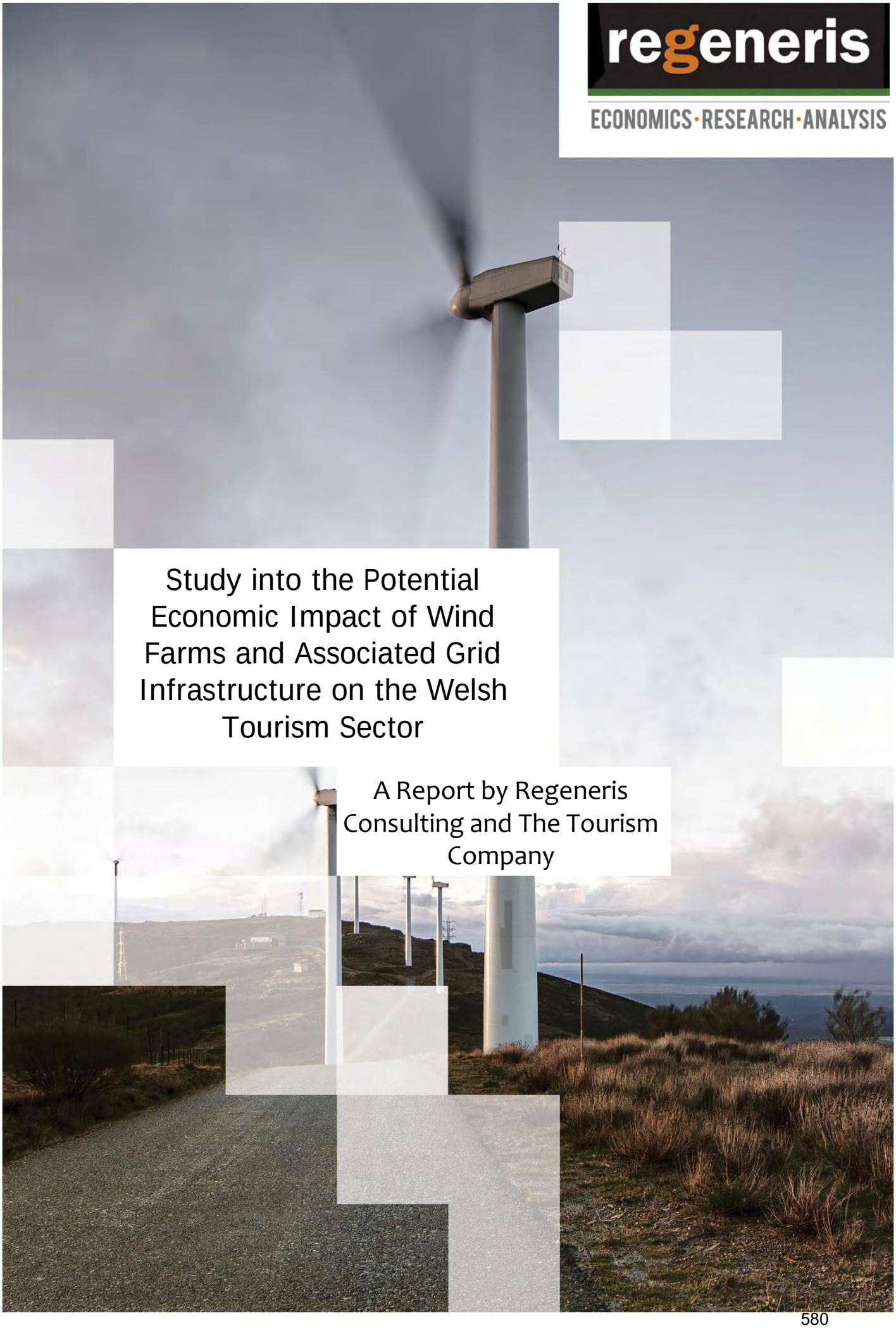
4. Don't know

ALL WHO SELECT 'YES' AT Q20
Q21e. Why has the presence of wind farms encourage/discourages (pull through dependent on Q20 answer) you to visit Northumberland?

ALL
Q21f. There are currently 15 operational wind farm sites with a further 3 under construction across Northumberland County. What increase in the number would start to discourage you from visiting?

DM COULD WE HAVE A SCALE TOOL

- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%
- More than 100%
- The number of wind farms would not affect my decision



regeneris

ECONOMICS · RESEARCH · ANALYSIS

Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

A Report by Regeneris Consulting and The Tourism Company

Welsh Government

Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

February 2014

Regeneris Consulting Ltd

www.regeneris.co.uk

Contents

Executive Summary

Purpose of the Report

i. Regeneris Consulting and The Tourism Company were appointed by the Welsh Government to carry out a study of the potential impacts of onshore wind farms and associated grid infrastructure on the visitor economy within Wales. This is a controversial and hotly debated topic. The issue has been brought into sharp focus by the potential for a fourfold increase in installed capacity by 2025, although in practice it may be much less than this.

ii. The study has not sought to quantify the total economic impact on tourism, in terms of jobs and GVA, given the technical challenges of doing this in a rigorous way (but also given the available timescale for the study). The study has taken a bottom-up approach, which draws upon the existing evidence of tourism impacts of wind farms and identifies those areas which are likely to be most sensitive to wind farm development and those areas where the potential for positive effects is greatest.

iii. The key tasks included:

- A **review of the literature** exploring the relationship between wind farm development and the visitor economy. This was used to develop a framework for assessing the sensitivity of tourism economies to wind farm development.
- An **analysis of the visitor economies** in nine local impact areas affected by wind farm development. This identified the scale and nature of development, the key tourism assets and the characteristics of visitors. This analysis formed the basis for the assessment of sensitivity.
- Three **case studies** in areas which are already affected by wind farm development. The purpose of these case studies was to gather evidence of existing impact and to test the framework for assessing sensitivity to wind farm development. The case studies drew upon local research where it was available, and a set of structured consultations with local tourism trade associations and local authority tourism officers. Whilst these consultees provided views for their particular communities and stakeholders, these views were also tested through consultations with businesses in close proximity to existing wind farms or catering for visitors most likely to be affected.

Key Findings

Negligible impact on the national tourism sector

iv. The current scale of wind farm development in Wales is modest, especially when compared with other European countries, including Scotland. National studies of tourism impacts of wind farms have shown that, where negative effects do occur, these are often in the form of displaced tourism. This is likely to be the case in Wales, where substantial areas of the country will remain unaffected by wind farm development.

Limited evidence of local tourism impacts to date.

v. There are a number of areas in Wales where wind farms have been an established presence on

the local landscape for a relatively long time. These include Powys, Anglesey and the South Wales Valleys which were all the subject of case studies. The case studies have not revealed any evidence of significant impacts on tourism to date. The few local studies which are available have shown the majority of visitors are positive or indifferent about wind farm development. Although there was some anecdotal evidence of visitors staying away due to wind farms, the vast majority of consultees believed there had been no impact on total visitor numbers and hence on the visitor economies as a whole.

Wind farms are remote from Wales's key visitor assets and tourism locations

vi. The study has shown that the areas most affected by wind farms (currently and in the next decade) account for a very small proportion of Wales's total visitor economy. This is likely to be an indirect consequence of planning policy focusing development away from Wales's key natural assets and visitor attractions, including areas of outstanding natural beauty and national parks.

Reactions to wind farms are complex and may change over time

vii. The evidence base shows a clear majority of people do not react negatively to wind farm developments or change their visiting behaviour as a result. However it also shows that visitor responses and reactions to wind farms are highly subjective and depend on the individual's own judgements and perceptions of the relative merits of onshore wind as a means of energy production.

viii. While current levels of support for onshore wind are strong, there are a diverse range of factors which could influence public perceptions over the next ten years which could then change visitor behaviour. The greatest risk is that the increased rate of development in some parts of Wales could change the value judgements made by some visitors, especially if they feel a tipping-point is reached. However, the study has not found any evidence to suggest this could occur in practice.

ix. This risk also needs to be weighed against the fact that wind farms will become a more common sight in the UK and across Europe. This increased familiarity with turbines is likely to mean that many visitors become more tolerant of turbines as a feature of rural landscapes, and their visiting behaviour may change little as a result.

Higher sensitivity to wind farms for certain visitor markets

x. There are examples of certain locations which are more sensitive to wind farm development on account of their landscapes, types of visitor, limited product diversity and proximity to wind farms. This is particularly the case where the key visitor markets are older people visiting for the tranquillity, remoteness and natural scenery offered in some parts of Wales. Remoter parts of Powys are the most notable examples of where this may be the case. In these locations, the study has concluded that the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. But these findings are still subject to various aspects of uncertainty and need to be explored on a case by case basis for schemes going through the planning system.

xi. Although these areas account for a small proportion of tourism employment in Wales as a whole, the narrow economic base in these areas means the sector is an important source of local employment and income

Some potential for positive impacts, often requiring further investment

xii. Although a number of studies point to the potential to attract visitors to areas containing turbines, there is little evidence that these positive effects occur in practice. There may, however, be some instances where wind farm development could enhance existing visitor attractions or be an attraction in their own right through investment in related visitor facilities. There may be particular opportunities for areas which attract a large number of day visitors and have large catchment populations in close proximity such as the South Wales Valleys or North Wales. The case studies showed there was enthusiasm for these types of projects among local stakeholders and an opportunity to make better use of community benefit funds to achieve economic development goals.

No evidence that wind farms on visitor routes deter tourists

xiii. There are a number of visitor routes which will be in close proximity to large concentrations of turbines. The general survey evidence presented in this study offers the only proxy for how visitors would react to these wind farms. This shows that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there is no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere.

Negative impacts during construction

xiv. The study has not shown there to be any evidence of a fall in visitor numbers as a result of disruption during construction. However, this was identified as a concern for many businesses in the case studies, particularly in relation to noise and traffic, and the closure and diversion of public footpaths or other popular routes. Given that some areas in the study could be affected by construction of wind farms for a number of years, it is vital that these disruptions are minimised and mitigated wherever possible through the planning process. There are also several examples of rights of way or trails which were enhanced during construction, and these improvements should be communicated to locals and visitors.

Associated infrastructure

xv. The evidence base for tourism impacts of associated infrastructure is far less developed than that for wind farms. The few studies which have addressed the subject have focused on visitors' opinions of pylons, which consistently find that reactions are far more negative than toward wind turbines. This strong feeling toward grid infrastructure presents an increased risk for those areas where new pylons are proposed alongside considerable wind farm development, particularly North Powys. However, there is no evidence that the existing National Grid infrastructure which is concentrated in North and South Wales, often in popular scenic areas, discourages visitors.

xvi. Nevertheless, the lack of robust evidence means the assessment of the potential impact of the proposed supporting grid infrastructure is particularly challenging. The proposals by National Grid will now see a significant proportion of the connection to the grid buried undergrown, including the section which crosses the Glyndwr's Way. This would reduce the visual impact upon one of North Powys's key visitor asset and mitigate potential impacts.

Recommendations

Land Use Planning Considerations:

- Planning Policy Wales requires Local Planning Authorities (LPAs) to quantify and take on board the economic impacts of proposed developments and is clear that LPAs should consider employment in all sectors (including tourism) and factor this in to the decision making process. However, assessing effects on tourism can be challenging and subject to uncertainty. This points to the need for improved guidance which should be considered by Welsh Government. The assessment framework which has been used in this study may provide a helpful tool in developing this guidance.

- Although most local tourism economies will face minimal or no threat from wind farm development, the nature of visitor economies in some areas does mean they are at greater risk of negative impacts. In these instances, there is a need for developers to undertake thorough research and consultation to understand the nature and extent of the threat, the potential opportunities (if relevant) and any actions which need to be taken. The emphasis should be upon reaching agreement on these issues with the local tourism partners, where this is possible, prior to submission of the planning application.

- The study has concluded that there is the potential for future wind farm development to have minor or even moderate negative impacts on the visitor economies of some localities. However, this conclusion is nevertheless subject to a degree of uncertainty and for this reason it will be helpful to monitor the actual impact of new development upon the scale and character of tourism in those areas where there are significant concerns. Given the shortcomings in visitor data at this localised level and the wide range of factors which influence the visitor economy, it will be important to agree a suitable approach to do this.

- Whilst the potential impact of onshore wind farms on the visitor economy was not a criteria in the selection of the strategic search areas within the TAN 8 policy (although the impact on landscape was), there is merit in it having a more explicit role in informing locational choices for any successor policy. The reason for this is that as the additional generation capacity associated with TAN 8 is implemented, the potential consequences of any further development in these areas on the local visitor economy would need to be carefully considered.

Maximising Opportunities and Minimising Dis-benefits

- The development of renewable energy in general and wind farms more specifically provides some opportunities for linked tourism development. The more significant opportunities for generating additional economic benefit impact are linked to new visitor attractions and likely to be few in number. They are more appropriate in locations with large day visitor catchments, good accessibility and a significant degree of complementarity with the local tourism strategies.

- In other instances, there will often be small scale opportunities to improve the visitor offer in close proximity to and linked to a wind farm development, including all weather access, signage and way marking, and information boards. Where landscape and habitats are being improved as part of a wind farm development, this may provide some opportunity to share information with visitors as a point of interest and to raise awareness.

- In other instances, it is important to minimise the potential for disbenefits during construction periods. This includes rerouting public access, clear signage and effective communication of disruption.

- In all of these instances, the scope to link public sector resources (Rural Development Programme and ERDF, for example) with community benefit payments from wind farm developers in creative ways should be explored. This provides potentially important way of providing additional resources to support local, often rural economies

Tourism and Economic Development

- Where a clear link can be established between a specific wind farm development and the likelihood of significant negative impacts upon the tourism economy, this would need to be mitigated through the planning approval.

- Although in other instances wind farm developments are far less likely to result in significant negative impacts, they are nevertheless seen by the tourism sector and other stakeholders as significant threats and may actually discourage some private sector investment as a consequence of the associated uncertainty. There is a role in these areas to use community benefit funds, where they are available and matched by public sector resources, in a much more strategic way to support the tourism sector.

1. Introduction

Background

1.1 Regeneris Consulting and The Tourism Company were appointed by the Welsh Government to carry out a study of the potential impacts of onshore wind farms and associated grid infrastructure on the visitor economy within Wales.

1.2 A diverse range of factors influence the tourist industry, mostly unrelated to wind farm development. These include global economic conditions, fuel prices, the weather and national and international marketing campaigns. Previous research carried out into the impact of wind farms on tourism in Wales has indicated that for the majority of visitors, the existence of wind farms in the countryside does not significantly impact upon their decision to visit or return to Wales on holiday, while a common finding of many other surveys is the public's desire to find out more about wind farms and renewable energy.

1.3 As the number of wind farm developments at the planning, construction and operational stages in Wales has grown, the potential role that associated socio-economic benefits could play in supporting economic development and in particular rural economic diversification has become more widely recognised. At the same time, and linked to the tendency for wind farms to be located in rural areas with important visitor economies, concerns about potential dis-benefits have come to the fore. The importance of tourism related employment in many rural areas has led to a growing desire to understand more about the potential effects that developments could have on tourism activity, particularly in areas where the sensitivity of tourism activity to development is perceived as high but also reflecting wider concerns about the overall vulnerability of the tourism sector in these areas.

1.4 The issue of the relationship between wind farms and tourism has become highly controversial and the debate is increasingly polarised. Groups opposed to wind farm developments point towards the potential for wind farm developments to discourage visitors, and the resultant damage that a loss of visitor spend would do in already fragile rural economies. Those on the other side of the debate point towards a lack of evidence of a negative impact upon tourism (and even point to examples of a positive impact) and the positive role that the sector can play in rural diversification.

1.5 Against this backcloth, the Minister for Environment and Sustainability undertook to carry out the study examining the relationship between wind farm development and the visitor economy, following a recommendation from the Environment and Sustainability Committee.

Purpose of the Study

1.6 With these considerations in mind, the study has sought to provide a thorough, evidence based assessment, drawing on and carefully interpreting the wide ranging and complex evidence concerning the impact of onshore wind farms on tourism. As such, it is intended to inform the debate on the relationship between wind farm development and the visitor economy in Wales. It will also inform Welsh Government in various aspects of its policy making, ranging from informing the future development of its planning policy for wind energy, tourism and destination development, wider aspects of rural economic development, and various aspects of its

investment planning.

1.7 The specific objectives of the research study were to:

1) Estimate the size of the tourism industry in areas of current and proposed wind farm development – in terms of jobs supported and money spent in the local economy by tourists.

2) Determine the benefits and dis-benefits to the tourism sector from onshore wind farm developments and their associated infrastructure.

3) Determine how wind farms may enable tourism activity.

4) Produce qualitative case studies specific to Wales.

5) Assist in the development of policy, particularly in those areas where tourism is an important part of the local economy.

1.8 A number of parameters for the assessment were agreed with Welsh Government (these are set out in more detail in Section 2), including:

- Consideration of onshore wind farm development, as well as any major supporting grid infrastructure (but excluding any other energy generating technologies);
- A focus on wind farm development which had occurred to date, as well as the potential future development up to 2025 (to be consistent with Welsh Government's aspirations for installed capacity by this date);
- Developments in excess of 0.5MW only, below which the developments are considered to be micro-generation and much more widespread across Wales and less intrusive in the landscape.
- A spatial focus on Wales as a whole, but with a particular focus on the areas in which current and planned wind farms are concentrated.

Structure of the Report

1.9 The remainder of this report is structured as follows

- Section 2 provides an overview of the assessment approach and research tools.
- Section 3 provides an overview of the development of onshore wind farms in Wales.
- Section 4 provides an overview of the tourism sector in Wales, the key policy drivers and challenges for the future.
- Section 5 reviews the literature assessing the relationship between wind farm development and the visitor economy.
- Section 6 presents tourism profiles for the local impact areas in which wind farm development is currently or likely to be concentrated in.

- Section 7 presents three more detailed area case studies.
- Section 8 presents the overall impact assessment.
- Section 9 presents the overall conclusion and recommendations.

2. Overview of the Assessment Approach

Introduction

2.1 This section describes the proposed approach for assessing the impact of onshore wind farms development on the visitor economy across Wales.

2.2 The study was shaped by a number of parameters which were agreed with Welsh Government:

- **Time Period**. A focus on both existing wind farm development and potential future development up to 2025. The future period is broadly consistent with the Welsh Government aspiration for 2GW of installed capacity, which was also examined in the Renewables UK Cymru economic benefits study[1]. There is too much uncertainty about the nature of development beyond this period for a longer timescale to be used.

- **Scale and Locations of Installed Capacity**. Assumptions about the future scale and spatial pattern of future development were informed by all onshore wind farm schemes over 0.5MW which are either consented or currently in the planning system. Combined with the current operational capacity, these account for around 2.1GMW of installed capacity, which is in excess of the Welsh Government's aspiration for 2GW of installed capacity. In practice it is highly likely that a proportion of these will not be delivered within this timescale or not in the specific locations in which current proposals are located – in this regard this should be seen as a maximum development scenario for this period.

- **Spatial Focus of Assessment.** The spatial focus of the assessment is Wales as a whole, but with a particular focus on the local areas in which existing and/or future development is located. As outlined below, ten local impacts areas have been defined and are the focus of this localised analysis of the visitor economy and the assessment of potential impacts.

- **Estimation of Impacts on the Visitor Economy**. The study does not seek to quantify the total economic impact on tourism, in terms of jobs and GVA, in the local study areas. The approach has been to analyse the characteristics of the wind farm development, nature of the visitor offer and positioning, and the characteristics of the visitor. This has informed an assessment of the sensitivity of the visitor economies in local areas to wind farm development and conclusions on the likely impacts on this basis. It does not, however, seek to quantify the impacts in terms of tourism value or volume, or overall economic output, as the evidence is not sufficiently robust to allow this type of economic modelling.

Initial Reviews

2.3 The detailed development of the assessment method was informed by initial desk research including:

- Review of literature: exploring the relationship between wind farm development and the visitor economy, based on a review of the existing evidence from the UK and also other countries where appropriate. This also included a review of changing attitudes to

[1] Economic Opportunities for Wales from Future Onshore Wind Development, Renewables UK Cymru, January 2013.

renewable energy and wind farms amongst the general public. The findings of this task are set out in Section Five.

- Mapping wind farm operation and future development across Wales: this task involved the detailed mapping of all operational, consented and planned wind farms and associated grid infrastructure, in order to establish the current and future spatial pattern of wind farm development. This included examining land use policies and the influence this exerts on spatial distribution of wind farm development.

- Local analysis of tourism areas: analysis of key datasets, local surveys and consultations with local authorities have been used to draw up profiles of local tourism economies. These included volume and value indicators but also capture the reasons for visiting different parts of Wales and the characteristics of visitors.

2.4 The findings from each of these tasks have been brought together to understand how the existing evidence base on the tourism impact of wind farms can be credibly applied, to consider the potential impact on the tourism sector in Wales as a whole, but also in those locations most affected by the presence of wind farms and associated infrastructure.

2.5 Following the review of findings from the initial tasks, the detailed approach to the assessment was developed and refined in consultation with Welsh Government. At the heart of this assessment was **a bottom-up approach** which focused on local area assessments for the areas in which wind farm development had been located to date or was proposed in the future. The advantage of this approach reflects the clustering of most wind farms into around ten local areas across Wales and provides the opportunity to closely examine:

- The nature of the wind farm development which had occurred locally to date and/or proposed in the future, including their setting into the landscape.

- The characteristics of the tourism offer and visitor market of the local areas and the way in which these are changing over time (possibly through specific investment plans or marketing strategies).

- The manner in which this development had to date impacted on visitor behaviour and the local visitor economy or potential to impact in the future, given the **main risk factors** in terms of nature of development, the visitor offer and characteristics of visitors. The approach would also allow for consideration of other local factors which have influenced the visitor economy, including major new investments or closure of particular visitor attractions.

2.6 The approach is based on a more qualitative approach, but draws on quantitative evidence where this is available. However, there are a number of limitations in terms of:

- **The availability of tourism data at a local level.** Whilst we draw on data on the volume and value of tourism activity, there are some limitations in the comprehensiveness and robustness of this data (GBTS, IPS and Day Visitor Survey) at a local authority level. However, the local impact areas are typically smaller than and don't align to local authority areas and these surveys are not available below the level of local authority. We have nevertheless drawn on these surveys and other sources to gain an indication of the importance of the visitor economy in these local areas.

- **Gaps and inconsistencies in the evidence base.** The literature review is not conclusive in relation to the circumstances under which wind farm development impact on visitor behaviour and changes in the local visitor economy. While the evidence provides some valuable insight, it needs to be carefully interpreted and is not sufficiently well developed to enable local impacts to be quantified. Furthermore, there are a number of gaps in the evidence base that prevent a comprehensive assessment of impact being undertaken. In particular, displacement, pricing and substitution effects are not fully explored in the evidence base.

2.7 Other studies have adopted a **top down approach** to assessing the impact of wind farm development on the visitor economy, in some instances quantifying these impacts. These studies tend to be of two types, neither of which were considered appropriate in this instance (in part due to the relatively short time period available to this study):

- Studies using large scale surveys of visitors and tourism businesses. It was not felt that this approach, which is time consuming to implement, would add a great deal to the large number of survey based studies which have already been undertaken in Wales and other parts of the UK (especially Scotland).

- Econometric studies which seek to model the relationship between wind farms, visitor behaviour and the visitor economy as a whole. We concluded that the evidence base concerning the relationship between wind farms and the visitor economy is not sufficiently robust to enable this type of approach.

2.8 However, we have also drawn on a number of the studies which have assessed the impact of wind farm development at a national level (eg the Glasgow Caledonian University study for Scotland) in examining the implications of their findings for Wales.

2.9 Our overall assessment of the impact of current and future wind farm development (and the related infrastructure) upon the visitor economies of Wales and specific localities therefore draws on a comprehensive analysis of the existing evidence, as well the bottom up assessment for particular local impact areas.

Local Impact Assessment Approach

2.10 The local impact assessment consisted of the following steps.

Step 1: Define Local Impact Areas

2.11 The study needed to define local impact areas based on the visibility of turbines and the potential to affect tourism. Large wind turbines can be visible for up to 35km in clear weather conditions and when located in upland areas, however at this range they have only a negligible presence on the landscape and there is no evidence that visitor behaviour is in any way affected when viewed from this distance.

2.12 A number of studies have shown that proximity to wind farm development is an important factor in determining visitor reactions to wind farms. A 2003 study of tourism in Wales (NFO, 2003) found that reactions to turbines became less negative as distance from developments increased while Westeburg et al (2012) found that wind farm dis-amenity cost on tourism revenues were minimal for distances over 8km, although this was related to offshore developments where

visibility is likely to be greater than onshore turbines.

2.13 This study has used a 7km distance for the purpose of defining an outer boundary for the local impact zones. This distance is taken from guidance published by the European Wind Energy Association (EWEA 2009) which states that, although turbines are visible beyond this distance, the apparent size is small and the impact on the landscape not significant. Alternative guidance published by the Scottish Government in PAN45 (Scottish Government, 2002) stated that, for distances between 5km and 15km, turbines could be prominent in clear visibility but only as a part of the wider landscape (i.e. they would not be visually dominant). It is possible that some visitors would still be deterred from visiting areas over 7km from wind turbines, however, based on the evidence above, it is considered that these would be a very small minority.

2.14 Since some of the current and planned wind farms are within proximity of each other (i.e. within 7km), a number of these local area zones overlap each other. Whilst this indicates that multiple wind farms may be in proximity of each other, it does not necessarily mean that multiple wind farms will be visible from any single viewpoints within these zones (although of course that could and will be the case in instances). However, where multiple wind farms can be seen they could have a cumulative impact in terms of the effect on visitor perceptions and behaviour.

2.15 Allowing for this overlapping of zones locally, the zones have been grouped together into nine separate local impact areas. The 7km zones have been grouped based on shared characteristics including:

- Landscape
- Population density
- Urban/rural classifications
- Tourism market character and interdependencies.

Although there is some variation in these factors within study areas, the grouping approach is intended to strike a sensible balance in terms of selecting areas with meaningful visitor economies in terms of their size and offer, as well as proximity to wind farms in terms of the potential for impacts on these visitor economies.

Figure 2-1: Map of Nine Study Areas

Step 2: The Local Impact Framework.

2.16 The purpose of the local impact framework is to establish a consistent method for assessing the sensitivity of local impact areas' visitor economies to wind farm development, based on the key findings from the literature. The evidence review points towards three groups of factors as being important in influencing the sensitivity of visitors to these developments and hence ultimately to potential impacts on the visitor economies as a whole:

- Scale and characteristics of existing and proposed wind farm developments in the area
- Characteristics of the local visitor economy and its offer
- Characteristics of visitors.

2.17 As concluded by the evidence review, there are some local area level indicators which could point towards there being greater potential for negative effects. These are outlined in Table 2.1 below

Table 2.1: Factors Associated with a Greater Sensitivity of Visitor Economies to Wind Farm Development

Type of Factor	Indicator	Explanation
Characteristics of Development	Scale of development (especially larger scale wind farms with more than 10 turbines)	The scale of development is strongly linked to the potential for physical presence and visibility within the landscape (although the nature of the topography will also be a factor)
	Clustering of multiple wind farms in close proximity to main visitor hubs or facilities (and in instances, proximity to major routes for visitors)	As above
	Extent to which wind farms feature on or in close to high quality landscapes	The quality of landscapes are affected by various factors including land based uses and existing or previous development. The impact of wind farms will vary depending upon their siting within the landscape and visibility.
Characteristics of Tourism Area	Extent to which high quality (and previously undeveloped) landscapes are a key feature of the visitor offer	High quality landscapes which are a key aspect of the visitor appeal, may be more sensitive to development.
	Diversity of the tourism offer	The greater the diversity of the visitor offer the wider the range of visitors and less the potential sensitivity of the tourism sector to wind farm related impacts
	Popularity of the tourism area, in particular the capacity at which it operates	Areas which are popular or growing in visitor terms, may be able to adapt more readily if wind farm development were to be a threat to the local visitor economy
Characteristics of Tourists	The diversity of the visitors, in particular the representation of groups which might be more (eg olders visitors) or less sensitive to wind farms (eg overseas visitors or visiting for adventure activities)	Linked to the diversity of the visitor offer. This recognises that different types of visitors may be more or less sensitive to wind farm development (although some will be largely indifferent).
	Loyalty of visitors, in terms of their commitment to an area and repeat visiting behaviour	Regular visitors to an area may be more sensitive to changes in the natural environment if they feel ownership of the area. Again, a large number would be indifferent.

2.18 Whilst each indicator is assessed in its own right, a number are closely related. For example, the diversity of the tourism offer is closely related to the diversity of the visitors in most instances. Consequently, the assessment of each indicator takes account of the interrelationships with other indicators.

Step 3: Local Area Profiles

2.19 Area profiles were prepared for each local impact area, based on the research and consultations undertaken in the initial stages of the study. The profiles, which helped to populate the assessment framework, focused on the following:

- The extent of current and planned wind farm development in the impact area, including the size of wind farms and number of different wind farms which may be visible.
- An analysis of the volume and value of tourism activity in the area, to better understand the scale of the visitor economy. As the areas do not correspond to local authority boundaries, an indicative estimate of the volume and value of the visitor economy was made (e.g. using GBTS the Day Visitor Survey, apportioned on the basis of areas using proxies such as bedstock and employment data[2]).
- The landscape quality of the study area (using LANDMAP), as well as proximity to other special protected areas such as national parks, forests and woodland, heritage coast etc.
- The key visitor attractions and activities in the impact area. This helps to establish the diversity of the visitor offer in these areas and the main reasons why people visit. They also consider the manner in which the area is marketed to e.g. open, unspoiled landscapes or activity based holidays.
- The main visitor routes which pass through the study area, where people may encounter wind farms.
- The characteristics of visitors, focusing on factors such as the age of visitors, socio-economic groups, and the degree to which it relies on repeat visitors (subject to the availability of information).

2.20 This assessment enabled a categorisation of the local impact areas across all of the different elements in the framework and begin to assess the degree of sensitivity of different areas to wind farm development. It should be noted that the indicators only provide an indication of the potential sensitivity of the visitor economy in a local impact area to the scale and nature of the current and proposed wind farm development. Whilst the overall assessment of the expected impact of wind farm development in each local impact area takes account of these indicators, it also requires careful interpretation of the indicators themselves and the wider context in these areas.

Step 4: Local Case Studies

2.21 Case studies were carried out in North Powys, North Anglesey and Neath Port Talbot and Rhondda Cynon Taf. These areas were selected as they are already home to a number of established wind

[2] Chapter Six provides a more detailed description of how tourism volume and value were apportioned to local areas

farm developments.

2.22 The purpose of the detailed case studies was to gather actual evidence of the impact of operational wind farms upon the visitor economy in a number of the local impact areas. The purpose was to fill a specific gap in the literature, namely ex-post assessments of the impact of actual large scale wind farm developments on local visitor economies rather than relying on ex-ante survey evidence of visitor intentions.

2.23 The case studies drew upon local research where it was available and a set of structured consultations with local tourism associations and local authority tourism officers. Whilst these consultees provided views for their particular communities and stakeholders, these views were also tested through consultations with businesses in close proximity to existing wind farms or catering for visitors most likely to be affected.

2.24 The approach taken to the case studies allowed an in depth exploration of recent trends and characteristics of the local tourism economy, and the relative importance of wind farms in explaining changes compared to other factors, such as investment in the local tourism sector.

Step 5: Application of Impact Framework

2.25 The framework for assessing impact was applied to each of the local impact areas based on the review of local area profiles and case studies. Each indicator was rated on a scale of one to five, where one equals very low sensitivity and five equals very high sensitivity. The findings were used to reach a view on overall sensitivity to wind farm development and the implications of this for the potential change in visitor numbers.

3. Onshore Wind Farm Development in Wales

Introduction

3.1 This section provides an overview of onshore wind farm development in Wales, including:

- The policy context that has shaped the development of onshore wind in Wales
- The scale and geographical distribution of current and planned wind farm development
- A comparison with the scale and density of development in other parts of the UK.

Policy Context

3.2 The Welsh onshore wind industry is subject to, and driven by, a wide array of policies at the EU, UK and Wales level. Here we focus on the evolution of Welsh policy to date, although it should be noted that projects with a capacity greater than 50MW are determined by the UK Planning Inspectorate (formerly this was the responsibility of the Infrastructure Planning Commission, which was abolished in April 2012).

3.3 Against the backdrop of numerous regulatory and statutory drivers, at the UK level, the key policy mechanism supporting the development of onshore wind is the Renewables Obligation (RO), which is intended to accelerate the deployment of renewable energy technologies in order to enhance energy security and contribute towards the delivery of wider carbon emissions targets and obligations. RO are being replaced in March 2017 as part of the reform of the electricity market.

3.4 Moving to low carbon energy production and maximising the economic opportunities from the low carbon transition have for several years been stated priorities for the devolved Welsh Government. Given Wales' natural advantages in wind energy, development of onshore wind forms an important part of this response. The stated ambition within the current Programme for Government (2011-16) is *to 'create a sustainable, low carbon economy for Wales*' (WAG, 2012).

3.5 As set out below, Welsh policy towards renewable energy in general, and to onshore wind in particular, has evolved in recent years.

2005 Planning Policy

3.6 Back in 2005 the then Welsh Assembly Government issued a Ministerial Interim Planning Policy Statement (WAG, 2005) that set a target for generating electricity from all renewable technologies to 4TWh by 2010, with an aspiration that this would then increase to 7TWh by 2020. Within this overall target, a technology specific target was set for an additional 800 MW of onshore wind capacity by 2010 (i.e. additional to the 233 MW that was already operational at that time). It was recognised that Wales had natural advantages in onshore wind:

"This is based on Wales' abundant onshore wind resource and the fact that onshore wind power is the most viable commercial technology available that will provide a high degree of certainty of meeting the 2010 target."

Technical Advice Note (TAN) 8

3.7 Subsequently, WAG published planning guidance known as TAN 8 (WAG, 2005b). This set out a strategic approach to enable the 800MW target to be met. A key element within this was the establishment of seven Strategic Search Areas (SSAs) where large-scale wind farms were to be located. Each SSA was given an indicative target that totalled to 1,120 MW amongst the seven areas; the excess was to allow flexibility in reaching the 800 MW target. A footnote also explains that capacity in these areas could be increased to give an overall SSA maximum capacity of around 1700 MW.

The Renewable Energy Route Map

3.8 Welsh Government, along with the UK Government and other devolved administrations, published its Renewable Energy Road Map[3] (WAG, 2008) in 2008 as a consultation document. This suggested that the target for 7TWh by 2020 be increased significantly to 33 TWh by 2025. The implication for onshore wind is that the capacity potential would be up to 2500 MW, or up to 6.5 TWh of electrical energy generated.

3.9 DECC, in conjunction with each of the devolved administrations has also published a Renewable Energy Roadmap (DECC, 2011). It mapped a number of possible deployment scenarios for onshore wind. In its central scenario, it identified potential for onshore wind to contribute around 13GW by 2020 which would equate to an annual growth rate of 13%. The 2013 update to the roadmap (DECC, 2013) showed that deployment of onshore wind was increasing strongly. Total onshore wind generation had increased by 25% on the previous 12 months. It warned however that a plateauing in the development of new onshore wind projects may be starting to occur, due to a limit on the number of sites available, growth of competing technologies and cumulative planning impacts.

Energy Wales: A Low Carbon Transition (2012) and July 2011 Ministerial Letter

3.10 A Low Carbon Transition (WAG 2012) moved the focus away from specific targets for energy production, towards how the energy sector can be supported and how the benefits for Wales can be maximised. It confirmed the Welsh Government's commitment to streamlining the planning process for energy developments and working to put in place an improved energy infrastructure to attract investment. It also outlined a number of measures to ensuring the economic and community benefits from energy investments are kept in Wales, including support for Welsh businesses to enable them to compete for energy contracts and workforce development initiatives to ensure that Welsh people have the skills they need to secure employment opportunities. The policy paper identified some of the key energy projects but did not specify a target for energy production through onshore wind.

Community Benefit Funds

3.11 In addition to the targets for onshore wind, the Welsh Government has also committed to ensuring that communities affected by energy developments see the benefits of those developments through community benefit funds (CBFs). Following a report by RenewableUK, which estimates CBFs to be worth more than £600,000 a year to local communities in Wales, the

[3] Welsh Assembly Government, *Renewable Energy Route Map for Wales, Consultation on way forward to a leaner, greener and cleaner Wales*, February 2008.

Welsh Government and RenewableUK Cymru developed a declaration which has been signed by all the largest wind farm developers, committing them to help secure long term benefits for the communities that host wind farms. The declaration is described as "*a commitment from the developers to ensure a consistent and best practice approach to the way they engage with communities and to ensure that economic and community benefits are maximised*."

3.12 Community benefit funds offer opportunities for the development of a range of community assets which can provide benefits for communities. Examples include community-owned affordable housing projects, community land trusts and community power and energy schemes. CBFs are also being used to invest in community-led projects and initiatives which seek to address a wide range of local challenges, including health and education improvement schemes, community safety, improving transport connections etc. There are also examples of CBFs being used to invest in and improve tourism assets which is explored in this report.

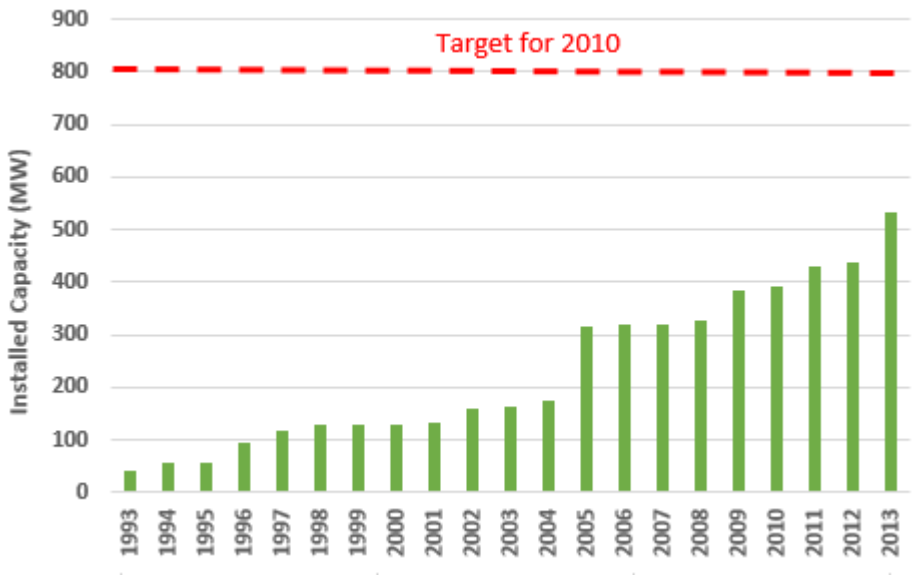
Development of Onshore Wind

Experience to Date

3.13 Figure 3-1 sets out the trend in the level of installed operational capacity (MW) over the past 20 years. It shows that development was fairly modest until around 2005 when a number of large wind farms were developed. These included Tir Mostyn in Denbighshire, Cefn Croes in Ceredigion and Ffynnon Oer in Neath Port Talbot.

3.14 Following this period of development, there was very little additional capacity installed between 2005 and 2008. By 2010, total installed capacity had reached 390 MW, less than half the aspiration identified by the Welsh Government.

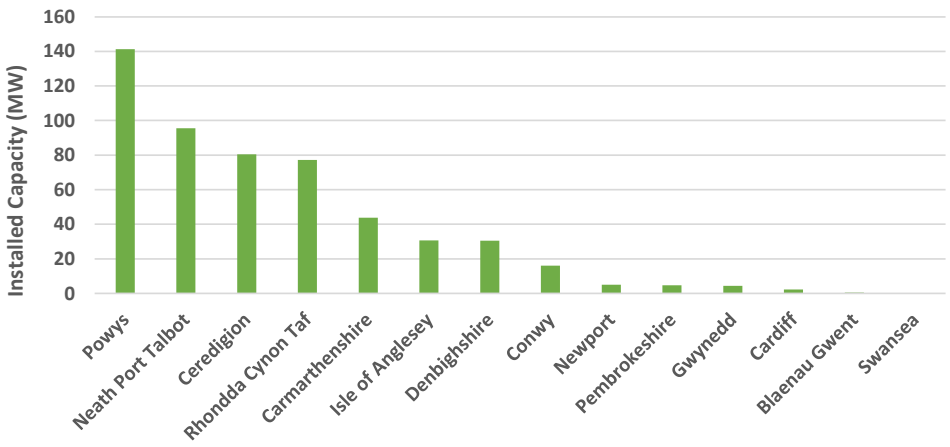
Figure 3-1: Cumulative Installed Operational Capacity in Wales, 1993-2013



Source: Department for Energy and Climate Change
Note: Data only includes wind farms with over 0.1MW in installed capacity

3.15 The wind farm development to date has been concentrated in a number of local authority districts, which largely reflect the locations of the SSAs identified in TAN8. Powys has the highest installed capacity (140MW), followed by Neath Port Talbot, Ceredigion and Rhondda Cynon Taf (between around 80 and 100 MW each). The data should be interpreted with caution - a number of wind farm schemes cross a local authority boundaries but have only been allocated to one local authority[4].

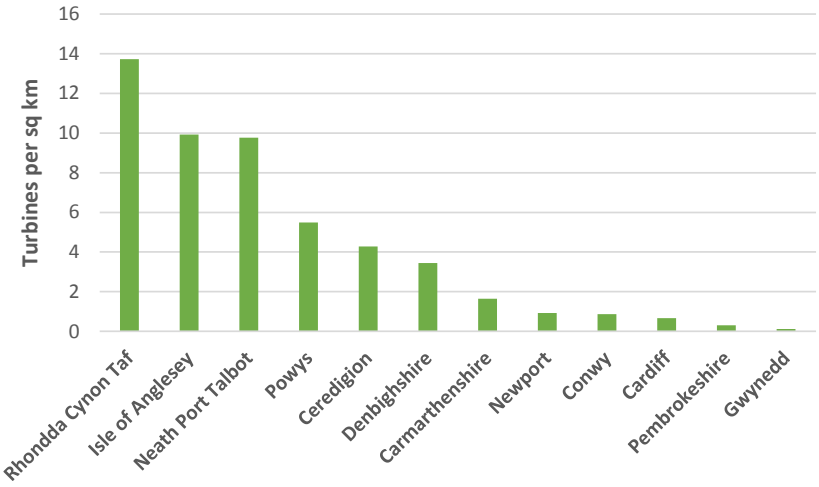
Figure 3-2: Installed Capacity by District, 2013



Source: DECC

3.16 The highest density of wind turbines by district (in terms of turbines per sq km) is in Rhondda Cynon Taff, Anglesey and Neath Port Talbot. Again, caution should be applied when interpreting this data as some of the turbines categorised as within Rhondda Cynon Taff are actually sited just within in the Bridgend County Borough boundary.

Figure 3-3: Number of Turbines per 100 sq km, 2013



Source: Desk based research of the number of turbines in wind farm developments in Wales,

[4] This occurs on the border of Rhondda Cynon Taff and Bridgend, the border of Neath Port Talbot and Carmarthenshire and the border of Powys and Ceredigion.

drawing upon various sources including thewindpower.net, renewables-map.co.uk, and individual developer websites
Note: this data only includes wind farms with over 0.5MW of installed capacity.

Comparison with Other UK Regions

3.17 Table 3.1 compares the installed capacity of Wales with other UK countries in 2013, based on DECC's onshore wind database. The data shows that Wales is still some way behind Scotland in terms of installed capacity relative to its size. Scotland accounts for over 60% of installed capacity in the United Kingdom. It also has the densest concentration of installed capacity, with 5.3MW per 1,000 sq km and the largest average wind farm size (21.3MW).

3.18 Wales ranks third for density, with 3.9MW installed for every 1,000 sq km. The average capacity per wind farm is half the size of Scotland, but larger than England and Northern Ireland.

Table 3.1: Comparison of Installed Capacity for UK Countries (Ranked by MW per 1,000 sq km)

	Installed Capacity (MW)	MW per 1,000 sq km	Number of wind farms	Average MW per wind farm
Scotland	4,179	53.3	196	21.3
Northern Ireland	504	36.4	60	8.4
Wales	534	25.7	51	10.5
England	1,522	11.7	234	6.5
Grand Total	6,739	27.7	541	12.5

Source: DECC
Note: The DECC database does not include the number of turbines so it has not been possible to compare on this basis.
The number of wind farms is based on the number of records in DECC's database, however a number of these will include extensions to existing wind farms.

Future Prospects

3.19 DECC's database also contains information on proposed wind farms, as well as those which are operational. These include consented wind farms which are under or awaiting construction, and those wind farms which are still in the planning system. While there is a high degree of certainty that the consented wind farms will be developed in the next ten years, there is less certainty about those which are still in the planning system.

3.20 DECC's database for Wales show there have been 38 planning applications refused since 2000, which is slightly more than the number which have been approved (36). A large proportion of these have been refused on the grounds of unacceptable changes to the landscape character of an area, particularly where wind farms have been located close to a National Park or an area of outstanding natural beauty. Proximity to heritage sites and ancient monuments is also cited in a number of cases. Effects on tourism are occasionally referenced as one reason why the application was rejected, however this is usually identified as a potential consequence of the intrusion on the landscape[5].

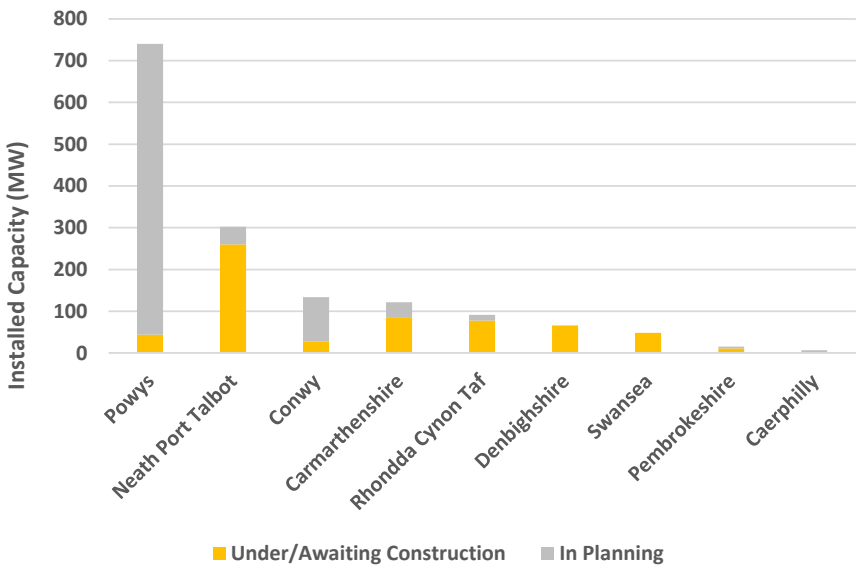
3.21 Given the large number of applications which are refused, there is clearly a great deal of uncertainty about the scale and location of future wind farms. For the purpose of this study, the

[5] We will be able to provide a more detailed analysis of the reasons for planning refusal in the final report.

assessment is based on all wind farms which have received consent or are currently in the planning system.

3.22 In total there is an additional 590 MW of installed capacity with planning consent and 920MW in the planning system. Figure 3.4 shows that the major focus for future wind farm development in Wales is in Powys, with 44 MW consented and yet to be constructed, and a further 700 MW lodged in the planning system for determination. Many of the schemes currently seeking planning permission are the subject of a conjoined public inquiry, which will consider a range of evidence before making recommendations on future development. The other areas which could see a large increase in wind farm development are Neath Port Talbot[6], Conwy and Carmarthenshire.

Figure 3-4: Wind Farms with Consent or in Planning System



Source: DECC
Note: Future wind farms have been allocated to a single authority. However many will cross local authority boundaries. The most notable example is the Pen Y Cymoedd development, which will straddle the NPT and RCT border. This will be the largest onshore wind development in Wales but appears in the data as being located in NPT.

Local Context of Wind Farms

3.23 The operational and planned wind farms are located in very different environmental and landscape contexts. Factors such as the local topography, degree of forestation and proximity to developed areas will influence the visibility of the turbines and also visitor's reactions to their presence. Table 3-2 shows that a large proportion of the wind farms are located in upland grazing and moorland areas. Wind farms in these contexts are likely to be visible over a wider area than lowland wind farms or those in densely forested areas.

3.24 The wind farms also vary in their proximity to developed areas. Although a large proportion of the wind farms in the South Wales valleys are in upland moorland areas, many are in close proximity to roads, significant settlements and other urban development which will influence

[6] A large proportion of this is from Peny Cymmoedd

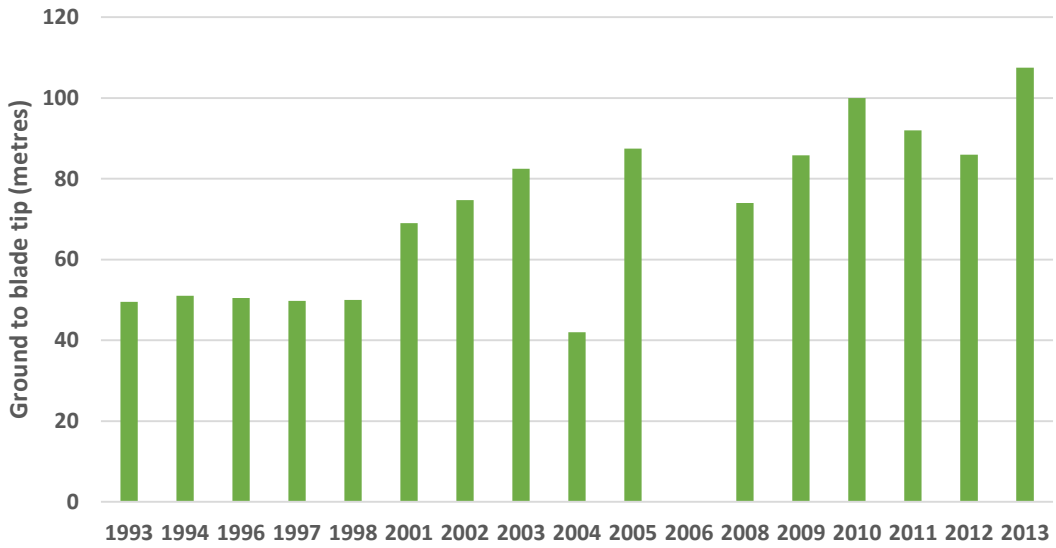
visitors' perception of the local context and their reaction to turbines.

Table 3.2: LANDMAP descriptions of Local Context of Wind Farms	
	Number of Operational and Planned Wind Farms
Upland Grazing	22
Upland Moorland	18
Open Rolling Lowland	14
Hill & Lower Plateau Grazing	8
Hillside & Scarp Slopes Mosaic	8
Hillside & Scarp Slopes Grazing	7
Mosaic Rolling Lowland	7
Urban	7
Wooded Upland & Plateaux	6
Flat Open Lowland Farmland	5
Other	11
Total	113
Source: LANDMAP. Note: Many wind farms cross a number of LANDMAP zones of classification. In each case, the grid reference provided by DECC was used to allocate wind farms to zones.	

Size of Turbines

3.25 Figure 3-5 shows there has been a general trend towards turbines becoming larger in height. The average ground to blade tip increased from around 50m in the nineties to between 80 and 110 metres in the late 2000s. This clearly increases the distance over which turbines are visible and the degree to which they may be considered intrusive on the local landscape. In turn there is potential for this to influence visitor reactions to wind farms.

Figure 3-5: Average Size of Turbines in Year they became Operational, UK



Source: various sources including thewindpower.net, renewables-map.co.uk, and individual developer websites. Note: no new turbines were constructed in 2006.

Associated Infrastructure

3.26 New sources of energy, including wind farms, need to be connected to the National Grid to ensure that electricity generated anywhere in England, Scotland and Wales can be used to satisfy demand elsewhere. The infrastructure required to connect power stations to the Grid includes substations, underground cables and overhead power lines on pylons. Pylons and overhead lines are arguably the key source of concern for this study as they have a much higher visual impact than other types of infrastructure

3.27 Figure 3-6 shows the existing locations of the overhead lines in Wales, as provided by the National Grid. It shows that the existing pylons are in South and North Wales, with no existing infrastructure in Mid Wales. There are still pylons in these areas, but these belong to electricity distributors rather than the National Grid. It has not been possible to map these distributors' networks. As these networks are for the purposes of distribution rather than connections to energy generation, they are not considered to be "associated infrastructure" for the purposes of this study. There are, however, large numbers of distribution pylons throughout Wales, particularly around significant settlements, meaning that they are a familiar and common site.

Figure 3-6 National Grid Overhead Lines

Source: National Grid

4. Tourism in Wales

4.1 This section provides an overview of the size, characteristics and recent performance of the tourism sector in Wales. It also summarises the Welsh Government's aspirations for the sector and key policies and strategies which have been put in place to improve performance.

Measuring the Volume and Value of Tourism Activity in Wales

4.2 The range of sources which can be used to quantify the volume and value of tourism activity include the following:

- **National surveys of tourism activity**. Nationally conducted surveys can be used to estimate the number of trips and associated expenditure. As these surveys are based on a sample of visitors they are subject to margins of error and often cannot be disaggregated below regional level. There is no single survey which covers all types of visits so the following sources need to be used to build up a picture of tourism activity:

  1) International Passenger Survey (IPS). This dataset provides an estimate for the number of visits made to Wales by overseas tourists. It also provides information on expenditure, accommodation type, length of stay and visitor origin.

  2) Great Britain Tourism Survey (GBTS). This dataset focuses on the number of overnight stays in Wales by domestic tourists only. Like IPS, it also provides wider contextual information about accommodation type, expenditure, length of stay and various visitor characteristics.

  3) Great Britain Day Visits Survey (GBDVS). This survey is used to estimate for the number of day visits to tourism locations within Wales and the associated expenditure. The dataset has only been available since 2011 so trend based data cannot yet be accessed.

- **Tourism Economic Impact Models.** There are a number of commercially available models which draw on locally produced data (such as estimates of bed stock, occupancy rates, visitor surveys, etc) to provide local authority based estimates for the number of day and overnight visitors to an area, the spend in the local economy and associated employment in tourism sectors (as well as various other characteristics of the visitor economy). The most widely used models are the Scarborough Tourism Economic Activity Monitor (STEAM) and Cambridge models, which both draw on locally collected intelligence to provide estimates for the overall volume and value of tourism activity in local authority areas. These models cover both direct and indirect expenditure and employment. Data from these models is not available on a consistent basis across Wales so has not been used as part of this analysis.

- **Locally collected data.** Alongside these tourism models, there is a range of locally collected data which provides a finer grained and detailed picture of the nature of tourism activities, the characteristics of visitors and the nature of the local offer. This includes visitor surveys; however the robustness of these datasets can vary significantly. Those carried out by Visit Wales tend to have larger sample sizes and can be disaggregated to a regional level.

- **Published economic datasets.** Nationally produced datasets such as the Business Register and Employment Survey (BRES) can be used to estimate the total level of direct employment in businesses trading in tourism related sectors. The estimate of employment in the visitor economy derived from BRES data overstates the level of direct tourism employment as it is based on a sector definition of employment and includes activity which is supported by both tourists and residents (e.g. restaurants and bars). It is not possible to measure indirect employment using this dataset.

The Importance of Tourism to the Welsh Economy

4.3 None of these sources offer a perfect or complete measure of the volume and value of tourism activity in Wales or the employment supported in the sector. It is necessary to draw together data from a range of sources to provide a full picture of the importance of the sector.

4.4 Estimates of visitor numbers and spend drawn from IPS, GBTS and GBDVS in the table below indicate that there were 111 million tourism visits to Wales in 2012, resulting in total visitor spend in the region of £5.7 billion. Day visitors make up the largest proportion of the visitor base in Wales and their expenditure accounts for 66% of the total.

Table 4.1: Overview of Tourism Activity in Wales, 2012

		Trips (million)	Nights (million)	Spend (£million)
Day trips	Domestic only	101	-	£3,834
Overnight Stays	Domestic	9	33	£ 1,550
	Overseas	0.8	7.1	£346
Total		111	40	£5,730

Source: Day Trips, GBDVS, 2012. Domestic overnight stays from GBTS, 2012 and visits from overseas from IPS, 2012

4.5 An assessment of the volume and value of tourism activity in Wales has been undertaken in the production of Tourism Satellite Accounts for Wales. This suggests that the direct expenditure of visitors to Wales in the local economy was £4.5 billion in 2011[7]. This spend contributed around 4% to national GVA in 2011.

4.6 The importance of tourism activity to Wales' economy is also evident in nationally collected employment datasets. The Business Register Employment Survey (BRES) indicates that there are in the region of 78,000 FTEs employed in tourism related activities[8] across Wales. Tourism therefore accounts for approximately 8% of total FTE employment across Wales.

4.7 While the estimates provided by various datasets are inconsistent, all highlight tourism as a very important sector which supports a large proportion of the Welsh employment base and contributes significantly to national GVA.

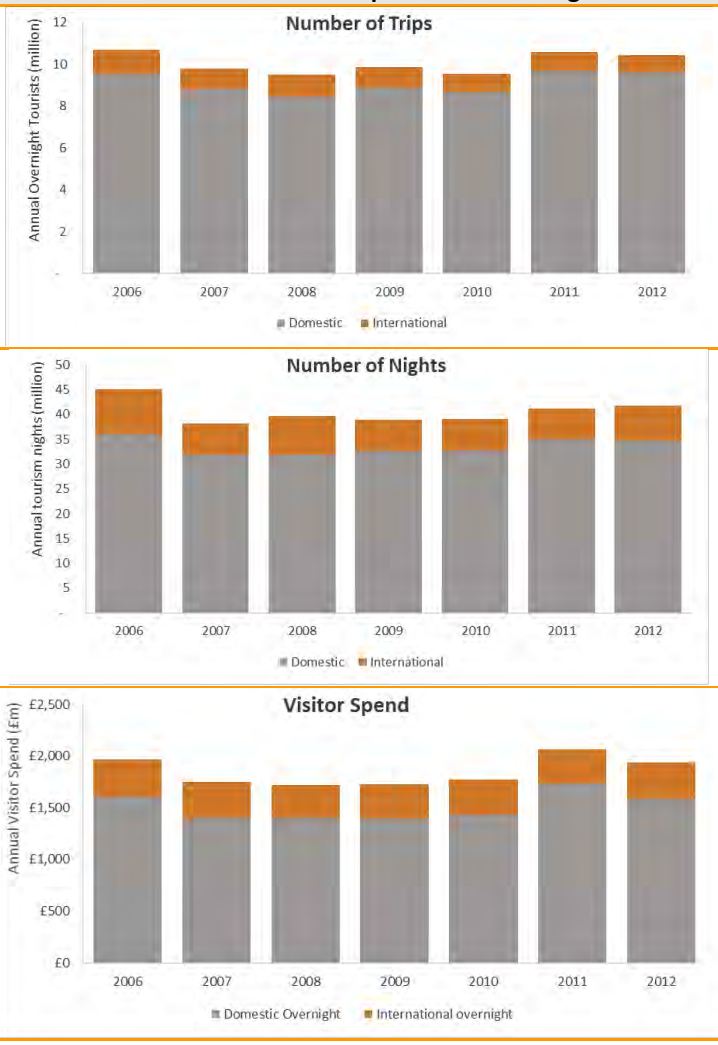
[7] Wales Tourism Satellite Accounts (2011)

[8] It should be noted that the sectoral definition of tourism employment used in the BRES analysis can overestimate the total volume of tourism employment as it also captures general service sector activities and employment which may not be supported by tourists (such as restaurant and bar employment).

Recent Performance

4.8 Trend data from IPS and GBTS is available for 2006 to 2012 and is presented below. These is no comparable trend data available for day visits so this trend analysis reflects only activities associated with staying visitors. The picture of recent performance that this provides is therefore only partial given the importance of day visitors to Wales' visitor economy

Figure 4-1: Recent Trends in Visitor Numbers and Expenditure: Overnight Tourists



Source: GBTS and IPS, 2012

4.9 In terms of visitor numbers (i.e. the annual number of trips to wales made by overnight tourists) the picture since 2006 has been reasonably static. There have been some annual fluctuations in overall numbers and the number of trips made in 2011 and 2012 appears slightly elevated, although this may not necessarily point towards an increasing trend.

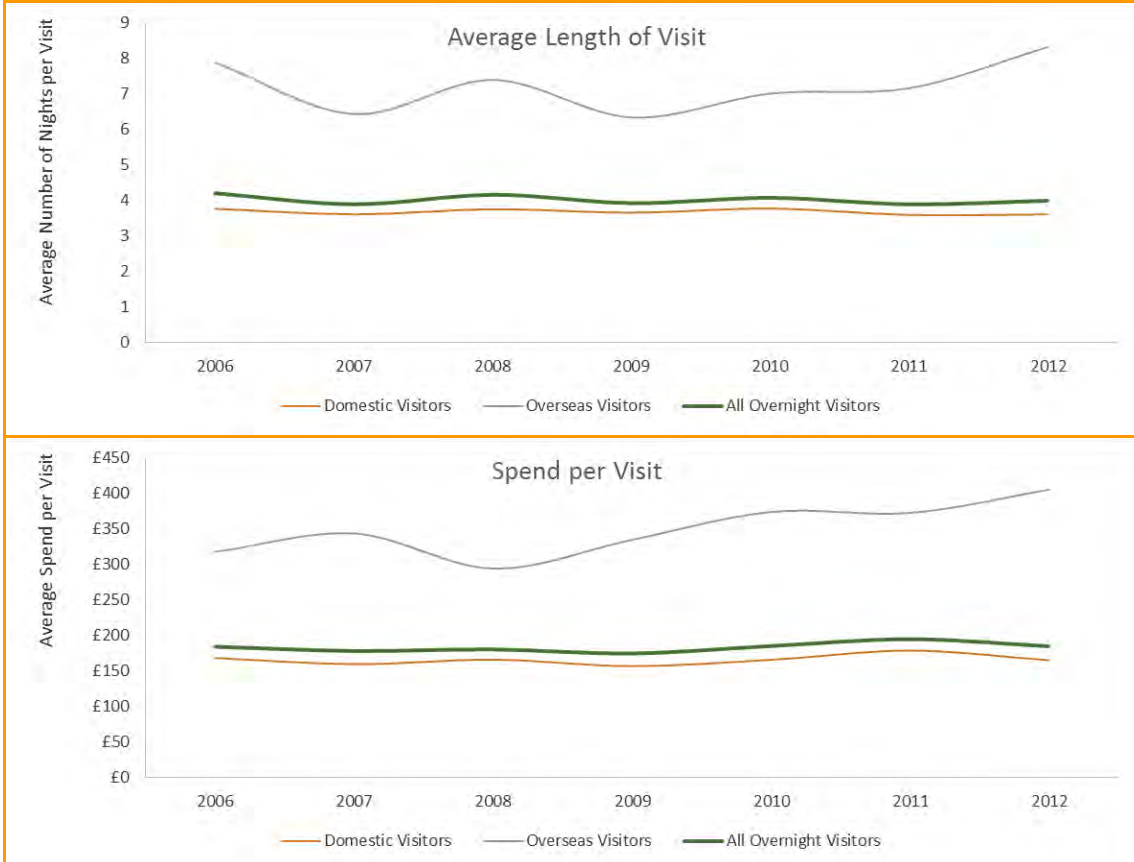
4.10 The total number of tourism nights broadly reflects the trend in visitor numbers although the slight increase in 2011 and 2012 is less pronounced, which suggests that although the number of trips has increased, average duration may have dipped.

4.11 Both visitor numbers and expenditure took a notable dip between 2006 and 2007, after which the volume and value of tourism activity remained largely stable until 2011. As Figure 4-1 shows, visitor numbers and spend have increases slightly since 2010 although the extent to which this is

indicative of a longer term trend is unknown.

4.12 The charts below highlight consistency in the average duration of overnight visits and associated expenditure since 2006. This consistency masks an increasing trend in the length of stay for international visitors and the average spend associated with each visit. As international visitors as such a small proportion of the total, this increasing trend is not reflected in the overall average.

Figure 4-2: Trends in Expenditure and Trip Length for Overnight Visitors



Source: GBTS and IPS

4.13 Tourism expenditure figures reported by IPS and GBTS are not adjusted for inflation. Taking the effects of inflation into account, the steady spend per visit should be interpreted as a real reduction in the average spend per visitor.

Tourism Areas

4.14 Each of Wales' four regions has a sizeable visitor economy and hosts a substantial number of day and overnight visitors each year. South East Wales (which has a concentration of tourism assets and attractions in Cardiff and the surrounding areas) is the destination for a large portion of annual day trips to Wales (43%) whilst North Wales takes the largest share of overnight visitors.

Figure 4-3: Proportion of Day and Overnight Visitors to Wales by Region

Source: GBTS and GBDTS, 2012
Note: Excludes international visitors.

4.15 Trend based data at the regional level is limited. For day visitors, there is no trend data available and it is not possible to disaggregate the IPS below a Wales level. However, the information available for domestic overnight visitors (from the GBTS) does allow some analysis of the recent performance of Wales' regional tourism economies.

4.16 The visitor number trends for the four regions shown in **Figure 4-4** indicates that there has been some fluctuation in visitor numbers to the four regions over recent years. Whilst the overall trend for North Wales and South West Wales has been towards a slight increase, the overall trend in South East Wales has been largely flat, whilst there is some indication that the number of overnight visitors to mid-wales has been decreasing over recent years.

4.17 These trends are not particularly pronounced however and may simply reflect the volatility of annual visitors numbers.

4.18 It should also be noted that as this analysis relates only to overnight visitors, there is a large portion of the visitor base missing (i.e. day visitors).

Figure 4-4: Visitor Number Trends for Wales Regions

Source: GBTS

4.19 The visitor expenditure trends in the figure overleaf largely mirror the trends in visitor numbers. In North Wales and South West Wales, annual visitor expenditure shows a positive trend. Whilst the trends relating to tourism expenditure in South East Wales and Mid Wales point towards a slight decline in expenditure. This decline would be more pronounced if the effect of inflation was factored in to the analysis.

Figure 4-5: Tourism Expenditure Trends for Wales Regions

Source: GBTS

Challenges and Opportunities

4.20 The Welsh Government's recent tourism strategy (WAG 2013) recognises the persistence of a number of challenges which the sector faces since it predecessor strategy was developed. Many of the challenges facing the sector reflect global trends such as continued economic uncertainty, price sensitivity within the market, changes in consumer behaviour, fuel prices and increased competition in the sector.

4.21 Locally specific challenges that have been identified by the Welsh government as affecting the sector include:

- **Branding and Brand Recognition**. The need to continually reinforce a coherent brand identify for Wales and foster brand recognition amongst potential visitors is recognised as a critical challenge for the sector. In particular the need to raise awareness of the nature of Wales' offer and overcomes out-dated perceptions about the tourism offer in Wales is recognised.

- **Quality of Accommodation**. The accommodation offer in Wales remains weighted towards the lower quality end of the spectrum. The challenge to encourage a higher

quality accommodation offer to reinforce aspirations to promote Wales as a high quality tourism destination remain.

- **Range of Attractions**. Although it is recognised that Wales has a diverse range of visitor attractions the relative lack of iconic, flagship, all-weather attractions is recognised as a challenge for the sector.

- **Skill Levels and Professionalism**. Developing and retaining the skills and professionalism required amongst the tourism workforce to ensure a quality experience for visitors is recognised as a key challenge for the sector. Developing skills within the existing workforce and business base, alongside boosting the status of careers in tourism amongst potential workers are highlighted as the key challenges.

- **Accessibility**. Air, rail and road connectivity remain as challenges which could inhibit the growth of the sector. In particular, the imposition of tolls on the Severn Bridges is viewed as having potentially disadvantageous effects on the sector.

4.22 The opportunities for tourism growth identified in the new strategy include the following:

- **Growth in International Tourism to UK.** The forecast growth in international visitors to the UK is expected to benefit Wales. An opportunity to maximise the share of this forecast growth that Wales can access has been identified. In addition branding and marketing efforts targeted on key overseas markets (Ireland, Germany, USA and Canada). Limited connectivity and air capacity are expected to act as barriers to realising these opportunities.

- **Build on Sporting Success**. Wales has already been successful attracting a number of major sporting events such as the Ryder Cup and the Ashes. This, in conjunction with the success national and local sports teams (e.g. the national rugby team, premier league football clubs) is presented as providing opportunities to reinforce the image of Wales as a destination for major sporting events.

- **Attract Major Events and Festivals.** Building on the existing success in attracting major events to Wales opportunities to selectively support new events to enhance the reputation of Wales have been identified.

- **Build on Recent Investment in Accommodation Offer.** Although the accommodation offer remains too focused on the lower quality end of the market, there is evidence of increased levels of investment in the self-catering and caravanning sector in particular that may provide opportunities to promote higher quality facility provision.

- **Continue to Grow the Heritage and Cultural Tourism Sector.** The wealth of culture and heritage assets and attractions are expected to continue to support growth in the tourism sector. Specific opportunities identified by the Welsh Government include enhancing visitor experience at existing attractions, growing the creative industries sector to further support the development of the cultural tourism offer and exploiting the appeal of internationally known stories such as the Arthurian legend a means of promoting Wales' offer more widely.

- **Grow the Business Tourism Sector.** Wales currently underperforms in this regard and

does not capture its full share of this relatively high spending and non-seasonal market. An opportunity to develop an international conference and events facility in Capital Region has been identified within the tourism strategy as offering potential to stimulate demand in this wider market.

Prospects and Strategic Aspirations

4.23 The tourism sector has been identified by the Welsh Government as a critical sector for the economy. The Welsh Government has recently launched a tourism strategy *Partnership for Growth: The Welsh Government Strategy for Tourism 2013-2020.* The strategy sets out the vision for the industry and Welsh Government to work in partnership to increase visitor spend to Wales. The strategy is designed to support the delivery of the priorities for tourism that are defined in the Welsh Government's Programme for Government:

- Develop tourism activity and specialist markets and secure maximum benefit from major events in our high profile venues.
- Promote Wales as a destination by making a high quality tourism offer.
- Work to extend the tourism season and associated benefits.
- Identify funding opportunities to improve the visitor infrastructure and product in Wales.
- Support investment in staff training and management to support a high quality tourism industry.

4.24 To support these aims, the strategy identifies a product led approach to developing and marketing tourism in Wales. In practice, this means working with iconic, high quality, reputation-changing products and events. There will be a focus on more luxury and branded hotels; more well-being facilities such as spas; more heritage hotels that utilise historic and distinctive buildings; more all year round attractions, activities and cultural experiences; more innovative, unusual and distinctive product.

Aspirations for Growth

4.25 The strategy sets out ambitious aspirations for the growth of the sector and highlights a headline ambition to **grow real tourism earnings by 10% or more by 2020**. This is a challenging target when considered in light of an increasingly competitive marketplace, challenging economic conditions and increasingly price sensitive visitors.

4.26 The strategic aim is to increase both the number and value of visitors by seeking to attract higher yield segments, in particular from international visitors (Germany, USA, Canada and Ireland are target markets)

4.27 The vision, aims and objectives of the strategy are set out in Table 4.2.

Table 4.2: Aspirations for Tourism Set out in The Welsh Government Strategy For Tourism 2013-20	
Vision	Wales will provide the warmest of welcomes, outstanding quality, excellent value for money and memorable, authentic experiences to every visitor.
Goal	Tourism to grow in a sustainable way and to make an increasing contribution to the economic, social and environmental well-being of Wales.
Ambition	Grow real tourism earnings in Wales by 10% or more by 2020 (this is estimated to equate to an unadjusted growth in earnings of 28%)

4.28 The strategy sets out the key areas where Wales is thought to have competitive advantage and upon which efforts should be focused and identified a number of areas of focus for investment in and development of Wales' tourism offer. These are:

- Heritage and culture
- Activity and wellbeing
- Food and drink
- Major events and festivals
- Business travel.

4.29 In addition to setting out the overall direction in which the Welsh Government wish to take the tourism industry, the strategy has been designed to unite the efforts of partners across Wales who are working in the tourism sector. Visit Wales and the four regional tourism partnerships are all aligning their activities to the broad aims set out in the strategy.

4.30 The strategy includes a commitment to regular delivery action planning whereby the Welsh Government, Visit Wales, local authorities, destination management partnerships and various other tourism organisations and stakeholders will take on responsibility for delivering actions. The commitment to a single unifying strategy underlines the importance attached to the tourism industry and the overall importance of achieving these goals.

4.31 The expectation is that as regional destination management strategies reach the end of their terms, the regional DMPs will operate within the aspirations set out in this strategy.

4.32 In addition to this new cross cutting strategy around which activities of partners are expected to align, the Welsh Government have two further strategies in place to guide the development of the country's tourism sector. Although now dated, these strategies highlight some longer standing aspirations for the sector.

4.33 The GB domestic market is the main market for Wales and will continue to be the main focus. Marketing activity will be increased in London and South East Midlands and Yorkshire, as well as within Wales itself for the first time. Overseas, the three key markets identified by the panel are Ireland, Germany and USA.

Table 4-3 Overview of Visit Wales Tourism Strategies	
Coastal Tourism Strategy, 2008	Sets out a range of aims and outcomes for coastal tourism in Wales to support the overall vision of *"An integrated year round coastal tourism industry, based on an outstanding natural environment and a quality tourism product that exceeds visitor expectations, whilst bringing economic, social, cultural and environmental benefits to coastal communities."* Specific aims include but are not limited to the following - Halt and reverse the decline in coastal tourism - Attract more higher spending visitors - Support more full time employment on the coast through tourism - Extend the coastal tourism season - Diversify accommodation base - Maintain environment and cultural heritage
Sustainable Tourism: A Framework for Wales, 2007	The vision for sustainable tourism in Wales is stated as : *'Wales is recognised internationally as a leading sustainable tourism destination that promotes local economic prosperity, supports community well being and engagement, enhances its natural environment and culture and delivers a high quality experience to visitors.'* To support the delivery of the vision, the strategy highlights four objectives and a range of aims, which are summarised below. 1. Promoting Local Prosperity: Specific aims under this objective include maximising the local economic effects of tourism (through local purchasing initiatives), strengthen the number and quality of tourism jobs. 2. Supporting Community Well Being and Involvement: Aims focus on securing impacts on local quality of life, community involvement and equitable distribution of benefits. 3. Minimising tourism's environmental impact. Aims are focused on use of renewable resources, minimising pollution caused by tourism visitors and enterprises. 4. Protecting and giving value to natural heritage and culture. Aims here focus on maintaining and enhancing the quality of natural landscapes and avoiding their physical degradation, minimise damage to natural areas, habitats and wildlife and support the wider conservation of natural areas.

Summary

4.34 The visitor economy makes a substantial economic contribution to Wales and supports a significant proportion of the country's employment base.

4.35 Day visitors make the most significant contribution to Wales' visitor economy in terms of expenditure, although there is insufficient data to fully explore trends in this important market. Domestic overnight visitors are the next most important segments of the visitor base and the volume and value of activity in this sector has been largely stable over recent years. In real terms, the value of expenditure associated with these visits is declining, which could reflect the increasing price sensitivity of visitors.

4.36 Overall stability in visitor numbers across Wales masks regional differences in performance;

trends in North and South West Wales suggest the visitor economy is growing in these areas. Conversely the trend is towards a slight decline in visitor numbers and expenditure in mid and south east wales.

4.37 The new tourism strategy for Wales sets out the overall direction in which the Welsh Government wish to take the tourism industry, the strategy has been designed to unite the efforts of partners across Wales. Heritage and culture, activity and wellbeing, food and drink, major events and festivals and business travel are expected to be the focal points for investment and growth.

5. Evidence Review for Tourism Impacts of Onshore Wind Farms

5.1 A review of the evidence relating to the potential impact of wind farm developments and associated grid infrastructure on tourism activity was conducted as part of the development of the assessment methodology underpinning this study. The review has explored both academic and non-academic research, with the objective of assessing the strength of evidence in relation to the following:

- The extent to which visitors might be encouraged or discouraged from visiting areas where onshore wind farms and associated infrastructure are present or can be viewed;
- The factors which might be most important in driving the positive or negative impact of wind farms on tourism activities;
- The extent to which the type of visitors, the types of tourism activities or the nature of the locality within an area affects the scale and type of impact; and
- Whether there are other factors which influence the nature and scale of the potential impact of wind farm development on tourism activity.

5.2 Whilst our primary interest is in the relationship between onshore wind farms and associated grid infrastructure and tourism, we have considered studies which relate to offshore developments and other structures. Studies have been included on the basis of the reliability of the methodologies employed9.

5.3 This section summarises the main findings of the literature review and highlights the implications of the evidence for the assessment methodology. A full bibliography and summaries of the findings of studies which have been reviewed as part of the evidence review are included within Appendix A.

The Nature of the Evidence Base

5.4 The literature which explores the potential impact that wind farms could have on tourism activity is not extensive. The primary research base can be divided into three broad groups; ex-post, ex-ante and wider research.

Ex-post Research

5.5 This part of the research base is limited in its coverage. Ex-post studies explore and provide evidence of the actual effects of specific wind farm developments. Relevant studies in this group are focused on assessing the observed changes in visitor behaviour after a wind farm has been built and is operational. These studies explore observed effects as reported by visitors, sector

[9] There are some frequently cited studies which have been excluded on this basis. For example survey research undertaken by North Devon Marketing Bureau in relation to the Fullabrook Wind Farm has been excluded due to the potential for self-selection bias resulting from the self-completion method employed and the low response rate (13%) achieved. Similar conclusions about this research were drawn in the public inquiry into the Fullabrook Wind Farm (The Planning Inspectorate, 2007).

bodies, tourism and other businesses.

5.6 The most helpful UK based studies of offshore wind developments are those carried out in relation to the North Hoyle and Gwynt y Mor wind farms off the coast of North Wales. These were amongst the first offshore wind farms developed in the UK (although construction of the Gwynt y Mor scheme has only recently got underway). Although there are now other offshore wind farms around the UK which have been operational for a number of years (for example, Kentish Flats, Barrow, Burbo Bank and Rhyl Flats), these have not been the subject of any ex-post study in relation to tourism impacts.

Ex-ante Research

5.7 The ex-ante research covers a group of studies which have been carried out to ascertain or explore potential reactions to wind farm developments. This group makes up the majority of the research base and includes both scheme specific studies, which tend to focus on impacts on a highly localised area and larger area assessments, which consider the cumulative effect that wind farm developments across a larger impact area could have on tourism activity.

5.8 The majority of scheme specific ex-ante studies rely predominantly on perceptions based survey research to draw conclusions about the potential for wind farm developments to affect visiting behaviour in the future. Although there is a lot of variation in the survey methods, study areas, sampling techniques and questioning types employed by these studies (which makes it difficult to compare the studies on a like for like basis) these assessments typically explore two types of effect:

- The extent to which the presence of a wind farm has an effect on the visitor experience; and
- Visitors' views on whether the development of a wind farm might affect their future visiting behaviour.

5.9 A smaller number use perceptions based research, along with other methods to assess whether there would be impacts on overall volume and value of tourism activity and the tourism economy more broadly.

5.10 The larger area assessments, often draw on similar methods to the scheme specific studies to explore the potential tourism impact of actual and proposed wind farm developments more generally across a larger regional area.

5.11 The majority of ex-ante studies focus on visitors themselves, although there are also a number of studies which explore the views of tourism related businesses, sector bodies and other stakeholders.

Wider Research

5.12 Alongside the thematic groups outlined above, there is a wider body of literature which encompasses

- **Studies which provide secondary analysis of the evidence base**. While some of these so-called meta-evaluations are helpful, there are many which draw selectively on the

available evidence and as a result may not provide a full assessment of the evidence.

- **Studies from overseas**. A slightly greater evidence base of studies has emerged from countries where the offshore wind sector has been established for longer. This includes both ex-ante and ex-post research.

- General perceptions based studies which explore **attitudes towards wind farms and associated infrastructure in genera**l (i.e. not in connection to a specific development proposal or area).

- General **tourism surveys** which explore what tourists value about a particular tourism destination and factors which enhance or detract from their experiences.

5.13 It should be noted that across all strands of the research base, there is limited coverage in peer reviewed academic literature. The lack of peer reviewed academic research in this area does not invalidate the evidence that exists although it does highlight the extent to which the evidence base is not yet well established. It is therefore necessary, when reviewing the evidence that exists, to consider the reliability of the methodologies used in available studies, particularly where survey research and impact assessment methods are used.

The Nature of Potential Impacts on Tourism

5.14 Studies in this field encompass a range of potential impacts that wind farms and other man-made structures might have on tourism activity. Most often, research is underpinned by the expectation that visual impacts will be the main drivers of tourism impact and assessments tend to focus on how visual impacts might alter the nature of an area's tourism resource or affect the visitor experience in an area. Other drivers of potential impact (such as noise, impacts on wildlife or perceived health risks) receive much less attention.

5.15 For a large proportion of studies, the assessment is presented in terms of the impact of developments on **visitor numbers.** Ex-ante research and some ex-post studies draw on perceptions based surveys to quantify effects on visitor numbers. Some studies go on to use changes in visitor numbers to estimate the associated change in visitor expenditure and employment. Assessment of potential impacts on visitor numbers is complicated by the fact that as well as affecting visitors' propensity to visit or not, the presence of wind farms could have an effect on the **frequency and duration of visits.** Far fewer studies seek to capture these more nuanced effects on visitor numbers.

5.16 Irrespective of the level of detail in the assessment, studies which focus on visitor numbers are seeking to capture the impact of a development or group of developments on the demand for tourism in a particular location. Impacts are most frequently presented in terms of visitor numbers, spend and employment. There are far fewer studies which explore the extent to which disruption in demand affects the **price or value of an area's tourism asset**.

5.17 Any perceived reduction in the attractiveness of the landscape or wider effect on the tourism experience could reduce visitor demand to such an extent that it results in reduced prices. This was the approach taken in the GCU (2008) study of the potential impact of wind farm developments in Scotland. This was explored further in Riddington et al (2010) who undertook an online survey of potential tourists to explore their willingness to pay to upgrade to a hotel room without a view of wind turbines and other man-made structures. It is important to note

that price effects can operate independently of impacts on visitor numbers and as a result, research that focuses solely on visitor numbers reflects only part of the picture of potential impact. For example, it is feasible that the number of visitors to an area could remain the same yet the value that they attach to a particular location and willingness to pay for certain activities, views etc may change and as a result tourism expenditure and associated employment in the area.

5.18 Although some studies touch on this important source of impact, there has been little research which explores potential pricing effects in detail.

Common Messages

5.19 The relative youth of this as a field of study together with the range of research questions explored by relevant studies, variety of methodologies used and breadth of study contexts mean that it is difficult to highlight consistent messages. Across the research base, there are a number of common themes and conclusions, which are outlined below:

1 – Responses to wind farms are subjective and as a result there is a great deal of variability in tourists reactions to wind farm developments

5.20 Across the ex-ante and ex-post evidence base, the central and fundamentally important theme which emerges is the variability in individual tourists' reactions to wind farm developments. While the precise findings of studies vary, they all point towards subjectivity in individual's interpretation of the structures and variation in the extent to which individual tourists would be likely to alter their behaviour in response to the presence of wind turbines or other structures.

5.21 As well as reflecting the level of subjectivity in the assessment, this variability reflects the breadth of motivations and complexity of the decision making processes in relation to tourism visits.

5.22 Given the breadth of motivations for visiting particular tourist areas, the relative importance of scenery and landscape to a decision to visit an area will differ from one tourist to the next, according to the values of the tourist, the reason for their tourism visit and the activities they wish to engage in. In addition to this, the subjectivity of visitors' judgements in relation to whether wind turbines are a positive or negative addition adds a further layer of complexity to understanding and predicting impacts on tourism activity.

5.23 Similarly, the relative importance of wind farms compared to other factors that could detract from the visiting experience is an important consideration here. Wind farm specific studies as well as more general tourism research have found that wind farms tend to be ranked fairly low amongst the factors that could detract from tourism experience. However, electricity pylons tend to be ranked more highly than wind farms as having a negative effect on landscape value.

2 – The majority of tourists are neutral about wind farms and do not expect their future visiting behaviour to be affected by their presence.

5.24 This is a common finding across all of the studies reviewed (both in the UK and overseas). There is some variation in the actual percentage of visitors who report neutral reactions across the studies but this is likely to reflect a number of factors. Firstly, for scheme specific studies, the variety of contexts (in terms of the nature of the development and the nature of the tourism areas being assessed) is likely to have an influence on findings.

5.25 Secondly, the study methodologies and question types used also varies. Although this does not have an effect on the overall findings, it could contribute to the variation in precise percentages highlighted by the reports. For example, the intercept survey element of the GCU study highlights 98% of visitors to Scotland who had seen a wind farm on their visit reporting no effects on their decision to visit Scotland again while the internet survey element of the same study found a smaller percentage of visitors (62%) would report no influence on their future behaviour if the number of wind farms in Scotland was to increase (although the remainder were split equally between those who would be positively or negatively influenced as a result). The researchers concluded that the internet survey approach and question phrasing meant that the achieved sample was more likely to discourage respondents from reporting neutral views and less representative of the tourist base in Scotland than the tourist intercept survey.

5.26 While there is a degree of variation in the results, the fact that almost all of the studies conclude that the visiting behaviour of the majority of visitors would not be influenced by the presence of a wind farm is an important finding, although this should be interpreted in light of the scale and type of development assessed.

3 - The proportions reporting that they were more or less likely to visit as a consequence of a wind farm development are typically small and often evenly balanced.

5.27 So while some view wind farms as having a negative effect on their enjoyment of the landscape or tourism experience, others see them as an enhancement. This is an important point as it illustrates the subjectivity of people's perceptions about wind farm developments and the range of potential reactions.

5.28 Consideration of the overall net effect (i.e. subtracting the proportion who view wind farms as having a negative influence on the tourism experience from those who view them as having a positive influence) provides a useful means of comparing the overall strength and direction of feeling suggested by each study. Here, the findings range from a net positive balance (with on balance of 35% believing that wind farms have a positive effect on Argyll and Bute as a place to visit) from MORI's research in Argyll and Bute to a net balance of 13% of respondents to the Atlantic Array Tourism Survey indicating that the development might have a negative effect on the tourism experience.

5.29 It is important to note that detailed findings of studies vary considerably in this regard – while some point minimal potential for positive effects (i.e. an overall negative balance), an equal number point towards potential for neutral or overall positive effects. This variation will reflect both differences in research methodology and the context for individual studies. The relative size of the positive, negative and neutral groups will be influenced by a range of factors including the nature of the tourism area, reasons for visits and the specific characteristics and interests of tourists.

4 – Even where visitors feel that wind turbines affect their tourism experience this does not always translate into changes in visiting behaviour.

5.30 This is important given the range in net effects on the tourism experience that the studies report. However, across all of the studies reviewed, the proportion of visitors who report a negative impact on their propensity to visit in future is much lower than the proportion indicating that

wind farms detract from their tourism experience. The difference ranges from three percentage points in the NFO Scotland study to 24 percentage points in the GCU intercept survey.

5 - Large area assessments highlight evidence of localised displacement of tourism activity

5.31 Some of the larger area assessments have concluded that amongst the minority of tourists who would change their visiting behaviour as a result of a wind farm development, a sizeable proportion would still visit the region / wider area. As a result, these visits are not lost – merely displaced to elsewhere within the study impact area.

5.32 For example, the GCU study finds that the tourists whose visiting behaviour is more likely to be affected by the presence of a wind farm would not be lost to Scotland, rather they would switch to other destinations within Scotland and often within a relatively local area. The existence of a substitution effect is echoed in the research carried out in Cape Cod in the USA by Lilley *et al.* (2010) which finds a substitution effect where some people will move from one beach to another within a similar local area if a wind farm is built so the loss associated with the small proportion of visitors who do change their behaviour is lessened.

5.33 The tendency for larger area studies to factor in these substitution effects to their assessments means that the overall net effects on tourism that these studies calculate tend to be lower than more locally focused assessments. The most robust and up to date large area study is the 2008 study carried out by GCU. This found that, on balance, there will be little impact on the overall volume and value of tourism activity across Scotland as a result of wind farm development.

5.34 While very useful at the large area level, these studies would underestimate impacts at a more local level and therefore cannot be used to inform a bottom up assessment.

6 – The ex-post evidence base does not provide any evidence of negative impacts on visitor numbers

5.35 There has not yet been any detailed or comprehensive research into the overall effect of constructing onshore wind farms on tourism activity, or the relationship between wind farm construction and the health of the tourism sector. Most of the ex-post evidence that exists is based on surveys with residents or businesses in areas where wind farms have been constructed. While there are obviously limitations to this, it echoes the point about the subjectivity of the assessment and variability in tourist responses but overall provides no evidence of impacts on visitor numbers.

5.36 An important point here is that much of the ex-post research is now quite dated and relates to developments which were a novelty at the time they were developed. This may have influenced the findings about tourism numbers increasing following development. It is also very important to note that the lack of ex-post evidence of tourism impact may not necessarily reflect a lack of potential impact – it could point towards the planning system working well to ensure that wind farm developments are not sited in sensitive locations. So the lack of evidence of negative effects should not simply be interpreted as indicating that there will never be any impacts on tourism activity.

5.37 The ex-post evidence base overseas is slightly more developed that that of the UK and there is a small number of ex-post academic studies which have been carried out. The evidence from

Denmark points very clearly towards there being **no demonstrable impact** on tourism activities. Again, caution is required in interpreting and applying findings from overseas particularly given that the tourism contexts for these areas can be very different.

5.38 There have not yet been any comprehensive studies carried out in the UK which have sought to monitor actual visitor numbers and levels of spend over time in areas where wind farms have been developed. There is some evidence that general tourism volumes have not been affected in areas that have seen significant wind farm development. For example, research undertaken by Nicholas Pearson Associates (1996) reported that there had been no decrease in the overall number of tourists visiting attractions within 10km of the Delabole Wind Farm between 1991 and 1996. Their data showed that there had been a small increase in the number of visitors to some attractions. A study by the Cornwall Tourist Board (2000) found that the proportion of tourists returning for repeat visits between 1996 and 2000 (a period of expansion in the number of wind farms in the area) did not alter.

7 – Grid infrastructure is less well researched, but the available evidence suggests that impacts materialise in a similar way

5.39 There is only a handful of studies which have explored the effect of grid infrastructure on tourism activity. These studies indicate that the effects materialise in a similar way to wind turbines (i.e. visual impacts are the primary concern) but noise impacts are also a consideration.

5.40 The evidence that exists suggests that pylons tend to be viewed more negatively than wind turbines as having detrimental effects on landscape quality. For example, in both the Scotland and Wales NFO studies, a greater proportion of tourists highlighted pylons than wind turbines when promoted with a list of factors which could detract from their tourism experience. In Scotland, 51% of survey participants highlighted pylons (compared to 29% highlighting wind turbines) and in Wales the proportions were similar – 48% highlighted pylons and 23% turbines. However, it is important to note that in both of these studies, earlier questions which asked visitors to spontaneously identify aspects of the countryside which enhance or detract from their experience, only a very small proportion of the sample mentioned pylons or wind turbines. This suggests that although pylons are ranked as more visually intrusive than wind turbines, they do not feature as a high profile concern amongst tourists overall.

5.41 While the evidence base is limited in relation to grid infrastructure, recognition of the concerns that exist around potential tourism impacts has led the National Grid to consider undergrounding parts of the proposed grid extension which pass through the most sensitive landscapes.

Factors Influencing Observed and Predicted Impacts

5.42 The overarching findings outlined above are useful in highlighting the key principles that should underpin any assessment of the impact of wind farms and associated infrastructure on tourism activity. Given the consistency of general conclusions across most studies, we can be reasonably confident in the overall conclusion that in most circumstances:

- The majority of tourists would not alter their visiting behaviour in response to a wind farm development; and
- A small proportion could be either more or less likely to visit as a result of a wind farm development.

5.43 We know that studies vary in their findings about the proportion of visitors that would respond to wind farm development in a positive, negative or neutral way. Most often the positive and negative ends of the spectrum balance each other out but some studies highlight potential for a net positive or net negative effect. The variation in findings could be related to methodological differences across the studies (as concluded for example by GCU study 2008) but might also point to other factors having an influence on the reactions of tourists to wind farm developments and affecting the balance between neutral, positive and negative responses.

5.44 This indicates that there might be some circumstances under which the general conclusion outlined above would not hold. There has not yet been a comprehensive meta-evaluation which explores the factors which influence tourists' reactions to wind farm developments and the associated grid infrastructure. The UK evidence base is limited in this regard, but the overseas evidence provides a more rich resource as the sector is more mature and much better researched. However, findings from both the UK and overseas evidence should be applied carefully. In most cases, the studies have not been designed specifically to explore which factors influence tourists' reactions to wind farm developments and the conclusions drawn are often based on observed trends in the data and in many cases not rigorously tested for their statistical significance.

5.45 While there are limitations, the evidence does suggest that there are factors related to both the characteristics of wind farm developments and characteristics of tourism areas that might influence tourist reactions. This evidence could be helpful in predicting more localised impacts and highlighting the circumstances under which the balance between positive, negative and neutral reactions to wind farm developments could lean towards a net positive or negative effect. These factors are outlined below.

Size of Development

5.46 Evidence relating to the relationship between wind farm size and tourism impact is mixed but, on balance, suggests that **smaller wind farms generate a less negative response from tourists**.

5.47 The impact of the size of a development on tourism activity has been explored in terms of both the size and number of turbines in a small number of studies.

5.48 Face to face interviews with visitors using photo montages showing wind farms of different sizes were undertaken as part of the GCU (2008) study. These indicated that visitors became more negative about a wind farm when its size in the photo montage was extended. This finding contradicted conclusions from a different strand of the GCU research (a web based survey) which indicated that the influence of size on tourist reactions was relatively small.

5.49 Researchers at GCU warn that the size of the effect noted in the face to face interviews could have been exaggerated by the difference between stated intentions based on a hypothetical situation and actual actions that might occur in reality. That is, visitors could have used the interviews to register a general opposition to larger wind farms that might not have translated into changes in behaviour if the developments were constructed. Although not explicitly recognised in many ex-ante studies, this point applies equally to much of the ex-ante research base.

5.50 While GCU do not attach a great deal of weight to this finding it should be noted that the preference for smaller developments accords with findings of studies carried out elsewhere in the UK and overseas. Research by SEI (2003), Devine-Wright (2005) and Frankal and Kunc (2011)

all point towards a preference for small wind farms amongst the general public and tourists.

5.51 The evidence base in relation to the size of developments is not sufficiently detailed to allow us to identify thresholds / tipping points after which impacts start to materialise. The GCU study did conclude that the relationship between size and potential tourism impact is not a straight line one. Their web based research suggested that there is a diminishing marginal loss associated with wind farm developments. That is once there has been an intrusion into the scenery the effect of expanding the size of a development is small. The conclusion of the GCU study in this regard does not accord with the findings of other studies which have explored the impact of development size on the potential for tourism impact. For example, the NFO studies in Wales and Scotland showed marked differences in people's reactions to developments according to size, turbine layout and context.

Relationship with Other Developments

5.52 Findings which indicate a preference for a large number of small wind farms should be treated cautiously in the context of this assessment. There is **insufficient evidence to draw any conclusions about the cumulative effects of multiple wind farm developments**.

5.53 A number of studies (for example SEI, 2003 and Devine-Wright, 2005) have explored further the tendency for tourists and the population more widely to prefer smaller wind farms and reached the conclusion that there is a general preference for a large number of small wind farms. It should be noted that these studies were focused on general population views (rather than specifically in the context of tourism) and based on hypothetical developments. Research carried out in the Czech Republic by Frankal and Kunc (2011) relating specifically to tourism also concluded that tourists prefer a larger number of smaller wind farms. It should be noted that these studies were designed to explore the preferred configurations or wind farms and participants were not provided with a "no wind-farm" option.

5.54 The authors of this study argue that it is the degree to which a development changes the character of the landscape rather than its absolute size that is the driving factor. While there is clearly a relationship between turbine size and number of turbines and the impact on landscape character these findings suggest that landscape context is as important as the characteristics of the development itself in determining impact. That is, a large wind farm in a landscape with lots of other man-made structures could have less of an impact than a single turbine in an area of particularly high landscape value.

5.55 This suggests that the **context for the development** is a critical factor in determining potential tourism impacts. The findings of relevant studies suggest that the context for the development influences three inter-related factors: the nature of the landscape, the importance of landscape in an area's tourism offer and the characteristics and interests of visitors to a particular tourism area.

The Nature and Quality of the Landscape

5.56 The evidence base here points towards potential for greater impacts to occur where wind farms or other infrastructure are sited in areas of high landscape value.

5.57 The findings of Frankal and Kunc (2011) suggest that the context for a development affects the extent to which turbines or grid infrastructure would result in a change in the character of a

landscape. This may, in turn, influence how tourists interpret the structures. Similarly, Wolsink (2007) concludes that the type of landscape in which turbines are situated is one of the dominant factors in how visitors assess and interpret them. Devine Wright's research relating to the proposed grid extension in mid-Wales (2012) presented impacts as being driven by the contrast between the perceived naturalness of some landscapes and the addition of industrial features (in this case power lines).

5.58 As we might expect, there is particular sensitivity around areas of high landscape value. For example Park et al (2008) in relation to mobile phone masts indicated that there was particular opposition towards mobile phone masts located in national parks. Tourists were not prepared to accept negative impacts on landscape character in these areas, even though they accept and recognise the socio-economic benefits associated with their enabling technology use. This is an important point – some research suggests that tourists and the general public more widely are prepared to make a trade-off when interpreting and responding to new developments. In some contexts, the benefits associated with wind farm development may be enough to tip the balance in favour of the turbines, but there may be some contexts where development would never be accepted, irrespective of its wider benefits. This may not be the case for power lines as these do not tend to be viewed as having any notable wider benefits.

5.59 Research in this area suggests that decisions about destinations are driven by a complex set of factors. Amongst these, appreciation and enjoyment of landscapes and scenery are ranked highly, particularly in rural areas where most studies place scenery and landscape as the most important factor in destination choice. Studies tend to conclude that the majority of visitors to rural areas cite landscape and scenery as an important influence on their decision to visit a particular area, however it should be noted that while clearly important, landscape and environment is part of a wider set of factors that tourists weigh up when making a decision to visit particular areas. Other important factors identified in the research include attending specific events, visiting friends and relatives, history and cultural attractions, beaches and recreational resources (e.g. walking / rambling trails, restaurants).

5.60 Although the research base does not explore this explicitly, it makes logical sense that areas which have particularly high landscape value are likely to attract visitors who value landscape particularly highly amongst the factors which affect their visiting decisions. Although, even in these circumstances, we would expect that landscape value would be weighed up amongst other factors which determine visiting decisions.

5.61 Under these circumstances any changes to the landscape that are interpreted as having a negative impact could be more likely to go on to influence final decisions about visiting behaviour.

Importance of Landscape in an Area's Wider Tourism Offer

5.62 Overall, the evidence suggests that in areas where landscape is a dominant aspect of an area's tourism offer, the potential for wind farms to have a negative effect on tourism activity is greater.

5.63 However, it is important to note that none of the studies reviewed have explored whether the importance of landscape within an area's tourism offer is a factor which determines impact. Quality of landscape is one of many attributes of a tourism destination that visitors weigh up when making a decision to visit a particular place. The amount of influence that the landscape quality will have on tourism decisions (as well as views on what would constitute a high quality

landscape) differs from one tourist to the next, depending on what their particular motivations to visit are.

5.64 If an area's tourism offer is broad and contains a mix of assets and attractions over and above the landscape itself then the scope for impacts could be lessened as the visitors for whom landscape quality is a major factor in visiting behaviour would make up a smaller proportion of the total visitor base. While this effect has not been explored explicitly it is alluded to in a number of studies. For example, Frankal and Kunc (2011) suggest that couples and family visitors tend to be more tolerant of wind farm developments as they are focused more on other attributes of a destination such as specific tourism assets and attractions.

5.65 There is however little research which has explored this although the findings of Westeberg et al point towards this. This research, conducted in France (and in the context of offshore wind development) found that older and retired tourists were primarily motivated by landscape and nature and were less likely to accept an offshore wind farm and may alter their visiting behaviour in response.

5.66 There is a reasonable base of evidence to suggest that the importance of landscape within the broader mix of tourism assets and attractions could be important in determining impact. That is, in locations where the tourism base is broad, groups who would be more likely to alter their visiting behaviour in response to a wind farm developments represent a smaller proportion of the overall tourism base and any net loss of visitors in this group could be made up by gains in other groups.

Activities that Tourists Engage In

5.67 Related to the importance of landscape within the mix of factors that attract visitors to a particular area is the type of activities that tourists engage in. This has been explored by a number of studies although **the findings are not sufficiently conclusive to allow activities to be used as a predictor of tourism impact**.

5.68 The NFO studies (in Scotland and Wales) make a distinction between active visitors (those taking long walks or participating in other outdoor activities) and passive visitors (those sightseeing by coach or taking short walks or using a beach). Both studies find that the active visitors are more likely to highlight scenery and environment amongst key factors in their decision to visit the area than the passive group. The findings of these studies are not conclusive in relation to how this then plays out in terms of visitors' reactions. The Scottish Study (NFO, 2002) indicated that there was no difference in the proportions of active and passive visitors who indicated that they would be more or less likely to visit the area if a wind farm was built. Conversely, the Welsh study (NFO, 2003) did highlight a slight difference between the proportion of active respondents who indicated that they would stay away from an area if a wind farm was constructed (14%) and the passive visitors (9%).

5.69 The GCU study indicates that tourists whose main activity was walking / hill walking (where landscape change is a major part of the experience) tend to be more positive on the whole in relation to wind farms; 19% of hill walkers indicated that they held negative views about wind farms compared to 25% overall. The study did not draw any conclusions about the relationship between tourism activity and impact.

5.70 A survey of visitors to North Devon and South Wales in relation to the proposed Atlantic Array

Offshore Wind Farm (ICM, 2012) indicated that there may be a relationship between the nature of activities that tourists are planning during their visits and their reactions to the proposals. It is difficult to identify definitive trends as many survey respondents identified more than one type of activity that they planned for their visit. However, there are some trends in the net balance of visitors who would be more or less likely to return. The most notable point is that the net balance for visitors engaging in activities where active appreciation of the landscape or seascape is involved (i.e. beach activities, walking and rambling) is greater than those whose activities are less dependent on enjoyment of the landscape (for example general sightseeing, surfing, visiting theme parks etc).

Frequency of Visits

5.71 **Regular visitors to an area may be more likely to oppose developments.** Frankal and Kunc (2011) found that regular visitors to a particular tourism area may be more likely to oppose wind farm developments (although no conclusions were drawn about the extent to which this might be reflected in their visiting behaviour).

5.72 This reflects the findings of wider research into reactions to wind farms amongst residents where a theme of people's attachment to a particular place is an important factor which influences their responses to developments see for example Devine-Wright, 2012).

Demographic Characteristics of Visitors

5.73 **Younger people tend to react more positively to wind farm developments.** For example, the web survey element of the GCU (2008) study found that respondents aged 16 to 25 tended to react more positively to wind farm developments. In addition, overseas research undertaken by Bishton and Miller (2007), Ek (2005), Firestone and Kempton (2007) Frankal and Kunc (2011), Lilley et al (2009) and Ladenburg (2010) and Ladenburg and Dubgard (2007) points towards younger people being less likely to alter their visiting behaviour as a result of wind farm developments or perceiving their visual impacts as being less intrusive.

5.74 This trend appears to hold for other types of development. For example based on a study in Finland, Soini et al (2011) found that younger respondents tend to react more positively to power lines than older people. The authors point to an important limitation of this finding however – it is not clear to what extent these views can be expected to change as this cohort gets older.

5.75 This pattern is reflected in the wider research relating to attitudes towards climate change and renewable energy more broadly. Most research points towards younger people tending to have move favourable attitudes (see, for example, IPSOS MORI, 2004 which indicated that 59% of 16-34 year olds strongly support the use of renewable energy sources compared to 38% of those aged over 60. Similarly, the research by Populus (2005) found that 80% of those aged 18 to 34 stated that arguments for wind power outweighed those against, compared to 73% of those aged 35-44 and 70% of those aged 45 and above).

Visitor Origin

5.76 **Visitors from overseas tend to be more positive about wind farm developments.** Case study research and web survey for GCU indicated that overseas visitors were more positive about developments. This finding is echoed in the NFO study in Scotland.

Socio-economic Status of Visitors

5.77 **Visitors from higher status socio-economic groups tend to be more positive about wind farm developments**. The evidence base is not conclusive about whether it is income, educational achievement or other socio-economic factors that drive the relationship.

5.78 For example, Firestone and Kempton (2007), Lilley etc al (2009) and Ladenburg (2010) all found that perceptions were related to income with those earning higher salaries being (on the whole) more positive about wind turbines than those on lower incomes. However, this is not a universal finding. Ladenberg and Dubgard (2007) found that income had no influence on tourists stated preferences for the distance to turbines (but where there was a negative response, did affect the amount that they were willing to pay for them to be located further away).

5.79 Interestingly, level of education (although a closely related factor) has been proven in a number of studies (e.g. Francal and Kunc, 2011, Ladenberg and Dubgard, 2007) to have no relationship between perceptions and attitudes. However, Ladenberg's work in Denmark contradicts this finding and indicates that attitudes towards offshore wind farms are associated with respondents' income and educational level (along with gender and the frequency of their visits to a particular area). The study indicated that people with higher levels of educational attainment tend to be more positive about wind farm developments. (Ladenburg, 2010). This corresponds to findings of Firestone and Kempton (2007) whose study in the US found that supporters of a proposed wind energy development near Cape Cod tended to be younger, better educated and more likely to own their own home (Firestone & Kempton, 2007).

5.80 A review of evidence undertaken by Devine-Wright (2007) pointed towards a positive correlation between support for renewable energy and income, citing studies which suggest that individuals earning in excess of £30,000 per annum, and classified within social class AB were, in comparison to DE, more supportive of renewable energy generally and wind energy specifically (MORI Social Research for REgenSW; 2004, cited in Devine-Wright, 2007). Similarly, the Populous survey which explored the extent to which people are convinced by arguments for and against wind power found that those in the DE social grouping were slightly more likely to indicate that they are persuaded by arguments against wind power (32% compared to 27% overall).

5.81 Research relating to support for renewable energy more broadly echoes this point about the importance of socio-economic status. 92% of those belonging to socio-group A/B1 and 89% of those in social group C1 indicated that they supported the use of renewable energy whereas support amongst those in C2 and D/E was 83% and 78% respectively (GFK NOP Social Research, 2009). This is echoed in the findings of the ONS public attitudes survey, where graduates are more likely to indicate that they are fairly concerned about climate change (82% of graduates compared to 60% of non-graduates).

Wider Views on Renewable Energy

5.82 **Wider views on renewable energy and wind power are important but are difficult to use a predictor of potential impact.** One factor which does appear to have a strong relationship with visitors' views on and reactions to wind farm developments is their existing attitudes towards climate change and renewable energy. For example, a study carried out in Ireland (Campey *et al.*, 2007) found that positive reactions to wind turbines are directly related to personal attitudes to renewable energy.

5.83 The Atlantic Array tourism survey (ICM, 2011) asked respondents to provide a rating for the extent to which they support the use of renewable energy. There were some interesting variations in visitors' responses to questions about whether the construction of Atlantic Array would encourage or discourage them from visiting the area in future.

5.84 Soini et al (2011) points towards negative responses to landscape features (in this case power lines) being driven by subjective beliefs rather than objective knowledge. Wolsink (2005) illustrates using regression analysis of survey data that there is hardly any relationship between attitudes to wind power and developments and understanding of the technology.

5.85 Symbolic associations are important in the subjective judgements that individuals make about objects in the landscape. This is illustrated by Francal and Kunc.

5.86 While the evidence base is not conclusive, the available research suggests that wider perceptions held by tourists in relation to climate change and renewable energy play a role in how tourists weigh up the positive and negative effects of wind farm developments and may influence their reactions. This means that, even in cases where a wind farm development may have an effect on characteristics of a tourism area that visitors value, the way that this effect is assessed by visitors (and reflected in future behaviour) is influenced by wider views and perceptions.

5.87 This appears intuitively correct in light of research relating to the factors that drive perceptions about wind farms which suggests that the perceived benefits and costs associated with them are key factors influencing people's responses (Warren *et al.*, 2005). If this is the case then this trade off will happen independently of an individual's views about the effect of wind farms on scenery i.e. some may perceive wind farms as a cost, others as a benefit but it seems feasible that the trade-off could be influenced by wider views about renewable energy and climate change, even where the visual impacts are viewed negatively.

Gaps in the Evidence Base

5.88 The evidence base provides some useful headline conclusions about the nature and scale of potential impacts and the factors which might help us to predict where they are likely to occur. However, there are a number of important gaps in the evidence base which need to be recognised in developing the methodology underpinning this study.

5.89 The most important gap in the evidence base relates to the scope of the majority of the impact assessments (both ex-ante and ex-post) that have been conducted to date. Much of the research deals thoroughly with the potential effects on overall visitor numbers but the evidence base in relation to the factors which might affect the overall value of activity is less well developed. The literature points towards three factors being important here:

- **Replacement Effects.** In cases where a proportion of tourists indicate that they would not visit as a result of the wind farm, the capacity within the local tourism economy that this frees up (e.g. hotel rooms, restaurants etc) may be taken by those who are either not affected or positively influenced. The size and influence of the replacement effect will depend on the size of the catchment area, the overall level of demand in each tourism area and the extent to which the replacement effect alters the balance between supply and demand. The extent to which there is potential for capacity left to be taken up by tourists who are less sensitive to the development of wind farms would depend on the level of capacity that exists in a tourism area. This is an important gap in the evidence

base which was highlighted in the inspectors report for the Fullabrook Down wind farm. That is, the proportion of visitors who indicate that they would be put off from visiting an area in surveys does not neatly translate into a reduction in the number of tourists, spend and ultimately employment.

- **Pricing Adjustments.** Although some studies touch on this important source of impact, there has been little research which explores potential pricing effects in detail. We might expect a reduction in demand (i.e. a loss of visitors) to result in reduced prices however the extent to which this actually occurs in reality is related to the existing balance between supply and demand in a tourism area. For example, if replacement demand is insufficient to maintain the current supply and demand relationship, tourist businesses might need to compensate using a price mechanism (e.g. lowering prices if supply outstripped demand). This effect would mean that, even where the volume of tourism visits stayed the same, the expenditure associated with them could decrease. This effect is not dealt with in any detail in any of the UK based studies. These studies tend to focus on asking visitors to a particular area at a particular time what the effects on their future behaviour might be. Although there are studies which present analysis of the likely changes in visiting behaviour that different types of visitors (e.g. day visitors vs tourist visitors) report (e.g. ICM, 2011), none include a full assessment of the balance between overall demand and supply or explore the potential for price effects.

- **Differences in Frequency and Duration of Visits.** Many studies are conducted on the basis of impacts materialising as a result of visitors staying away altogether. However, the reality is that wind farms could cause a change in the duration and frequency of visits as well as simply resulting in people staying away.

5.90 The key point here is that the **existing balance between supply and demand in a tourism area may be an important predictor of the potential impact,** although this is not prominent in the evidence that currently exists. We might expect that areas where demand for tourism services (e.g. accommodation and leisure facilities etc) outstrips supply would be less sensitive to wind farm developments. That is, pricing effects would be unlikely to kick in as replacement demand would take up capacity left by any visitors who were discouraged as a result of wind farm development. The opposite would be true in areas where supply outstrips demand – i.e. they would be more sensitive to changes in demand, even small ones, as this would further alter the balance between demand and supply. Seasonality of tourism in Wales is therefore an important consideration here - balance between supply and demand fluctuates throughout the year and, anecdotally, many tourism businesses could rely on their ability to attract out of season visitors as a key factor in their viability.

5.91 Other important gaps in the evidence base include:

- **Displacement of Tourism Activity**. Although some of the large area studies indicate that displacement can occur at a relatively local level (i.e. tourists put off by wind farm developments may still visit Wales but choose to visit areas and attractions that are not affected by wind farm developments). This is not particularly well evidenced or explored and there are no metrics from the evidence that can be applied to quantify or model this effect.

- **Persistence of Impacts**. A further area that is not particularly well researched is the time over which any positive or negative effects on tourism activity might persist. There is

some research which indicates that any negative effects might be temporary as:

- Visitors' perceptions might change over time – research conducted into residents' perceptions about wind farms suggests that views become more positive as time goes on and that residents accept the new structures in the landscape. The same effect may be present within tourism groups, although there is no evidence which has explored this.

- The tourism offer in affected areas may adjust - The evidence base points towards some groups and types of tourism area being more sensitive to the effect of wind farm developments than others. If demand from certain groups reduces, it is possible that over time the tourism offer may adjust and adapt to attract the type of visitors where demand remains strong (i.e. those who are not affected). These effects have been alluded to in some studies, but not explored in detail. It should noted that the scope for this effect could be limited in some areas by the nature of the natural tourism resource that exists.

- **Wider Effects on Destination Reputation and Image**. The majority of ex-ante primary research focuses on the views and likely changes in behaviour reported by current visitors to an area. This is largely due to the practicalities of devising a research methodology to explore an area's tourism market. For ex-ante survey research, the population of interest is all potential visitors to an area, not just those currently visiting. There are concerns that a perceived proliferation of wind farm developments, whether actual or not, could affect the image of an area and lead to a perception that a region or location has a strong visible wind farm presence. A wider market research approach to understanding the effect of wind farm developments on the wider reputation of a tourism location has not been conducted to date although the GCU study attempted this using a web based survey.

- This is linked to the lack of conclusive evidence in relation to the cumulative effect of wind farm developments. As outlined earlier, some of the research that has explored the effect of wind farm size and layout on visitor and wider population perceptions suggests that there may be a preference for a larger number of smaller wind farms. However, this should not be interpreted as indicating that cumulative effects are of no concern. Firstly these conclusions are frequently drawn based on survey research asking about hypothetical wind farm developments (so the siting, context and extent was unknown by respondents). Secondly, these conclusions are not drawn in the context of wider effects on the image of a tourism location so cannot be applied in this context.

- **The importance of tourism routes**. The effect of wind farm developments visible from tourism routes has not been widely explored.

- **Cumulative effects of multiple wind farms**. Although some studies suggest that visitors may prefer multiple wind farms to a single large wind farm, this finding may be misleading in the context of an overall assessment of potential effects in Wales.

Conclusions and Implications for the Assessment

5.92 Although there are challenges in interpreting the evidence base, we can draw some general conclusions about the scale and nature of the potential impact of wind farm developments and associated grid infrastructure on tourism activity. While the purpose, focus and context for

relevant studies varies substantially, the review has highlighted a number of consistent messages. The most important of these, in terms of the development of the impact assessment methodology, are outlined below:

1) Interpretation of wind farms is subjective and as a result there is a great deal of variability in tourists' reactions to wind farm developments.

2) The majority of tourists are neutral about wind farms and do not expect their future visiting behaviour to be affected by their presence.

3) The proportions reporting that they were more or less likely to visit as a consequence of a wind farm development are typically small and often evenly balanced.

4) Even where visitors feel that wind turbines affect their tourism experience this does not always translate into changes in visiting behaviour.

5.93 The weight of the evidence, together with findings of the large and comprehensive study undertaken by GCU, suggest that we can be quite confident that, at the Wales level, effects will be modest given the scale of development proposed in most locations. The GCU study suggests that even where negative effects arise, these often occur in the form of displaced tourism. That is, the small proportion of tourists who adjust their visiting behaviour in response to the presence of wind farms are very likely to choose to visit other locations nearby, which are not affected by wind farms. The overall net impacts across larger areas are therefore modest.

5.94 This effect does however point to the existence of localised effects, which need to be factored in to the assessment. Even at a very local level the assessment needs to be conducted in light of the key conclusion that **the majority of tourists would not be influenced by the presence of a wind farm.** However, it also needs to draw out some of the more detailed insights that the literature provides and reflect the possibility that there may be circumstances where, although this conclusion would hold in a general sense, the balance between neutral, positive and negative reactions to wind farm developments could result in a net negative effect on tourism activity.

5.95 The findings of the literature review suggest that the context for development influences three inter-related factors: the characteristics of the development, characteristics of the tourism area and characteristics of tourists. This points to a number of indicators which could be used to highlight local areas where there is a risk of a net negative effect on tourism activity. The factors and indicators are outlined in Table 5.1 below.

5.96 These findings can help us identify circumstances where there is a greater risk of wind farm developments having negative impacts on tourism activity. There are however a number of important points to bear in mind when applying this evidence:

- The indicators outlined in the table above have been observed or intimated from the findings of the primary evidence base. There has not been any assessment of the causality of these relationships so there remains the possibility that the observed relationships could have occurred by chance or could have arisen as a result of other related factors which influence impacts on tourism activity.

- In many cases, these conclusions have been reached based on a small number of studies. As illustrated elsewhere in the assessment, study context is a very important variable so findings should be applied cautiously.

- There has not yet been a comprehensive assessment of the relative importance of these factors in determining or explaining how impacts on tourism activity might arise. It might therefore be difficult attach a relative weight to these factors. This could complicate the assessment in areas where there are conflicting influences.

Table 5.1: Factors Associated with a Greater Sensitivity of Visitor Economies to Wind Farm Development

Type of Factor	Indicator	Explanation
Characteristics of Development	Scale of development (especially larger scale wind farms with more than 10 turbines)	The scale of development is strongly linked to the potential for physical presence and visibility within the landscape (although the nature of the topography will also be a factor)
	Clustering of multiple wind farms in close proximity to main visitor hubs or facilities (and in instances, proximity to major routes for visitors)	As above
	Extent to which wind farms feature on or in close to high quality landscapes	The quality of landscapes are affected by various factors including land based uses and existing or previous development. The impact of wind farms will vary depending upon their siting within the landscape and visibility.
Characteristics of Tourism Area	Extent to which high quality (and previously undeveloped) landscapes are a key feature of the visitor offer	High quality landscapes which are a key aspect of the visitor appeal, may be more sensitive to development.
	Diversity of the tourism offer	The greater the diversity of the visitor offer the wider the range of visitors and less the potential sensitivity of the tourism sector to wind farm related impacts
	Popularity of the tourism area, in particular the capacity at which it operates	Areas which are popular or growing in visitor terms, may able to adapt more readily if wind farm development were to be a threat to the local visitor economy
Characteristics of Tourists	The diversity of the visitors, in particular the representation of groups which might be more (eg olders visitors) or less sensitive to wind farms (eg overseas visitors or visiting for adventure activities)	Linked to the diversity of the visitor offer. This recognises that different types of visitors may be more or less sensitive to wind farm development (although some will be largely indifferent).
	Loyalty of visitors, in terms of their commitment to an area and repeat visiting behaviour	Regular visitors to an area may be more sensitive to changes in the natural environment if they feel ownership of the area. Again, a large number would be indifferent.

5.97 In light of the breadth of factors which affect potential impacts, and the possibility of their influence to be slight in some cases, the breadth of an area's tourism offer is an important consideration. As the research suggests that particular groups react differently to wind farm developments, it is feasible that effects might be lessened in areas where the tourism offer and visitor profile is more varied. For example, one segment of an area's tourism base may have characteristics which suggest that a net negative effect could be likely, however this effect could be offset by characteristics of another group which suggest a net positive effect is likely. Neither the evidence base, nor the availability of local data is strong enough to fully reflect this effect in the assessment. However, the breadth of the visitor base should be recognised as a factor.

5.98 It is very important to note that only a handful of studies provide a full and detailed assessment of all types of potential tourism impact. Some studies deal with various aspects of the effect separately (e.g. most of the scheme specific ex-ante studies focus on effects on visitor numbers, while a small number of academic studies look at pricing effects in isolation. The GCU study is widely recognised as the most comprehensive assessment and presents a detailed picture of potential impact. However, this study is of limited use in the context of this assessment given that its overall conclusions relate to Scotland's tourism sector as a whole – limited attention is paid to local impacts and the circumstances under which they might arise.

5.99 Notwithstanding the difficulty applying the findings of scheme specific studies outside of the context in which they were undertaken, the lack of attention paid to substitution, pricing and displacement effects in these studies means that they are of limited use in building a bottom up assessment of potential impacts.

5.100 Finally, the limitation to the evidence that exists in relation to the cumulative effects of multiple wind farms represents a real challenge for the assessment. In our view, the evidence that exists in this area is not conclusive and can be easily misinterpreted. In relation to the potential for cumulative effects, the most important finding of the literature review is in relation to effects on tourism materialising as a result of changing the character of a landscape. There is no simple metric or indicator that can be applied to capture this – the logical extension from this conclusion could be that a large number of small wind farms could have a substantial effect on the character of a landscape if the visual impacts were concentrated. However, the extent to which this change would be viewed positively or negatively (as for single wind farms) would be assessed subjectively by individual tourists and may not necessarily result in changes in behaviour.

6. Local Area Profiles

Introduction

6.1 This chapter presents the assessment of local tourism in each of the nine study areas where wind farms are located or planned. The key objectives of the profiles are as follows:

- Establish the nature of the tourism offer, visitor market and the indicative economic importance of tourism in each of the defined study areas using the best available tourism datasets;
- Assess the likely sensitivity of local visitor economies to wind farm development based on analysis of some of the key indicators identified in the framework.

6.2 The research methods applied in this section were primarily based on desk based research, including analysis of LANDMAP, a review of local destination management plans, tourism strategies and visitor surveys. The findings were also informed by consultations with local tourism officers about the nature of the local tourism economy, its key assets and the characteristics of visitors.

Estimating Volume and Value of Tourism

6.3 The estimates of tourism volume and value were based on the two visitor surveys which are available at local authority level. These are:

- Great Britain Tourism Survey, which covers the domestic visits and expenditure of overnight visitors from Great Britain. The data is based on three year averages, the latest of which is 2010-2012.
- Great Britain Day Visits Survey, which includes all visits of at least three hours for particular leisure activities, which take place in a destination outside the respondent's normal place of residence. The data is based on a two year average, the latest of which is 2011-2012.

6.4 These surveys do not capture the volume and value of visitors from overseas. The local authority area estimates therefore represent only a partial picture of total tourism activity. The key data source available for overseas visitors, the International Passenger Survey, is not available for local authority areas. Consequently there is no reliable and consistent method for estimating the local value of this market which this study is able to draw on. Across Wales as a whole, overseas visitors account for a small proportion of total visitor numbers (8%) but a significant proportion of visitor expenditure (16%)[10]. However, this varies in different parts of the country. The absence of local volume and value estimates for this part of the visitor market should be borne in mind when interpreting the estimates in this chapter.

6.5 Since all of the study areas do not correspond with local authority boundaries, it was also necessary to develop an apportionment methodology for estimating volume and value in the areas most affected by wind farms. This methodology made use of the two datasets which are

[10] Partnership for Growth, 2013, Tourism Strategy for Wales

available below local authority level:

- Business Register and Employment Survey: this is based on the inter-departmental business register and is the most reliable dataset for estimating employment in lower super output areas[11] (LSOAs). Estimates are available for detailed sectors. A group of sectors were defined as "tourism related industries" using 2007 SIC codes using DCMS's and ONS's agreed definition[12]. The analysis estimated tourism related employment using a best-fit of lower super output areas in each of the study areas.

- Bedstock Surveys: Visit Wales collect detailed information at postcode level for all visitor accommodation in Wales. Visit Wales conducted analysis of the total stock of visitor accommodation bed spaces in each of the study areas.

6.6 The volume of tourism related employment and bedstock in each of the study areas was calculated as a percentage of the totals for local authorities in which they are based, and used as proxies for tourism activity (both day and overnight visitors). The percentages were applied to the findings of the visitor surveys to provide an indicative range of estimates for the volume and value of tourism in the study areas.

6.7 This approach has been used in the absence of localised data on the scale and importance of the tourism economy in the local impact areas (i.e. below the local authority level). Whilst there are clear limitations to this approach, it should be borne in mind that it is only intended as a means of gauging the importance of the visitor economy in the vicinity of operational or proposed wind farms. The estimates have therefore been provided as a range, and should be treated as the best estimate of visitor activity given the data available.

Assessing Sensitivity

6.8 Each of the local area profiles are based around the indicators which were identified in Section Five as influencing the potential sensitivity of the visitors to wind farms. The profiles look at each of the following:

- The scale of development in the study area, distinguishing between operational, consented and planned wind farms. This assesses the degree to which wind farms are clustered, which could give rise to cumulative effects, and how dominant they would be on the landscape in relation to the key visitor locations.

- The character of the landscape in which the wind farms are located, drawing upon LANDMAP assessments.

- The key visitor assets and activities in the area, and their relation to wind farms.

- The characteristics of visitors to the study area, focusing particularly on the age of visitors, the proportion of repeat visitors and the reasons why people visit certain locations.

- The key messages from visitor brochures for the area. This is important in illustrating

[11] LSOAs are small areas, which on average have a population of around 1,500 people. They are used extensively as geographical units in socio-economic data collection and analysis.

[12] See appendix for full list of sic codes

how areas are portrayed to visitors, and whether wind farms may be inconsistent with the marketing of particular visitor destinations.

6.9 Each of the profiles provide a description of the area based on the above factors and concludes with the key points for the assessment. These are used to draw conclusions about actual and potential impact in Section Eight.

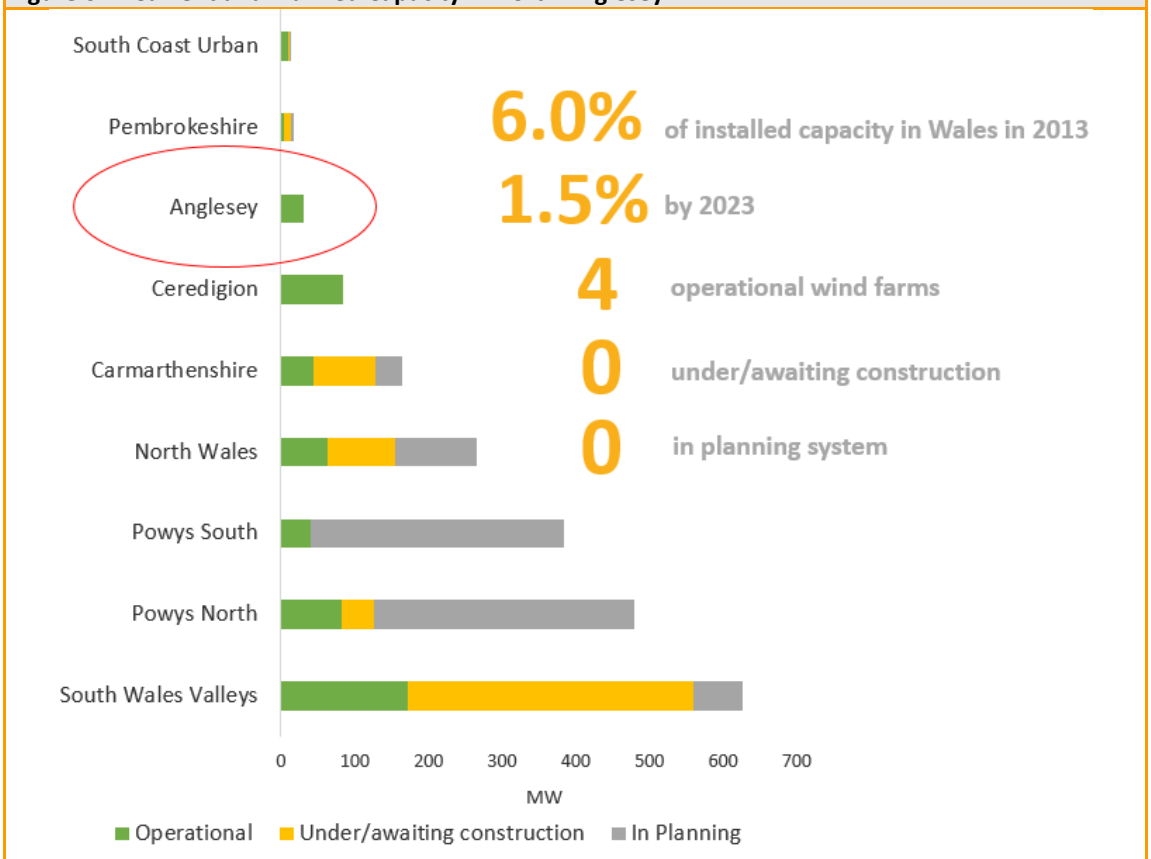
North Anglesey

Current and Planned Wind Farm Development

6.10 There are currently four onshore wind farms on Anglesey, all in close proximity in the north of the island. Although one of these may be repowered in the next ten years (Rhyd y Groes), there are currently no applications for wind farms (as opposed to single or multiple small turbines over 0.5MW in total) in the planning system. The largest operational wind farm is Llanbabo wind farm (34 turbines), followed by Rhyd y Groes (24 turbines). Due to the age of these wind farms, the turbines tend to be smaller than those currently used in modern wind farms.

6.11 Anglesey is not covered by a Tan 8 Strategic Search Area and as a consequence the island will be remote from the largest concentrations of wind farm development, although some smaller wind farms may be approved. The area is, however, the focus for wider energy development. Celtic Array wind farm is a large scale offshore wind farm (2GW) being built off the north coast of Anglesey. There are also plans to develop a new nuclear power station on the island, to replace the existing Wylfa plant.

Figure 6-1: Current and Planned Capacity in North Anglesey



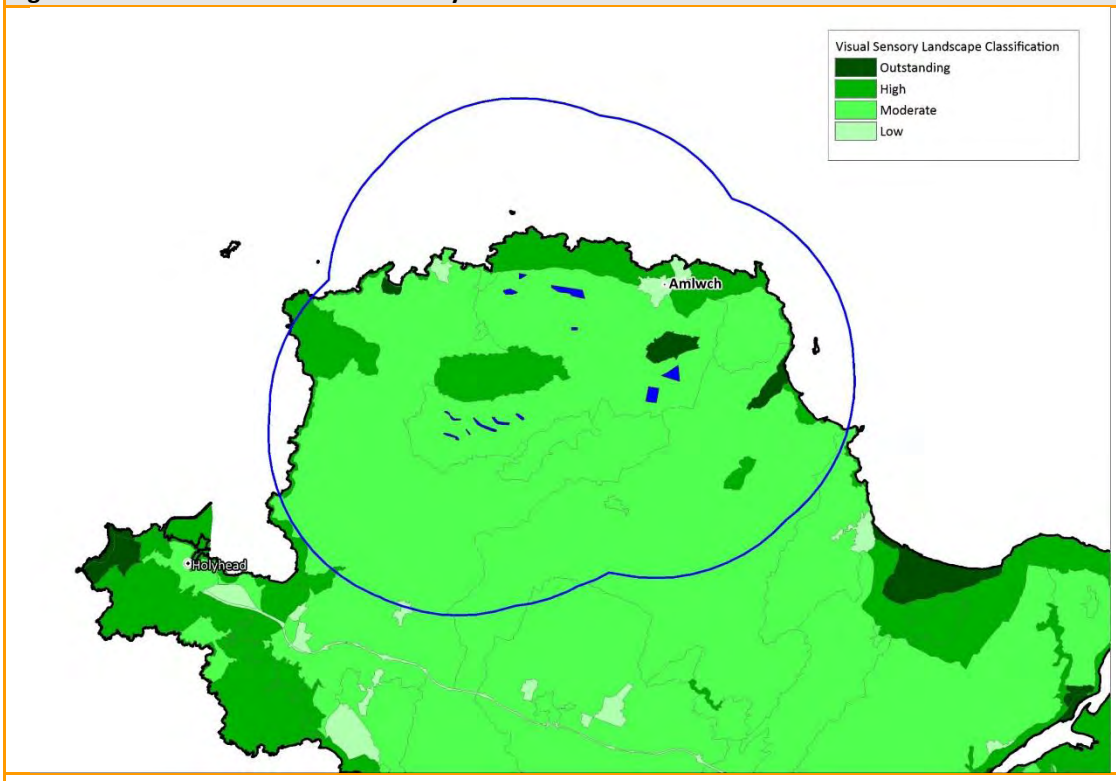
Source: DECC

Local Landscape

6.12 All four wind farms in Anglesey are located in an area of lowland farmland in the north of the island. LANDMAP classes the whole area as moderate for visual landscape quality, however this assessment is influenced by the presence of the turbines themselves. Landmap comments: "Wind turbines form very intrusive elements, lowering integrity but raising character and rarity"13.

6.13 The turbines are a dominant presence on the surrounding landscape: "Groups of wind turbines dominate the landscape in the north part of Anglesey, south of the A5025 and Amlwch, to Llyn Alaw, and west to around Mynydd Mechell". All three wind farms are in close proximity to high and outstanding quality areas, including the North Anglesey coast and Parys Mountain.

Figure 6-2: LANDMAP Visual and Sensory Assessment



Source: LANDMAP

Scale of Visitor Economy

6.14 Tourism is an important sector for Anglesey. Business Register and Employment Survey data shows there are around 2,400 jobs in tourism related sectors[14] (12.3% of employment). There are indications that the visitor economy has grown since most of the wind farms on the island were established (late 1990s). Annual Business Inquiry data shows there were around 1,700 jobs in tourism related sectors in 1998. This would represent an increase of 700 jobs (circa 40%) but

[13] LANDMAP forms its overall assessment based on a number of criteria including scenic quality, integrity, character and rarity. The assessment of integrity is based on the degree to which the area is unspoilt by large-scale development, while character is based on the degree to which features and qualities give a clear sense of place. Rarity is based on the degree to which the features are rare or representative locally.

[14] Tourism employment is likely to be highly seasonal. The BRES estimates are based on returns completed in September/October, so tourism employment could be higher during summer months and lower during winter.

should be treated with caution as it draws upon two different datasets which use different methodologies[15].

6.15 The key tourism datasets show there have been around 3.2m visits per annum to Anglesey in the last 2-3 years, with these visitors spending roughly £230m. This breaks down as follows:

- Great Britain Tourism Survey (GBTS) shows there were an average of 332,000 overnight domestic visitors during the three year period 2010-2012, with these visitors spending approximately £61m per annum.
- Great Britain Day Visits Survey shows there were an annual average of 2.95m day visits to the island over the period 2011-12, with these visitors spending £168m p.a.

6.16 In order to estimate the proportion of tourism volume and value in the local impact area, the figures above have been apportioned based on the share of tourism related employment (based on BRES) and visitor bedspaces (based on Bedstock data). Using a best-fit of LSOAs for the study area16, it is estimated there are around 270 jobs in tourism related sectors in the study area. This represents 11% of total employment17 in the impact area and 11% of all tourism related employment on Anglesey. Bedstock data shows there are 3,500 visitor beds in the local impact area (with over 70% in caravans), accounting for 12.1% of bedspaces in Anglesey.

6.17 Applying these percentages to the tourism datasets gives a range of 364 to 397 thousand visitors and £27m to £29m in visitor expenditure each year. These figures provide an indicative estimate of the volume and value of domestic tourism in the study area. They represent a best estimate given the data sources which are available, but should be interpreted with caution. It is likely that the estimates understate the number of visits from overnight visitors staying in other parts of the island.

Table 6.1: Estimate of Volume and Value of Domestic Tourism in Study Area using Apportionment Methodology

	Isle of Anglesey		Low Estimate for Study Area		High Estimate for Study Area	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	2,950	167.9	327.5	18.6	357.0	20.3
Domestic Tourists	332	76.0	36.9	8.4	40.2	9.2
Total	3,282	243.9	364.3	27.1	397.1	29.5
Source: Calculations by Regeneris Consulting using Bedstock, BRES, GBTS and Day Visits survey						

Visitor Assets

6.18 Anglesey's Destination Management Plan (IACC, 2012) identifies the Area of Outstanding Natural Beauty which covers almost the whole coastal area as its key visitor asset. The AONB on the

[15] BRES was the successor to ABI. Both datasets are based on the interdepartmental business register but use different methodologies and are subject to inconsistencies over time. The 1998 figure also used 2003 standard industrial classification codes for estimating sector employment. The 2012 figure uses 2007 SIC codes but in the closest matching sectors.

[16] See appendix

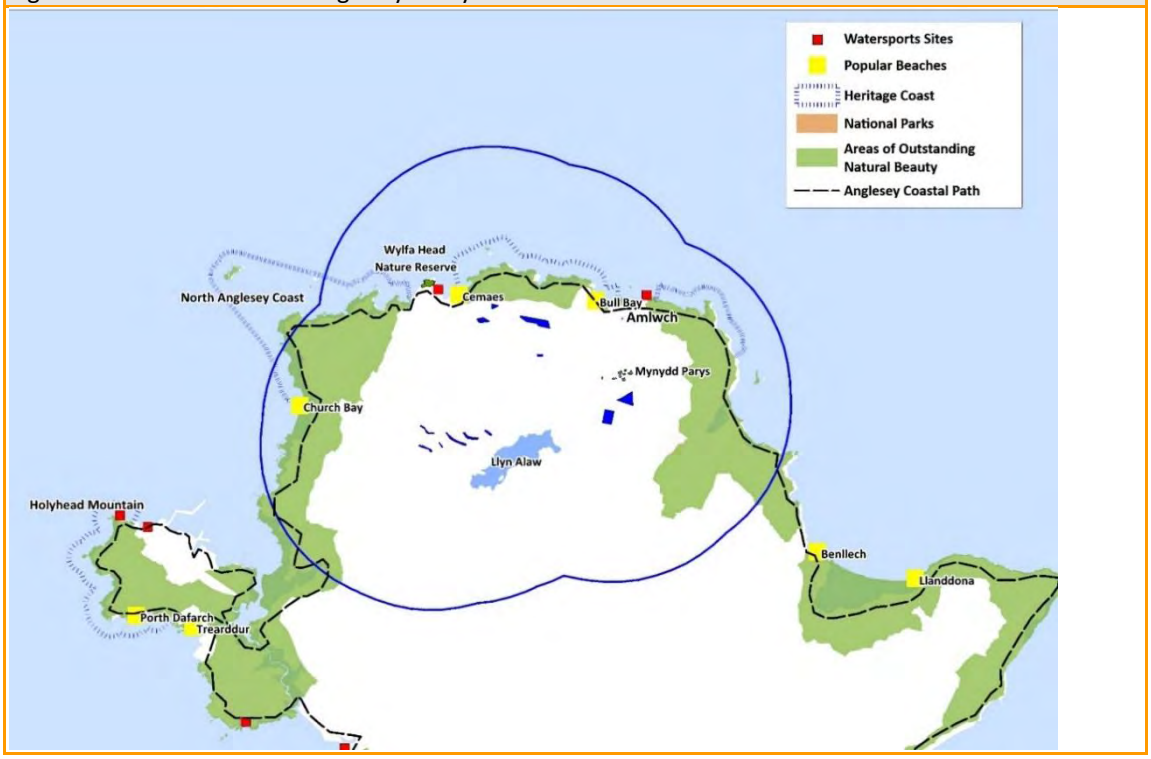
[17] This gives a location quotient of 1.2 indicating tourism employment accounts for a greater share of employment than the average for Wales

northern coast is in very close proximity to Rhyd y Groes, Anglesey's oldest onshore wind farm.

6.19 A coastal path runs around the entire island (through the AONB) and has become a popular visitor attraction. Again, the northern part of this path runs in close proximity to onshore wind farms. There are a number of very popular beaches on the island and opportunities for watersports. Three of these are in the study area. Cemaes Bay is the closest to the wind farms.

6.20 In the north east of the study area there are a number of historic attractions including Point Lynas, Porth Amlwch and Parys Mountain. Parys Mountain is in very close proximity to Trysglywyn wind farm. Inland the scenery is described as "pleasant but unremarkable" in the DMP. One notable attraction is Llyn Alaw reservoir which is popular for fishing. This is in very close proximity to Llanbobo wind farm, although the site of this wind farm has poor accessibility for the public.

Figure 6-3: Visitor Assets in Anglesey Study Area



Visitor Characteristics

6.21 There is no data available on visitor characteristics in the study area itself, however Anglesey's DMP highlights that the key visitor markets for the island are families mainly staying in a mix of caravan parks and unserviced accommodation during peak season, and short-stay, higher spending older visitors staying in higher quality accommodation.

6.22 Visitors to the island tend to be older than the Wales average, with 40% aged 55+ and 45% aged 35-54. The main reasons for visiting Anglesey given by visitors were the scenery/landscape/countryside (61%), the coast (61%), enjoyment of a previous leisure visit (52%), the peace and quiet (42%), convenience/ease of access (37%) and outdoor activities (37%).

Marketing and Promotion

6.23 Tourism marketing for Anglesey highlights the range of coastal and outdoor activities available

on the island and the coastal landscapes. There are very few inland, scenic landscapes included in visitor brochures, reflecting Anglesey's highly scenic, coastal areas.

Figure 6-4: Images from Marketing Brochures for Anglesey

Source: Images from Visit Anglesey brochure and website

Key Points for Assessment

- Anglesey has a number of large, well-established wind farms in close proximity in the north of the island. These are relatively clustered in one area and dominate the landscape in this particular area of lowland farmland. The Island is not in a TAN8 strategic search area and there are not current proposals for further large scale development (although there are multiple proposals for smaller single turbines).

- Tourism is an important sector in the north of the island (the study area), accounting for around a tenth total employment locally. However, the study area only accounts for a small percentage of Anglesey's tourism employment and visitor accommodation. The key tourism locations on the Island are remoter from these wind farms.

- The Anglesey coast is the key visitor asset. Some wind farms such as Rhyd y Groes are visible from the AONB and coastal path which may deter some visitors with negative views toward turbines. However, these turbines are small (31m) and are unlikely to be visually dominant (although there is a proposal to repower this particular scheme with larger turbines). The landscape in which the turbines are located, where they are visually dominant, is not considered to be of high scenic value and in its own right has limited visitor appeal.

- Anglesey has a diverse offer which includes watersports, beaches and historic attractions. The island attracts a diverse mix of visitors, families and older visitors dominate. Whilst the available data is limited, the older visitors are more likely to visit for the scenery and tranquillity. Research indicates that these visitors may be more sensitive to wind farm development and may avoid those parts of the island in closer proximity to the wind farms.

- If some of these visitors were deterred from visiting the north of the Island as a consequence of the wind farms, there is a low likelihood of them ceasing to visit the Island at all. Also, given the diversity of the visitor market, there is a good potential to replace those small number of visitors deterred from visiting the north part of the island.

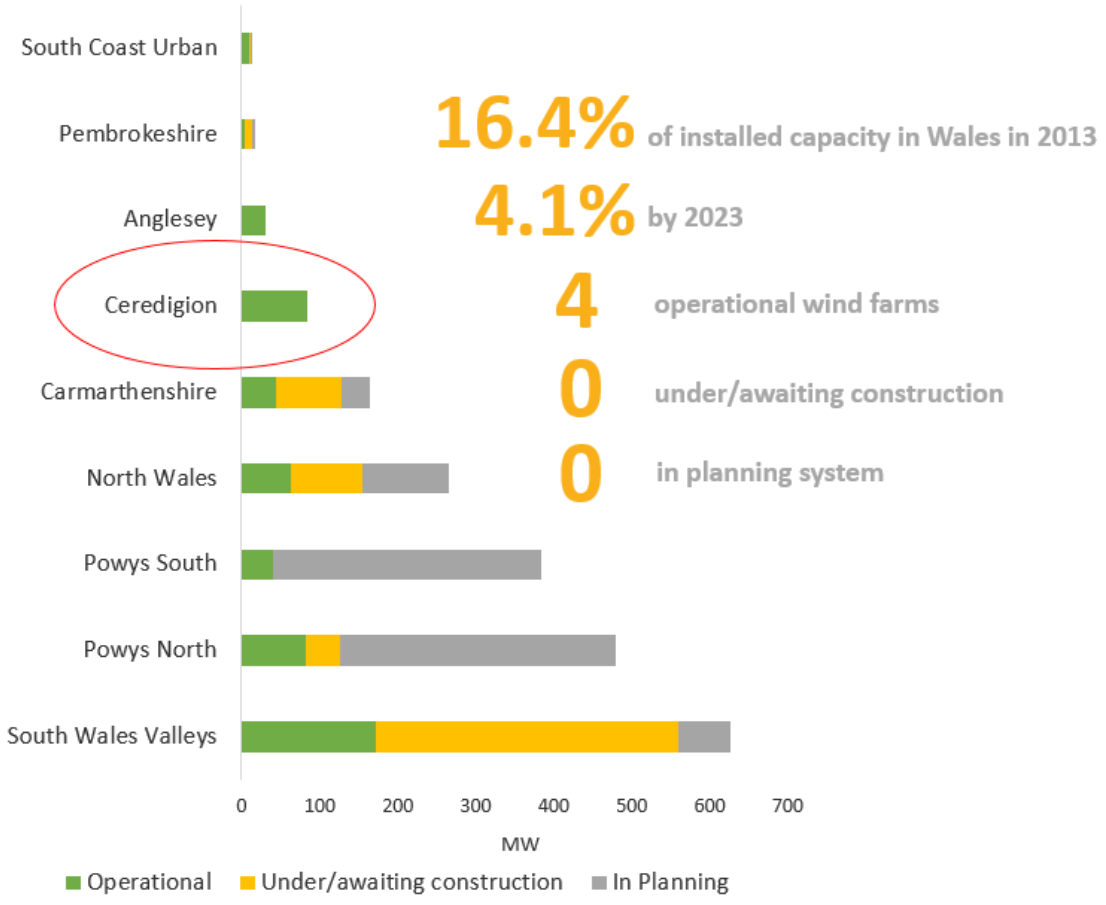
North Ceredigion

Current and Planned Wind Farm Development

6.24 The northern part of the district is covered by a Strategic Search Area meaning it could be a focus for future development. There are currently four operational wind farms, the largest of which includes 39 turbines (Cefn Croes). The district as a whole currently accounts for around 16% of Wales's total onshore installed generating capacity. There are currently no planning applications for major wind farms in Ceredigion.

6.25 The wind farms are spread out over a wide area. Whilst it is possible that two wind farms could be seen in the same view, they would be at a considerable distance and would be likely to include Rheidol wind farm, the smallest of the four developments with only eight turbines at 30m.

Figure 6-5: Current and Potential Capacity of Wind Farms in North Ceredigion



Source: DECC.
Note: Future capacity assumes all wind farms in planning system receive approval

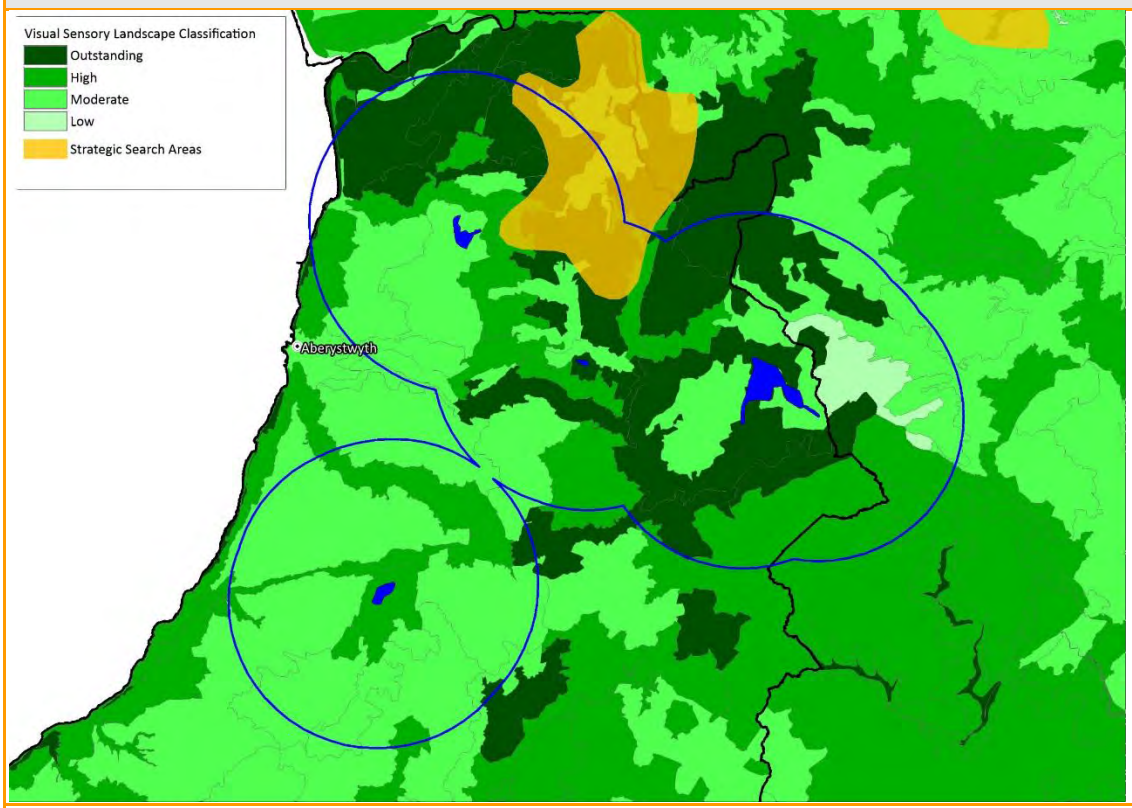
Local Landscape

6.26 Ceredigion's wind farms are located in predominantly remote, wild and expansive landscape in the north of the County. Three of the wind farms are located in areas where the landscape is assessed as outstanding or high quality, although the LANDMAP assessments for the two outstanding areas were carried out prior to the installation of the turbines. These assessments note the local landscape as a reason for visiting the area: "panoramic views…. are available from footpaths and roads through the area… (the) area is popular in places for visitors and this indicates its value".

6.27 The introduction of two wind farms in these areas following the completion of the Landmap assessment (Rheidol and Cefn Croes) will have to some extent detracted from the landscape character of the area.

6.28 The assessments for the other two areas were carried out when the wind farms had been installed. These note that the wind farms have detracted from the character of the area, however the assessments also note other factors which have contributed to the overall assessment, such as plantations and hedgerow deterioration.

Figure 6-6: LANDMAP Visual and Sensory Assessment



Source: LANDMAP

Scale of Visitor Economy

6.29 Tourism is a key sector in the study area. BRES shows there are around 540 jobs in tourism related sectors in the study area which represents 22% of employment. Over 300 of these jobs are in the LSOAs on the coast, reflecting the presence of coastal resorts north of Aberystwyth. There is far less employment in tourism related sectors inland. These 540 jobs account for 17% of tourism

related employment in Ceredigion, but does not include some of the highest concentrations in coastal resorts such as New Quay and Aberaeron. Bedstock data shows a total of 6,100 bed spaces, accounting for 19% of all visitor accommodation in Ceredigion.

Table 6.2: Total Visitor Bedspaces and Tourism Employment		
	Bedspaces	Employment
North Ceredigion Study Area	6,100	540
Ceredigion LA	32,800	3,200
Percentage in study area	18.5%	16.9%
Source: BRES and Bedstock data (Visit Wales)		

6.30 Applying this to the tourism datasets provides a range of 663 to 725 thousand visitors per annum and £29m to £32m in visitor expenditure – that is, a little less than a fifth of Ceredigion's overall visitor economy. As described above, this only provides an indicative estimate of the tourism volume and value in the study area, using the datasets which are available, and it doesn't capture the interrelationships between the study area and the rest of Ceredigion and the wider area.

Table 6.3: Estimated Volume and Value of Domestic Tourism in North Ceredigion Study Area						
	Local Authorities		Low Estimate for Study Area		High Estimate for Study Area	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	3,580	84.7	605.0	14.3	662.3	15.7
Domestic Tourists	340	88.0	57.5	14.9	62.9	16.3
Total	3,920	172.7	662.5	29.2	725.2	31.9
Calculations by Regeneris Consulting using Bedstock, BRES, GB Day Visits Survey and GBTS						

6.31 There is little data available on occupancy, however the Tourism Strategy notes that tourism is highly seasonal in the district and a large proportion of business is turned away during the summer months. Occupancy is lower in the shoulder months and out of season.

Visitor Assets

6.32 Ceredigion's Tourism and Visitor Economy Strategy (CCC, 2011) identifies the coastal path, coastal resorts and beaches as the primary attractions for Ceredigion, however these are all largely remote from the wind farms and are unlikely to be directly affected.

6.33 Within the study area itself, the key visitor assets which could be affected by the wind farms are the dramatic upland areas of the Cambrian Mountains which are in close proximity to Cefn Croes, the largest of the local wind farms. The Cambrian Mountains are the subject of a new initiative to promote them actively as a tourist destination. This area is already popular for walking, cycling and nature watching.

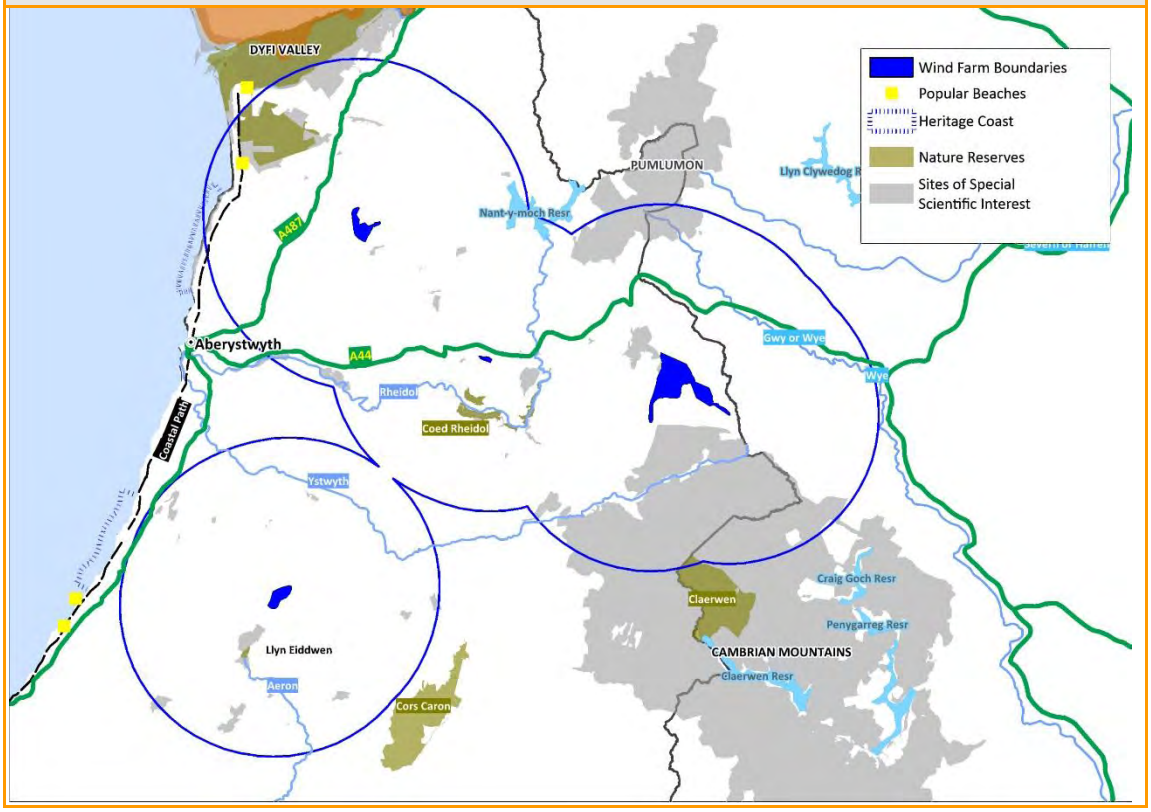
6.34 Attractive river valleys include the Aeron, Ystwyth, Rheidol and Dyfi, which are all popular walking routes. Walkers on the Rheidol river valley routes will be able to see Rheidol wind farm, while walkers in the northern part of the Aeron valley may encounter Llanwyryfon which lies next to Llyn Eiddwen, a lake and nature reserve. It is noted, however, that large areas of these valleys contain dense woodland which would mean wind farms are not visible for long stretches.

6.35 The visitor strategy also notes Ceredigion is popular with anglers, both for sea-fishing and river-

fishing. However, most activity will be unaffected by wind farms as it is located in coastal areas or on the Teifi to the south.

6.36 Cycling is also identified as an emerging strength. Road cycling routes from Aberystwyth to Shrewsbury (A44) run in close proximity to Rheidol wind farm, while Cefn Croes is also likely to be visible. A number of national cycle routes run north south through the area, with views over a number of the wind farms.

Figure 6-7: Visitor Assets in North Ceredigion



Visitor Characteristics

6.37 Ceredigion's Tourism Strategy notes that visitors to the County have a similar age profile to the Wales average, being older on average. The largest group of visitors are Empty Nesters (i.e. older people with grown up or no children) accounting for 48% of visitors. The next largest groups are Families (22%), followed by Older Independents (20%). The smallest group are Young Independents who account for 10% overall, in part reflecting the poorer accessibility and rural character of the area.

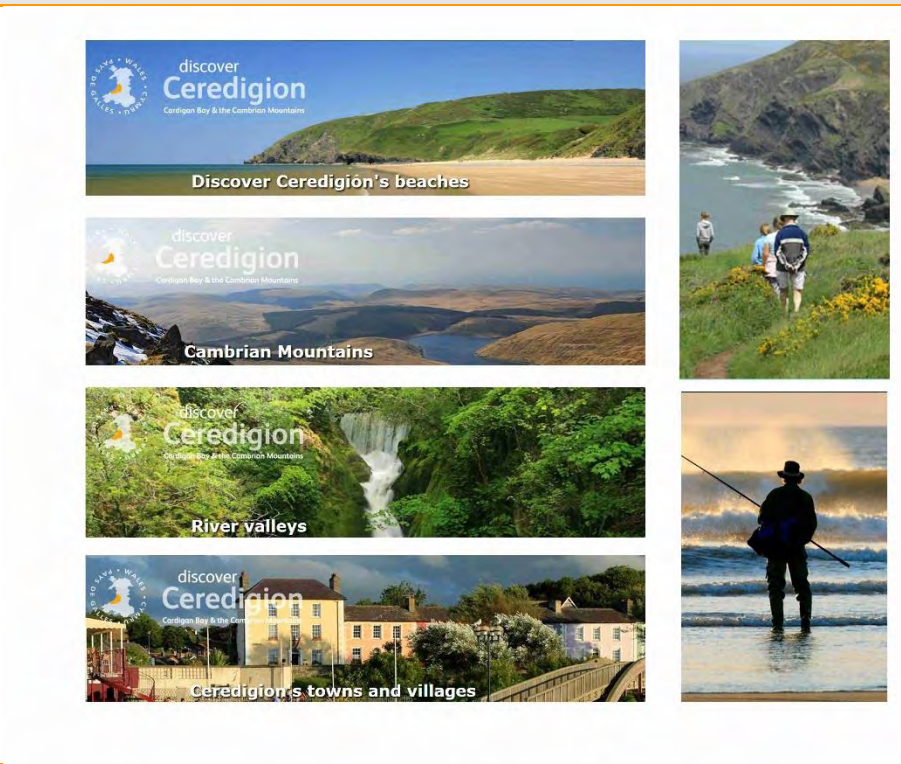
6.38 The poor accessibility and small catchment area of Ceredigion means that it attracts a lower proportion of day visitors as a percentage of all visitors (21%) compared with Wales as a whole (37%). About 35% of visitors are from Wales, 60% from the rest of the UK and 5% from overseas.

6.39 The main reasons for choosing to visit given by visitors to Ceredigion were the scenery/landscape, countryside and the coast.

Marketing and Promotion

6.40 The visitor brochures for Ceredigion reflects the relatively narrow basis of the County's visitor offer and highlights, among others, its beaches, river valleys and upland, unspoiled landscapes.

Figure 6-8: Marketing and Promotional Brochures for Ceredigion



Source: Visit Ceredigion

Key points for assessment

- North Ceredigion has a number of large, well established wind farms. However these are not clustered in the landscape and it is highly unlikely that there is potential for significant cumulative effects on views or the enjoyment of the countryside. Two of the wind farms are, however, located in highly scenic areas of the Cambrian Mountains. No additional wind farms are currently in the planning system.

- The wind farms are remote from many of the main visitor attractions of Ceredigion, including the main coastal resorts. This is reflected in the low level of estimated visitor expenditure in the study area – around a fifth of the total for Ceredigion.

- In tourism terms, the most sensitive area is, on balance, around the Cefn Croes wind farm, in the Cambrian Mountains. However, there is very little visitor accommodation in close proximity to this wind farm and tourism activity is low. There is the potential for some visitors to be discouraged from visiting the area, but this is likely to be limited and there is plenty of opportunity for these visitors to find similar unaffected countryside in other parts of the Cambrian Mountains.

- The majority of tourist visits to the Cefn Croes area are likely to occur in summer and shoulder months when there is little capacity in visitor accommodation in Ceredigion as

a whole[18]. There is some potential for replacement demand if any visitors were deterred from visiting the wind farms.

- The research has not identified any evidence to suggest that the existing wind farms have impacted negatively on the tourism economy, either in the study area or the wider Ceredigion area. However, it should be noted that the area has not been the focus of a more detailed case study.

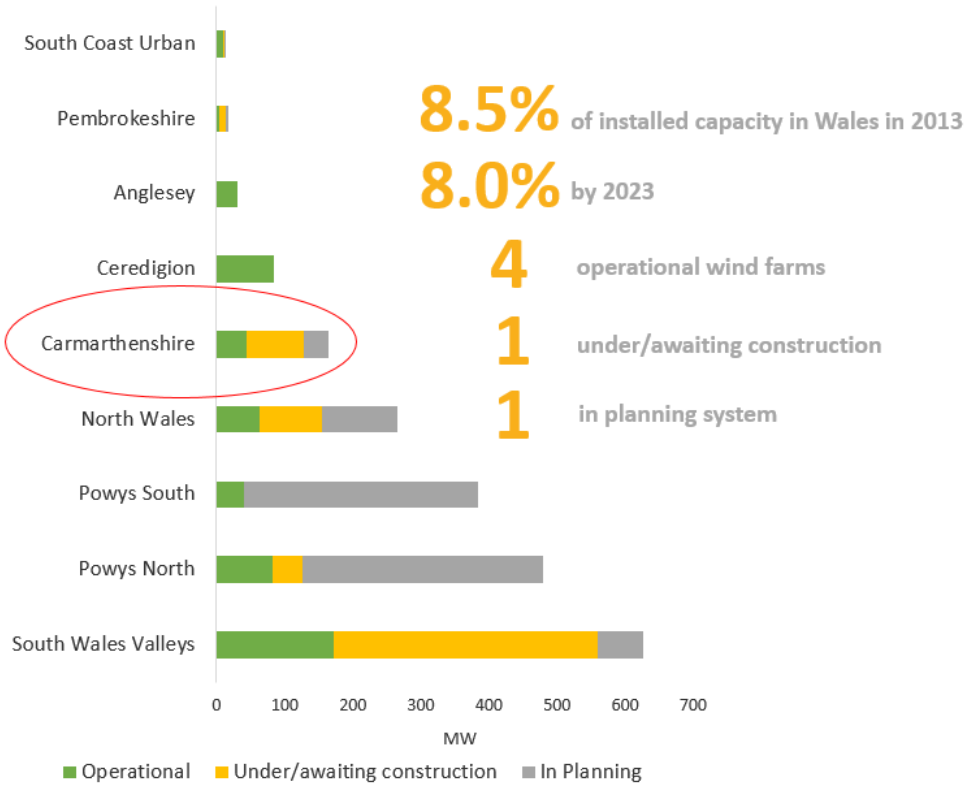
Carmarthenshire

Current and Planned Wind Farm Development

6.41 There are four operational wind farms in Carmarthenshire, however these are all relatively small. The largest is Parc-Cynog in the south of the County with 16 turbines19. There is a much larger wind farm of 28 turbines with planning permission in Brechfa Forest West. There is also a planning application submitted for a smaller wind farm of 12 turbines in Brechfa Forest East.

6.42 If both of the Brechfa Forest wind farms were developed, there would be a cluster of three wind farms in this area. Other than this, Carmarthenshire's wind farms are spread out over a wide area, and it is considered unlikely that there would be cumulative effects on the landscape beyond Brechfa Forest.

Figure 6-9: Current and Potential Installed Capacity in Carmarthenshire Impact Area



Source: DECC
Future installed capacity assumes all wind farm developments in planning are approved.

[18] There is no data available for the area around Cefn Croes itself,

[19] This includes the original Parc Cynog wind farm and the subsequent extension

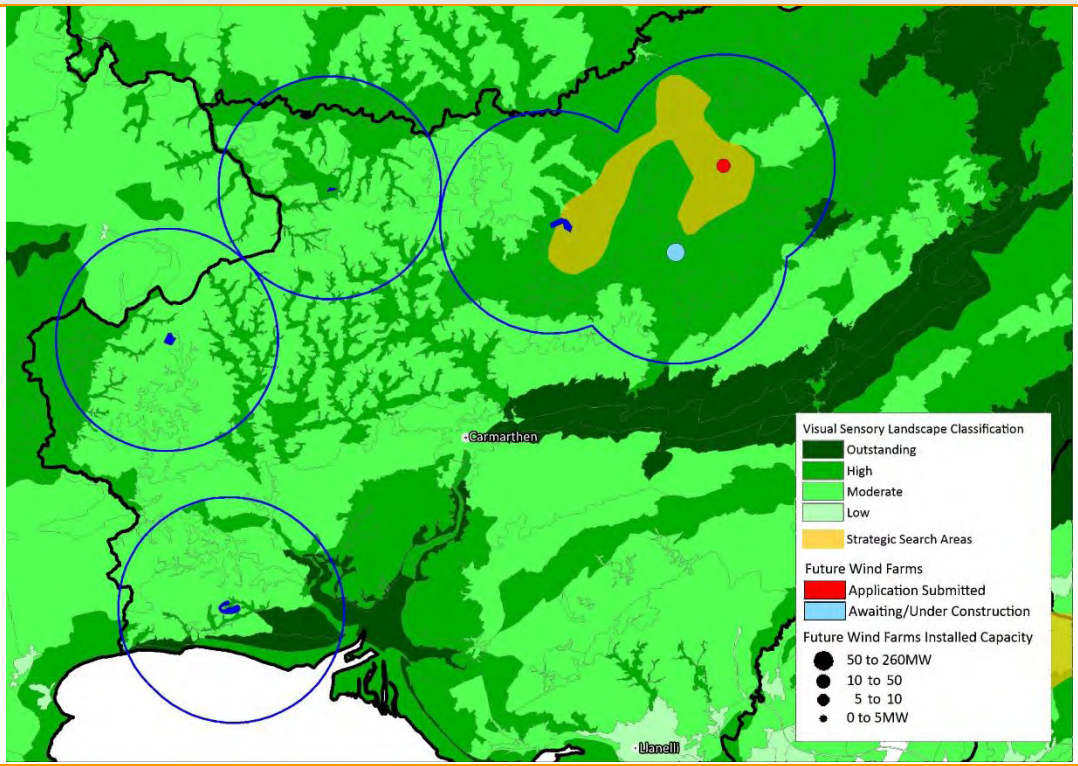
6.43 There is one other wind farm in the south-east of Carmarthenshire (Mynydd y Betws), however this is in close proximity to other wind farms in Swansea and Neath Port Talbot. It has therefore been included in the South Wales Valleys study area.

Local Landscape

6.44 Of the four operational wind farms, three are assessed by LANDMAP as being in high landscape quality areas. In some cases, the wind turbines are observed to contribute to the overall assessment as they provide additional interest and novelty in an area that has very few wind turbines: "there are very few landscapes in the county that currently support wind turbines, so while the scenic quality of the area is considered to be moderate, it scores high for rarity and character". Judgements such as these are highly subjective, however they contribute to the overall impression that the size and distribution of wind farms mean that they do not have a significant presence in large areas of Carmarthenshire. This may of course change as more wind farms are developed.

6.45 The areas which are likely to be the focus for future development (around Brechfa Forest) are also assessed as being high landscape quality, although these areas are a mix of farmland and woodland. The LANDMAP assessment notes the possible threat to the landscape integrity of the area from proposed wind farms. However, large numbers of turbines may not be visible in some areas because of forest cover.

Figure 6-10: LANDMAP Visual and Sensory Assessment for Carmarthenshire



Source: LANDMAP.

Scale of Visitor Economy

6.46 Tourism is a relatively important sector in the study area. BRES shows there are around 580 jobs in tourism related sectors representing 14% of total employment (compared to a Wales average of 9%). These 580 jobs represent 13% of tourism related employment in Carmarthenshire.

6.47 Bedstock data shows 6,100 visitor bedspaces representing 34.7% of the stock in Carmarthenshire. The high percentage reflects the inclusion of a large area of the Carmarthenshire coast within the study area, where there is a large concentration of visitor accommodation (including Amroth).

Table 6.4: Employment in Tourism Related Sectors and Visitor Bedspaces, 2012

	Carmarthenshire Study Area	Carmarthenshire LA	Percentage in Study Area
Jobs in tourism related sectors	580	4,520	12.8%
Bedspaces	6,100	17,600	34.7%
Source: BRES, Bedstock (Visit Wales)			

6.48 Applying these percentages for the study area to the tourism datasets gives a wide range of 708,000 to 1.9m visits per annum and £23m to £62m in visitor expenditure. The higher end of this range is driven by the area to the south. However a large amount of the visitor expenditure would be likely to occur outside the study area in places like Saundersfoot and Tenby.

Table 6.5: Estimated Volume and Value of Domestic Tourism in Carmarthenshire Study Area

	Local Authorities		Low Estimate for Study Area		High Estimate for Study Area	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	5,280	115	678	15	1,830	40
Domestic Tourists	239	65	31	8	83	23
Total	5,519	180	708	23	1,913	62
Calculations by Regeneris Consulting						

Visitor Assets

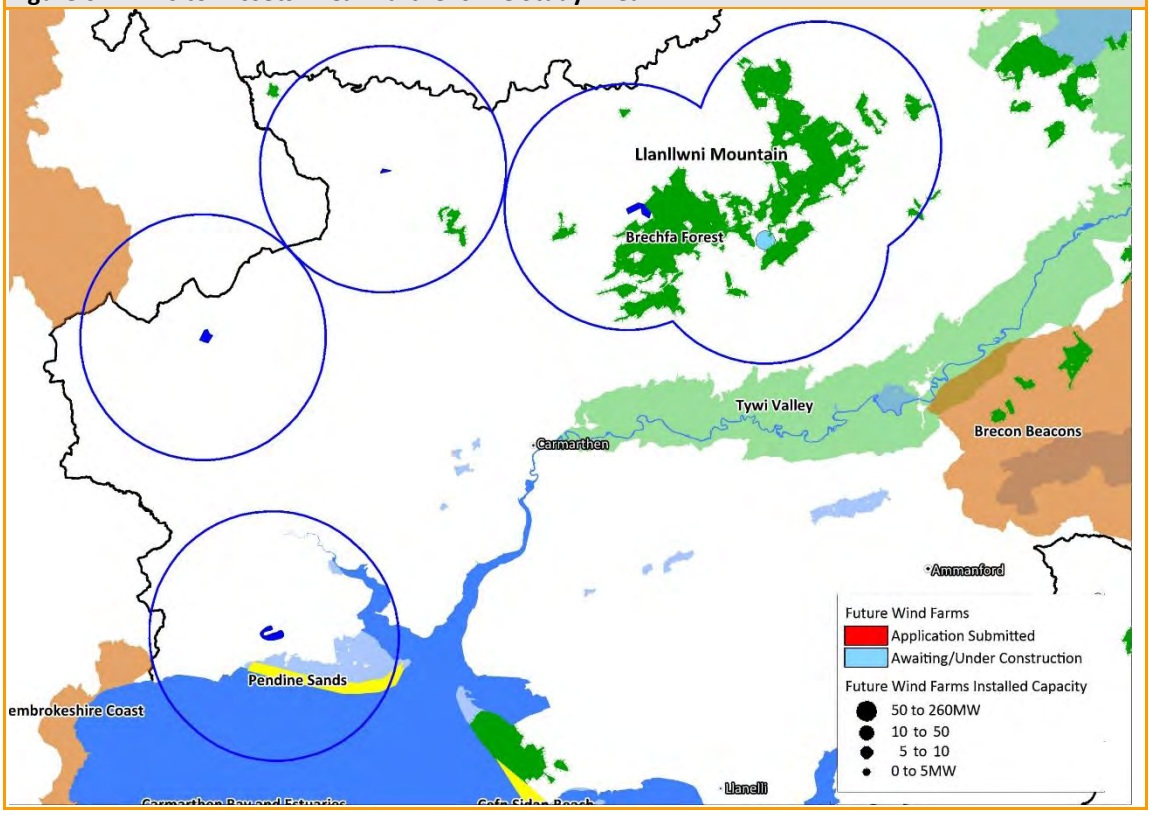
6.49 Carmarthenshire does not have a current tourism strategy, however the County's natural environment and cultural heritage are identified as the key visitor assets in the Unitary Development Plan (Carmarthenshire County Council, 2006). In particular, the Carmarthenshire coastline and beaches are popular visitor attractions and have protected status as special areas of conservation and sites of scientific interest. Parc Cynog is the only wind farm which might be encountered by walkers and other visitors to this particular area.

6.50 Carmarthenshire's most open landscapes are located in the western area of the Brecon Beacons National Park. These areas are remote from existing wind farm development. The proposed wind farms may be visible from these areas, however this would be at a considerable distance.

6.51 The key visitor asset within the study area is the southern area of the Cambrian Mountains, including Brechfa Forest and Llanwni Mountain. These areas are all classed as public forests or other statutory access land and are relatively popular with walkers, horse riders and mountain bikers. Although turbines may not be visible across a wide area due to forest cover, it is possible that there would be some disruption to public access in these areas during the construction of Brechfa Forest West wind farm (although it is normal for a mitigation strategy to be put in place to minimise this, if it were a significant issue).

6.52 Other special landscape areas in Carmarthenshire include the Towy and Cothi Valley. These are largely remote from wind farm development, although may be visible from a distance in some areas.

Figure 6-11: Visitor Assets in Carmarthenshire Study Area



Visitor Characteristics

6.53 There is very little information available about the characteristics of visitors to Carmarthenshire. The only visitor surveys available were carried out in East Carmarthenshire (Strategic Marketing, 2013) which has limited wind farm development. In keeping with many rural areas of Wales, this area has an older profile of visitors (51% are aged over 55) which is likely to be the case for the large parts of rural Carmarthenshire. However, we would expect the coastal areas to be popular with a much broader range of visitors, especially families and to some extent younger independent visitors.

Marketing and Promotion

6.54 The visitor brochures for Carmarthenshire highlights outdoor activities, unspoiled landscapes and attractive beaches as the key elements of the visitor offer. However, the unspoiled, open landscapes featured in the marketing material are from the Brecon Beacons which are largely remote from wind farm development. Brechfa Forest is marketed as a key destination for mountain biking and walking.

Figure 6-12: Images used in Marketing and Promotional Brochures for Carmarthenshire

Source: Visit Carmarthenshire

Key Points

- Most of Carmarthenshire's operational wind farms are relatively small in size and distributed over a wide area. As such, there is limited potential for cumulative landscape effects. They are not considered to be a dominant presence on Carmarthenshire's landscapes and would be highly unlikely to deter visitors.
- The largest existing wind farm, Parc-Cynog, is located in an area where the mix of visitors who are, on balance, likely to be less sensitive to the presence of the wind farm.
- The development of future wind farms around Brechfa Forest could create a cluster of turbines which could form a more significant intrusion on the landscape. However, much of the development area is forested, which will reduce the intrusion from the wind farms on the landscape.
- There is little known about the characteristics of visitors to the areas affected. Surveys in East Carmarthenshire showed the area attracted older visitors, who on average tend to be more sensitive to wind farm development. However, the area most affected by the future development is popular with mountain bikers. The South Wales Valleys profile (below) shows that similar locations (Afan Valley Park) tend to attract visitors who may be less sensitive to wind farm development. If there is the potential for disruption to walking and mountain biking routes during construction, this should be mitigated and short term.

Powys North

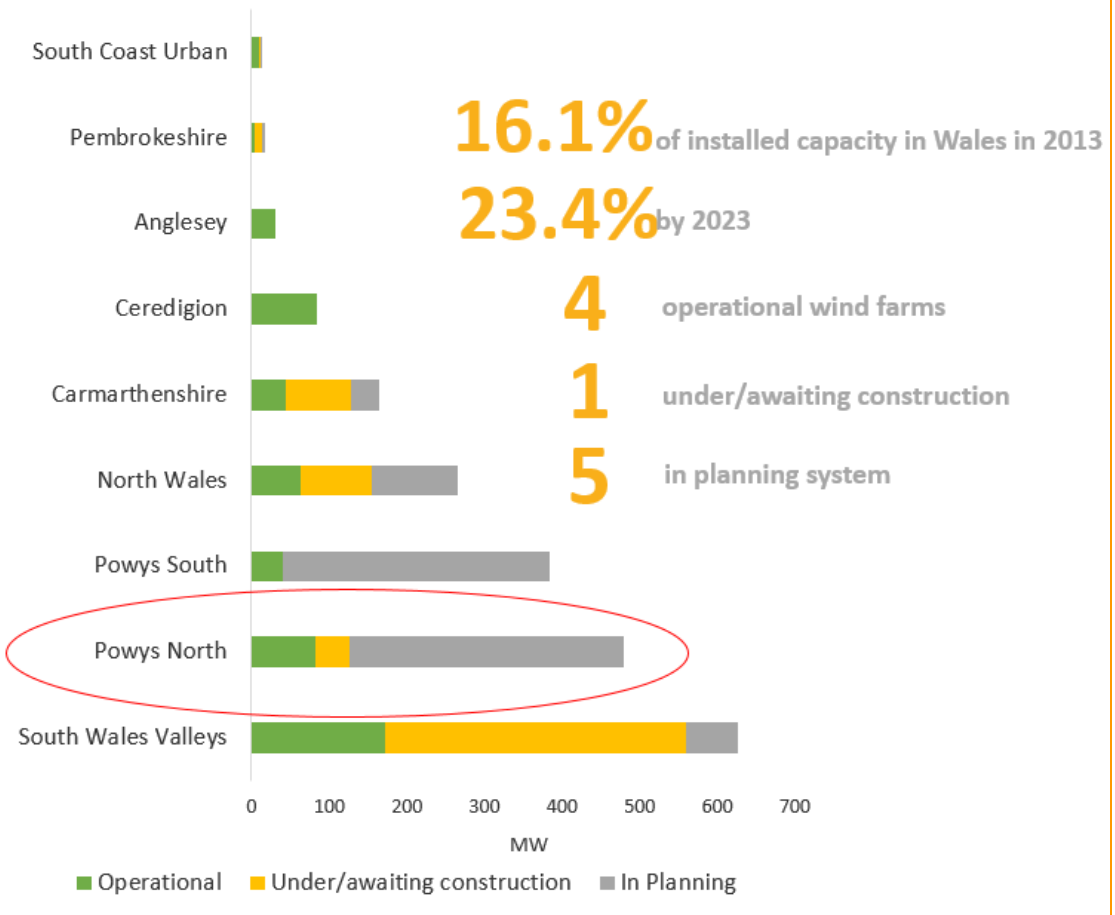
Key Statistics

6.55 Powys North comprises four operational wind farms. The largest of these is Carno wind farm, which comprises 112 turbines in total (half of these were installed in 1996 with the other half installed in 2009). Cemmaes wind farm is another well-established but smaller wind farm comprising 30 turbines. Current operational wind farm schemes account for around 16% of the total installed capacity in Wales.

6.56 There are a further five applications for potential future wind farms in the planning system. This includes an application for 150 turbines at Carnedd Wen and 69 at Llanbrynmair which would be adjacent to each other and cover an area of 45 sq km. If all of these proposed schemes were to go ahead, they would account for 23% of the total installed capacity within Wales. These schemes are currently the focus of a conjoined public inquiry.

6.57 The Powys North study area also includes additional infrastructure which would connect the wind farms located in Mid Wales to the National Grid. Part of this infrastructure would be buried underground, however large sections of it would be exported through overhead pylons linking to a substation in Shropshire.

Figure 6-13: Current and Potential Installed Capacity in Powys North



Source: DECC
Note: Future capacity assumes all wind farm developments in planning receive approval

Local Landscape

6.58 The Powys North study area is a remote and sparsely populated area of Mid-Wales with very few significant settlements (Newtown and Llanidloes are the closest). The landscape includes a mix of open, upland moorland and heaths. However, there are also a number of extensive conifer plantations which alter the landscape in some areas and may detract from the area's appeal in terms of its landscape quality and to some extent as a visitor destination.

6.59 Both Carno and Cemmaes were operational at the time of the latest LANDMAP assessment and influenced the overall assessment, albeit with different results:

- The landscape in which Carno is located was assessed as moderate, with the assessor noting "*Upland moorland that suffers from some degradation due to the extensive forestry adjacent to the south and extensive wind farm development*".

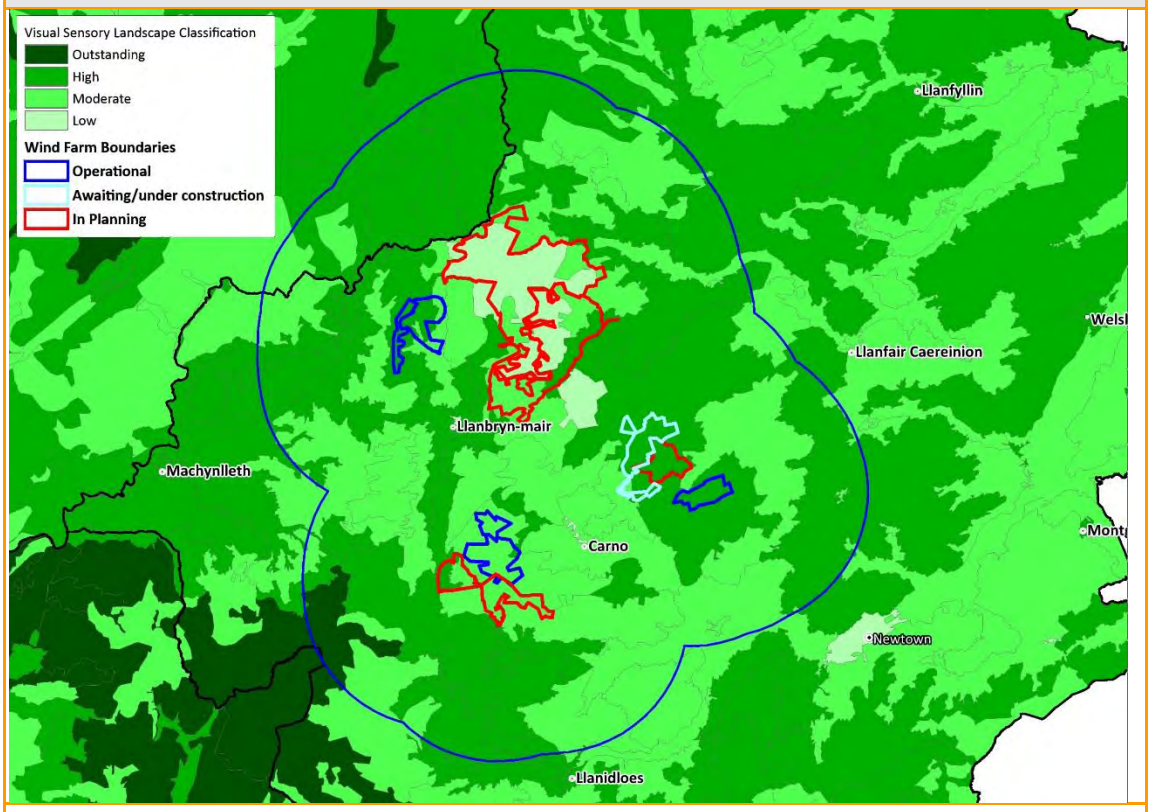
- The landscape surrounding Cemmaes was assessed as high, with the assessor noting that the wind farm had enhanced the landscape: "*Wind turbines provide a contrasting visual experience and overall focus for the surrounding area that does not necessarily degrade or detract from the aesthetic quality - rather it complements it and provides for a unique experience*."

6.60 In the case of potential future developments, the local landscape in which Llanbrynmair and Carnedd Wen are located is assessed as poor. The justification for this assessment is that "*large scale coniferous afforestation blankets the subtleties of the underlying landform and produces intrusive conifer fringes and harsh plantation edges into an otherwise open expanse of upland moorland and grazing*". The assessment also notes that there is little or no public access in this area of upland.

6.61 A feature of the proposed Carnedd Wen scheme is an environmental scheme which would remove much of the forestry plantation and restore the moorland habitat. This has the potential to significantly improve the landscape quality, wildlife habitats and the setting of the Glyndwr's Way (a long distance national walking trail).

6.62 One of the other proposed wind farms (Esgair Cnwoen) is also located in landscapes which are altered by conifer plantations. This contributes to an overall assessment of moderate, while Tyrgwynt wind farm is assessed as high quality due to its patchwork upland grazing.

Figure 6-14: LANDMAP Visual and Sensory Assessment for North Powys Study Area



Source: LANDMAP

Scale of Visitor Economy

6.63 Although tourism is limited in the study area, it is nevertheless an important source of employment in this part of Powys. In total there are around 250 jobs in tourism related sectors in the best-fit LSOAs, accounting for around a quarter (24%) of employment. These jobs only account for a very small share of tourism related employment in Powys as a whole. The largest concentrations lie in the Brecon Beacons National Park to the south and to a lesser extent some of the market and spa towns.

6.64 There are approximately 1,100 bedspaces in visitor accommodation, comprising a mix of caravans, serviced accommodation and self-catering. This represents a little less than 3% of the bedstock in Powys.

6.65 These low percentages partly reflect the size of Powys which is Wales's largest county, and that this area is not a well established and popular tourism location compared to other parts of the County. However the high share of employment in tourism related sectors shows that this is still a valued sector for the local area.

Table 6.6: Tourism related Employment and Visitor Bedspaces, 2012

	North Powys Study Area	Powys LA	Percentage in Study Area
Jobs in tourism related sectors	250	5,300	4.7%
Bedspaces	1,100	40,400	2.7%
Source: BRES and Bedstock (Visit Wales)			

6.66 Applying these percentages to the visitor surveys shows a range of 176 to 305 thousand visitors and £8m to £14m in visitor expenditure in a typical year (less than 5% of the total visitor economy for Powys as a whole). This is a low figure for volume and value, but is still likely to represent an important source of income in an area with a very narrow economic base.

Table 6.7: Estimated Volume and Value of Domestic Tourism in North Powys Study Area

	Powys		Low Estimate		High Estimate	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	6,140	222	167	6	290	10
Domestic Tourists	334	84	9	2	16	4
Total	6,474	306	176	8	305	14
Calculations by Regeneris Consulting						

Visitor Assets

6.67 The Mid Wales Tourism Strategy (TPMW, 2011) recognises the natural environment as Powys's key visitor asset. The County has unspoiled landscapes in mountain ranges in the south (Brecon Beacons), the north (Berwyn Mountains) and the west (Cambrian Mountains). The North Powys study area takes in part of these mountain ranges and also includes part of Snowdonia National Park. Although no existing or proposed wind farms are located in Snowdonia, Cemmaes wind farm can be seen from some locations on the south eastern boundary (as would Carnedd Wen, if it was developed).

6.68 The study area also takes in more gentle areas of Montgomeryshire to the east. These areas are less dramatic and the relatively low levels of visitor accommodation in the area implies that they have less visitor appeal than other parts of Mid Wales. However they still attract visitors for the isolation and remoteness offered by the area. Large areas of this part of Powys are designated as open country or other statutory access, providing opportunities for walking, cycling and wildlife watching. It is in this area where National Grid have proposed to install overhead pylons to connect the wind farms to a substation in Shropshire.

6.69 A National Trail (Glyndwr's Way) passes through the south of the study area, from where Carno wind farm is already visible. The trail then passes directly through the proposed site for Carnedd Wen and Llanbrynmair, where walkers would pass in close proximity to the turbines. The pylons from the grid infrastructure would not cross the National Trail. This section of the grid connection would be underground which would minimise intrusiveness for walkers in this area. It is likely, however, that the pylons would still be visible from some parts of the trail.

6.70 The scale of development in this area (for the grid infrastructure and the pylons) could cause disruption during construction through closure of pathways, traffic and noise, however we would expect for this to be considered and minimised through the planning process if it were a significant issue.

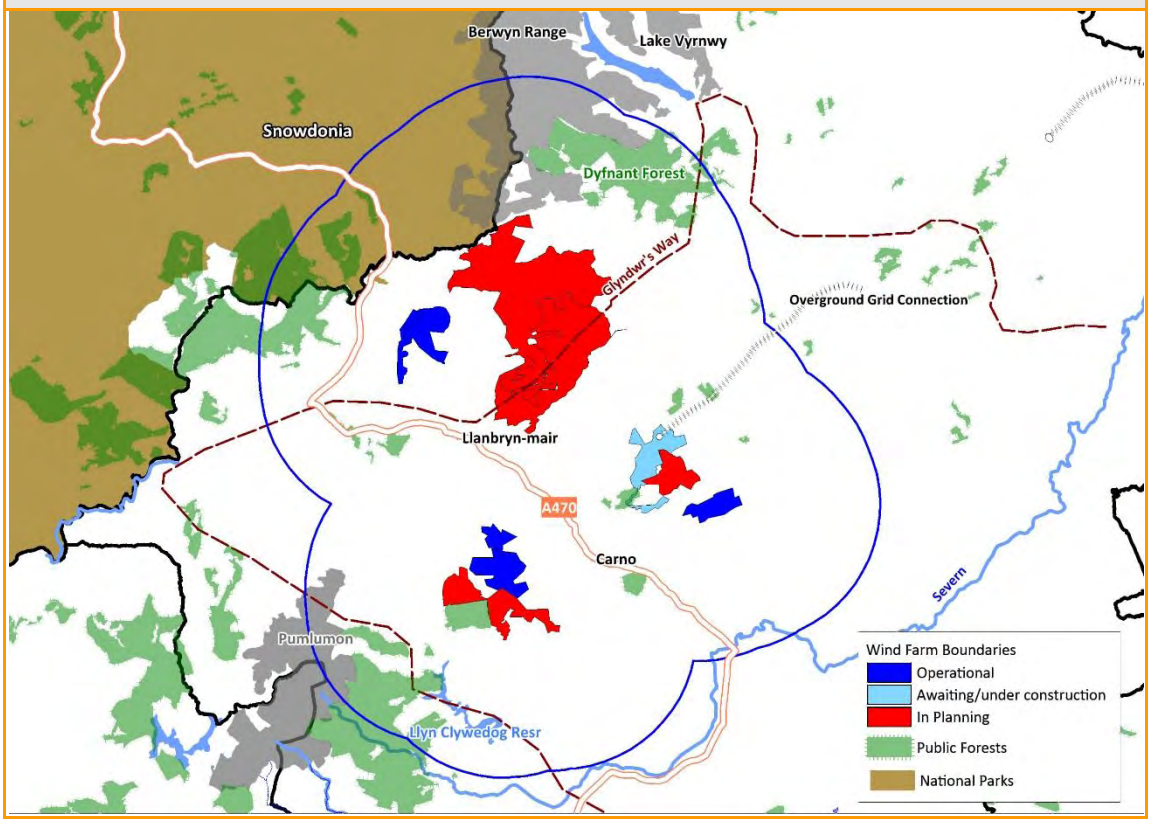
6.71 Llyn Clywedog reservoir is located in the south of the study area. This is popular with walkers, anglers and wildlife watchers (buzzards and red kites are common in the area).

6.72 The A470, which is a busy tourist route for visitors travelling north-south, passes through the centre of the clusters of wind farms. Carno and Cemmaes wind farms are both visible to motorists and cyclists on this route, although neither come in very close proximity (around 2km at the

closest point). The two large proposed wind farms, Llanbrynmair and Carnedd Wen would also be likely to be visible from this road and would be in much closer proximity than the existing wind farms.

6.73 The minor roads across the moorland here are used partly for the access they offer to remote countryside, but also for an attractive driving experience. Drivers on these roads would also be likely to encounter wind farms. In some areas this would be at close quarters.

Figure 6-15: Visitor Assets in North Powys



Visitor Characteristics

6.74 The 2011 Mid Wales Tourism Survey (TPMW 2011b) shows that Powys typically attracts older visitors. Half of the visitors surveyed were "empty nesters" aged 55 or above. A further 22% were families while only 10% were "young independents".

6.75 Over 80% of visitors to Powys were day visitors and only 5% of all visitors were from overseas. The survey also showed that visitors to Powys tend to be very loyal, with one in ten visitors to Powys being a repeat visitor.

6.76 It should be noted that this survey was for the whole of Powys which covers a very large area. No survey evidence was available for the North Powys study area itself. However, given that a large number of visitors visit the area for its remoteness, older visitors and couples may be a dominant market here too (as opposed to families and younger groups).

Marketing and Promotion Brochures

6.77 The visitor brochures for Powys place an emphasis on open country, unspoiled landscapes and

activity orientated holidays. It relies heavily on its relatively unspoilt high quality landscape, especially the Brecon Beacons which are remote from operational or proposed wind farms.

Figure 6-16: Images from Marketing Brochures for Powys

Source: Explore Mid Wales and the Brecon Beacons

Key points for assessment

- Tourism volume and value in the North Powys study area is low, accounting for less than around 5% of the total for Powys. Despite this, tourism is still a very important sector locally given the narrow economic base, accounting for around a quarter of all employment. The local economy would therefore be sensitive to any potential changes in tourism activity.

- There is already a number of wind farm developments in the area, however this would increase significantly if most or all of the currently planned wind farms were approved. Wind turbines would be a dominant feature on the landscape in a number of extensive areas within the study area (although in some instances this is lessened by development occurring within or in close proximity to forestry plantations) and would come in to close proximity to a number of important visitor assets (eg Glyndwr's Way). However, the proposed Carnedd Wen scheme would enhance the quality of the local landscape and setting of Glyndwr's Way through the restoration of the natural moorlands and wildlife habitats.

- There is also new grid infrastructure proposed for the area, which would include pylons and underground lines. Evidence indicates that visitor perceptions of electricity pylons are more negative than wind turbines. The current proposals for an additional export route will, however, keep the pylons away from some of the key visitor assets in the area (such as Glyndwr's Way).

- The area has fewer visitor assets than the more popular visitor areas in surrounding parts of Powys and Snowdonia, but appears to attract visitors for its relative tranquillity and remoteness. Visitors also tend to be older and more likely to be repeat visitors.

- The area has a relatively narrow visitor offer. Walking, wildlife watching and cycling are all popular activities, as well as general relaxation. However, the area is not as established as other neighbouring areas for these activities.

- Although the literature points to small changes in visitor behaviour as a result of wind farm development, the points above would indicate that this area's visitor economy is potentially more sensitive to wind farm development than other parts of Wales.

South Wales Valleys

Current and Planned Wind Farm Development

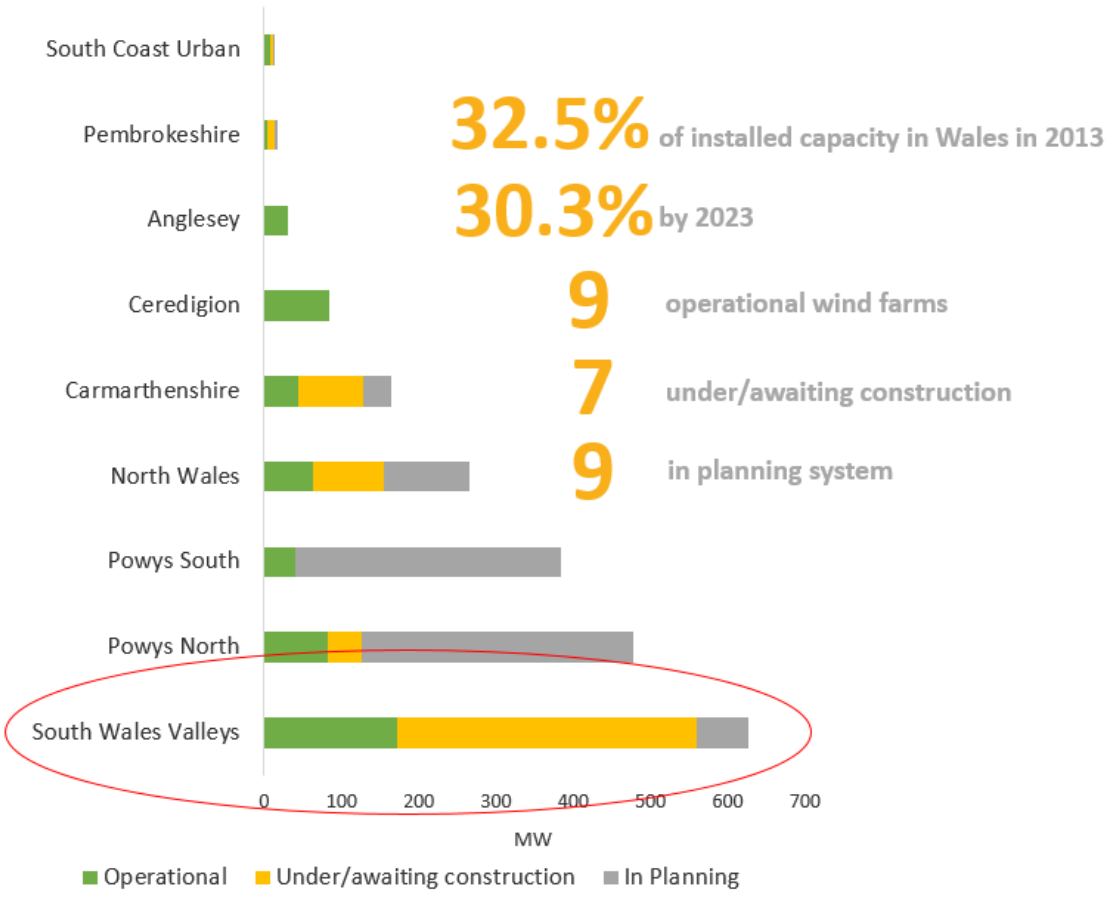
6.78 The South Wales Valleys impact area, covering large parts of Neath Port Talbot (NPT) and Rhondda Cynon Taff (RCT) as well as smaller parts of a number of other districts, has been the location of a number of wind farm developments. There are also a large number of consented wind farms and schemes seeking planning permission, mostly located in NPT and RCT.

6.79 Wind farm databases show there are around nine wind farms in total in the study area. It may be difficult for observers to distinguish these wind farms as many of them are extensions to existing schemes or are in very close proximity to each other (Mynydd Portref and Taff Ely for example).

6.80 To date there have been 102 turbines installed, with a generating capacity of around 170MW. This accounts for nearly a third of total installed capacity in Wales, making this currently the largest study area in terms of installed energy capacity.

6.81 The current largest concentration of turbines is the cluster of Mynydd Portref and Taff Ely in RCT, with a little over 30 turbines. However, this will be surpassed by Pen y Cymmoed, a development of 76 turbines which will be in close proximity to the existing Ffynnon Oer development (16 turbines) and the consented Maerdy and Mynydd Bwllfa developments. This will create a significant cluster in the forested area covering the NPT/RCT border.

Figure 6-17: Current and Potential Future Capacity in South Wales Valleys



Source: DECC
Note: Future capacity assumes all planned wind farm developments receive consent

Local Landscape

6.82 The only parts of the study area assessed as outstanding by LANDMAP's visual sensory assessment are to the north in the Brecon Beacons national park. In some places these are within 3km of an existing wind farm. A large number of the wind farms are, however, in areas assessed as high quality.

Table 6.8: LANDMAP Visual and Sensory Assessments for South Wales Valleys Wind Farms

	Operational	Under/awaiting construction	In Planning	Total
High	6	4	2	12
Moderate	3	3	6	12
Low	0	0	1	1

Source: LANDMAP

6.83 Despite having quite a high population density overall most of the settlements are located in the valleys, while wind farms are located in upland areas. In many places, the landscapes retain a feeling of tranquillity despite close proximity to towns and villages.

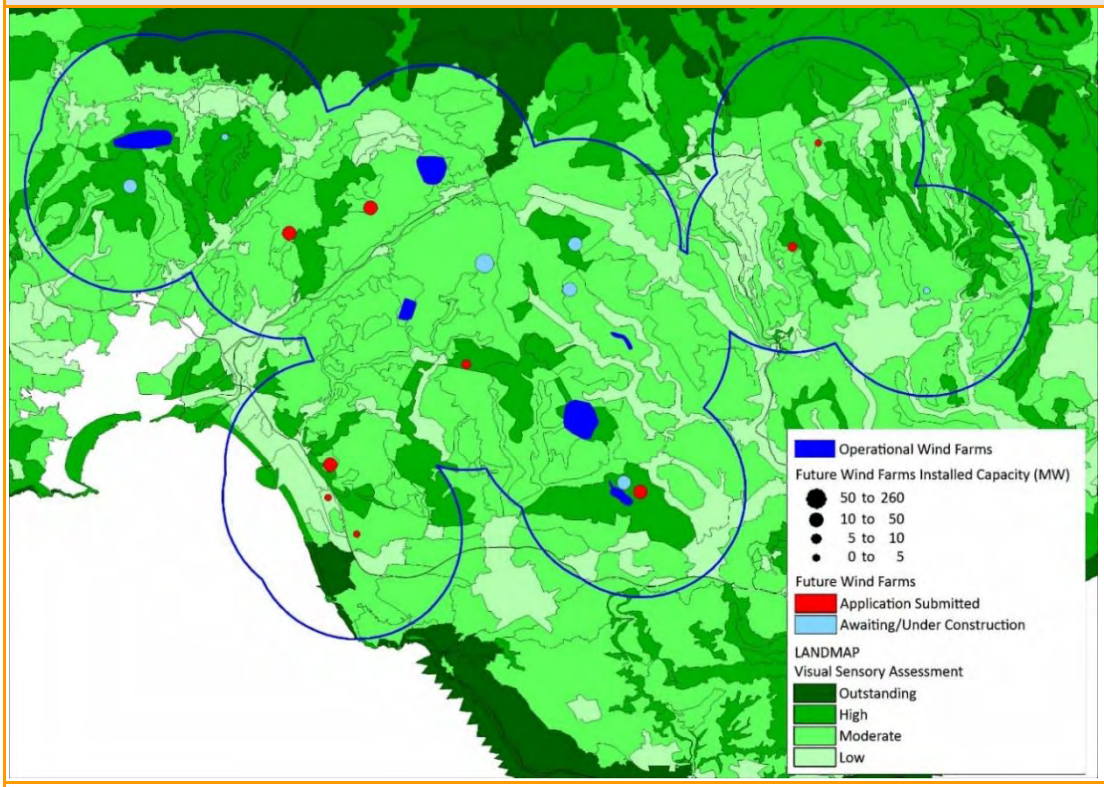
6.84 In other locations, such as in the north west of the study area, around the Mynydd y Betws wind

farm, the landscape has retained a sense of wilderness and isolation. The LANDMAP assessment was conducted prior to the installation of the turbines, and it is possible that the wind farm may have detracted from the "unspoilt" character of the area.

6.85 Some of the other key wind farm locations are in much closer proximity to settlements. The Landmap assessment concludes that the cluster around Taff Ely detracts from the integrity (or "unspoiltness") of the area, but enhances the character and sense of place which contributes to the overall assessment of high landscape quality.

6.86 The major focus for future development is the area around the existing Ffynnon Oer wind farm and consented Pen y Cymmoed development. This area is heavily forested and is assessed as moderate by LANDMAP. On scenic quality, the assessment notes that the trees on the valley sides give drama, but "in many areas the abrupt forest edge sits uncomfortably with the surrounding open landscape... *Cleared areas of forest are unsightly*".

Figure 6-18: LANDMAP Visual and Sensory Assessment



Source: LANDMAP

Scale of Visitor Economy

6.87 BRES shows there are around 10,700 people employed in tourism related sectors in the study area, representing 36% of all tourism related employment in the eight local authority areas covered. Bedstock data shows there are a total of 6,200 bedspaces in the study area which represents only 9% of all bedspaces in the local authority areas.

6.88 This provides a wide range for the estimate of tourism volume and value which is located in the study area. It is likely that the figure is closer to the lower estimate from the bedstock data. This is because a large proportion of the tourism related employment is in food and beverage sectors. Given that the study area covers a very densely populated area of Wales, it is likely that a large

proportion of the jobs are driven by demand from locals as opposed to visitors.

Table 6.9: Visitor Accommodation and Employment in Tourism Related Sectors		
	Bedspaces	Employment
Valleys Study Area	6,200	10,700
Local Authorities	67,600	30,000
Percentage in study area	9%	36%
Source: BRES and Bedstock (Visit Wales)		

6.89 Applying this to the tourism datasets provides a range of 2.6m to 10.1m visitors per annum and £88m to £342m in visitor expenditure. As described above, the true values are likely to be towards the lower end of this scale.

Table 6.10: Estimated Volume and Value of Tourism in South Wales Valleys Study Area						
	Local Authorities		Low Estimate for Study Area		High Estimate for Study Area	
	Visits (m)	Expenditure (£m)	Visits (m)	Expenditure (£m)	Visits (m)	Expenditure (£m)
Day Visitors	27.5	725.7	2.5	66.9	9.8	258.8
Domestic Tourists	0.7	234.0	0.1	21.6	0.3	83.5
Total	28.2	959.7	2.6	88.5	10.1	342.3
Calculations by Regeneris Consulting						

Visitor Assets

6.90 The South Wales Valleys study area is not as well established as a tourism location as many of the other study areas. It is however, recognised as a growth area, with both Neath Port Talbot and Rhondda Cynon Taff adopting tourism strategies in order to increase the contribution of the sector to the local economy. It also has distinctive assets which differentiate the visitor offer from many other parts of Wales. Mountain biking is identified as a particular asset in Neath Port Talbot's tourism strategy (NPT, 2011) as it is home to Afan Forest Park which contains mountain biking trails with an international reputation. RCT's tourism strategy (RCT, 2007) also identifies cycling and mountain biking as growth areas as it contains the Celtic Trail, part of the National Cycle Network. Many of the key cycling destinations are in very close proximity to the area which will see considerable wind farm development in coming years.

6.91 Walking and other outdoor activities are a key part of the offer in the Brecon Beacons which occupies the northern part of the study area. Walkers here are likely to encounter views of Maesgwyn and Mynydd y Betws wind farms. To the south, there are large upland areas, which include open moorland and dense forestry. There are walking routes throughout this area and large areas of open country which offer people the right to roam across the countryside, with many of these areas containing planned or operational wind farms. Many of the walks are densely forested which would restrict views of turbines in large sections.

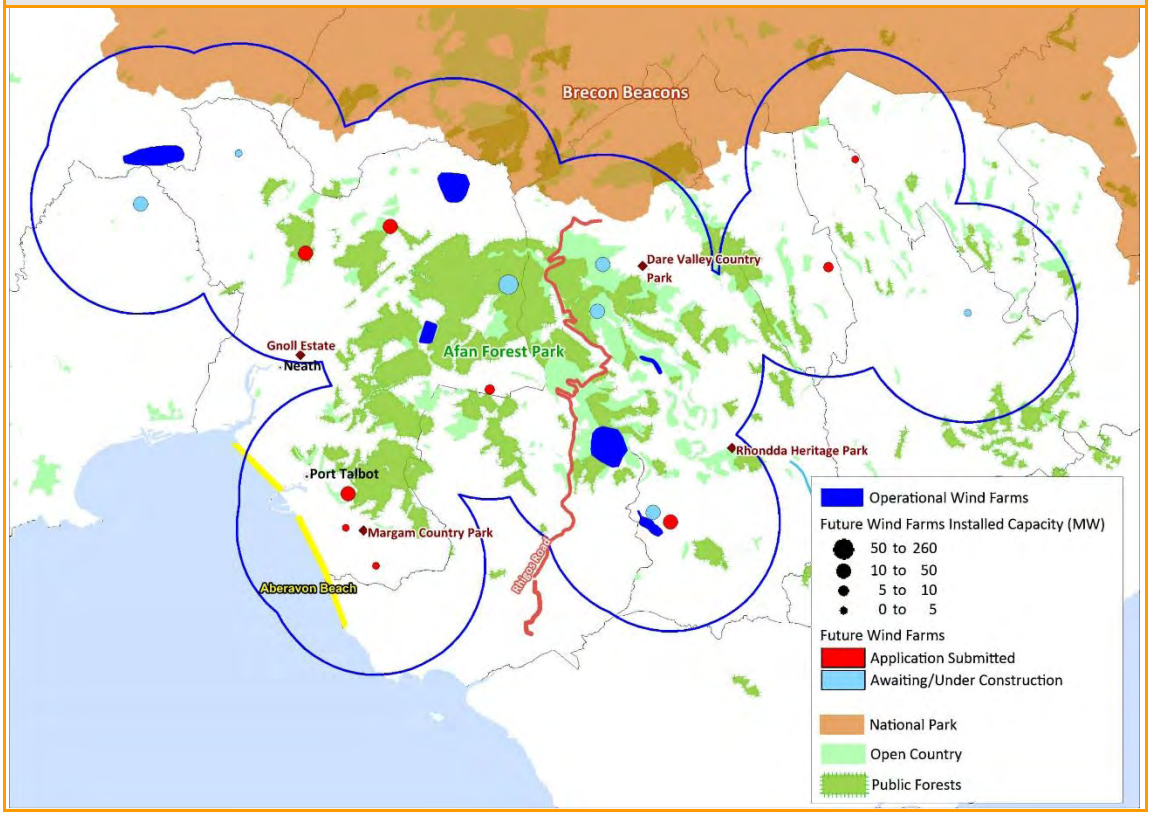
6.92 There is a question over the degree to which this area is an established walking location for tourists compared to other areas of Wales. Both NPT and RCT's strategies identify walking as a growth market, however a large proportion of the walkers in the areas affected by wind farms are likely to be local. RCT's tourism strategy notes that the countryside product is "not fully developed for tourism".

6.93 Culture and industrial heritage are other key assets, although more so in RCT than NPT. RCT's strategy identifies industrial heritage as an asset and the opportunity to develop niche markets such as genealogy. Rhondda Heritage Park and Cynon Valley Museum and Gallery are both relevant attractions which each attract around 50,000 visitors per annum.

6.94 In the south of the study area, Aberavon beach is a popular location for surfing. There are a number of small, planned wind farms in close proximity. These are mostly located in, or very close to, built up and industrial areas so would not be expected to detract from the scenery. Margam Country Park is close to this cluster, and it may be possible to see turbines from parts of the estate.

6.95 The Rhigos Road is a popular route for scenic drives and bike rides and this dissects a number of the wind farm developments. The turbines on some parts of this drive are already clearly visible, and some of the largest consented wind farms will also be located in close proximity to this road.

Figure 6-19: Visitor Assets in South Wales Valleys Study Area



Visitor Characteristics

6.96 The area attracts a high proportion of day visitors. The respective tourism strategies suggest 60% of visits to NPT were day visitors and 40% in RCT. The data from the Day Visits survey and GBTS suggest that the proportions are substantially higher than this (around 99%) but this is likely to reflect differences in the way the surveys were conducted. The high proportion of day visits reflect the accessibility of this area and the large population within driving distance. It also reflects its own poorly developed holiday offer and its proximity to established holiday destinations such as the Gower and Brecon Beacons.

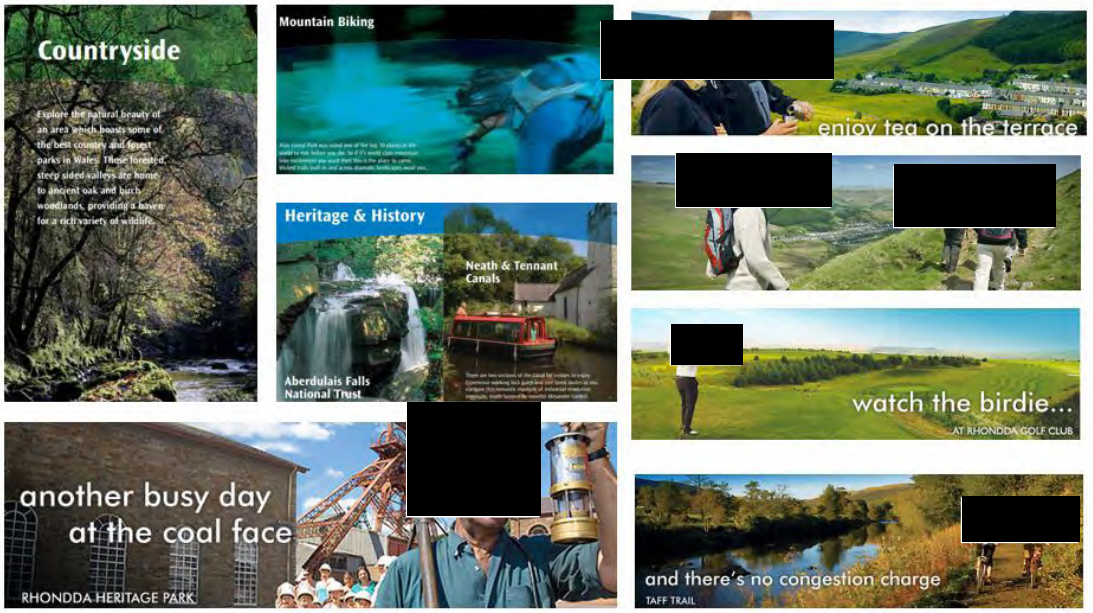
6.97 NPT's tourism strategy notes that the district attracts a younger visitor mix - 30% are aged 16-

24 compared to 20% across Wales. In Afan Forest Park, 51% of visitors are aged 35-59 which reflects the popularity of mountain biking for this demographic. RCT's strategy does not provide information on the average age of visitors.

Marketing and Promotion Brochures

6.98 Although unspoiled, open landscapes do feature in some of the marketing brochures for RCT, in general both areas highlight the diversity of the offer, including industrial heritage, mountain biking and other outdoor activities.

Figure 6-20: Marketing and Promotional Brochures for South Wales Valleys



Source: Visit Neath Port Talbot and Visit Rhondda Cynon Taff

Key Points for Assessment

- There are a number of existing wind farm developments in this study area and a number of additional major schemes which have been consented. Although these wind farms are spread out over a wide area, there will be a very large concentration of turbines in the central area around Afan Forest Park (NPT's key visitor asset), the border of NPT and RCT and in the south of RCT.

- These wind farms will be relatively dominant features on the landscape in some parts of this area, particularly where landscapes are open and unspoiled in the north west of the study area. However, large areas are forested (including major forestry plantations) which would limit visibility for tourists in some of these areas. Many of the wind farms are also close to existing developed and former industrial areas which will limit their impact on the quality of landscapes and their attractiveness to visitors.

- The area has a diverse offer which includes walking, adventure sports, mountain biking, heritage, beaches and surfing. Many of these markets are not likely to be sensitive to wind farm development which increases the potential for substitution of visitors if some visitors are deterred.

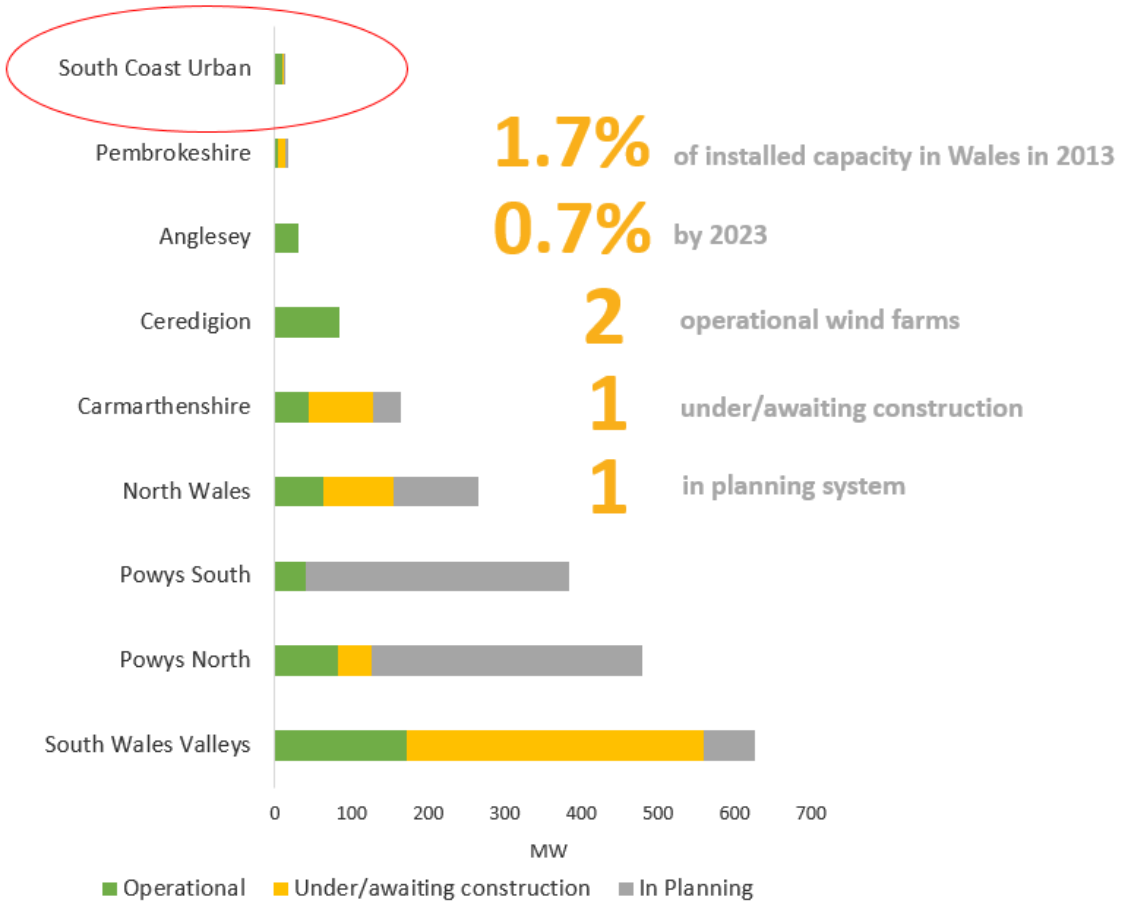
- Surrounding areas in the Gower and Brecon Beacons National Park are more established as areas of high scenic value and walking destinations. Although the study area does attract people for walking and upland landscapes, many of these are likely to be locals or day visitors from surrounding areas who spend less while visiting the area.

South Coast Urban Area

Current and Planned Wind Farm Development

6.99 This study area comprises four small wind farm developments, predominantly in built up areas of Cardiff, Newport and Monmouthshire on the south coast of Wales. It is the smallest of the study areas in terms of energy production. Each of the wind farms contains only one or two turbines.

Figure 6-21: Current and Potential Future Capacity in South Coast Urban Area



Source: DECC

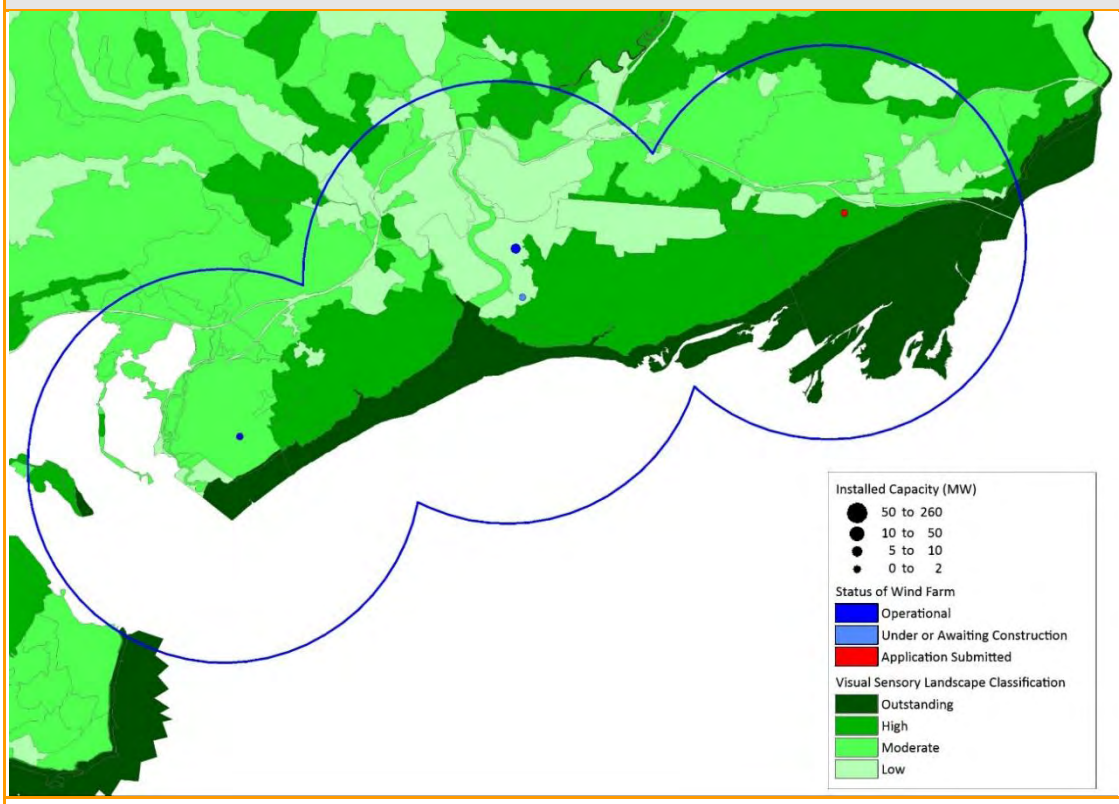
Local Landscape

6.100 The study area contains long stretches along the coast which are assessed as being outstanding in LANDMAP's visual and sensory assessment. This is due to the open seascapes with long views to the English coastline: "*the views form part of the Severn estuary which has a very distinctive estuarial and maritime character and strong sense of place*". The assessment notes that "*large-scale industrial development visually intrudes upon this open and exposed landscape*", however this does not detract from the distinctiveness of the area.

6.101 The operational and consented wind farm in close proximity to each other are both in an area assessed as low quality as they are located in a built up, commercial area. The wind farm in Cardiff is assessed as moderate as the "degraded nature of area reduces scenic quality". The wind farm in Monmouthshire is in an area assessed as high quality for its "long views framed by attractive pollarded willows". This wind farm is however adjacent to the M4 motorway.

6.102 Despite the proximity of the wind farms to some high and outstanding quality landscapes, it is unlikely that single turbines would have a noticeable effect on the landscape given the industrial development in the area.

Figure 6-22: LANDMAP Visual and Sensory Assessment for South Coast Urban Area



Source: LANDMAP

Scale of Visitor Economy

6.103 The study area contains 17,800 jobs in tourism related sectors and 23,200 bedspaces in visitor accommodation, representing between 76.7% and 85.9% of the total for the local authorities. The high percentages here are because the study area contains Cardiff city centre.

Table 6.11: Tourism Related Employment and Bedspaces in Visitor Accommodation

	South Coast Urban	Local Authorities	Percentage in Study Area
Jobs in tourism related sectors	17,800	23,200	76.7%
Bedspaces	23,200	27,000	85.9%

Source: BRES and Bedstock data (Visit Wales)

6.104 Applying this to the tourism datasets provides a range of 20.1m to 22.5m visitors per annum and £1.1bn to £1.3bn in visitor expenditure. Again, this reflects the number of visitors to Cardiff city centre.

6.105 It should be noted that this data excludes foreign visitors which is an important market for Cardiff, accounting for 25% of overnight visits according to the 2012 visitor survey. The data is therefore likely to substantially underestimate the total volume and value for the area.

Table 6.12: Estimates of Tourism Volume and Value in South Coast Urban Area

	Local Authorities		Low Estimate		High Estimate	
	Visits (m)	Expenditure (£m)	Visits (m)	Expenditure (£m)	Visits (m)	Expenditure (£m)
Day Visitors	25.6	1,282.1	19.6	983.3	22.0	1,101.2
Domestic Tourists	0.5	260.1	0.4	199.4	0.5	223.3
Total	26.1	1,542.2	20.1	1,182.7	22.5	1,324.6
Calculations by Regeneris Consulting						

Visitor Assets

6.106 The visitor assets in this study area centre around Cardiff, its cultural and sporting attractions, shopping, entertainment and heritage. It is also by some margin, Wales's most established location for business tourism and conferences. Around a quarter of overnight domestic visits to Cardiff are business related (GBTS) – substantially more than any other area of Wales. Monmouthshire attracts smaller number of visitors than Cardiff but offers large areas of unspoiled countryside. This is all remote from the proposed wind farm development adjacent to the M4 motorway.

6.107 Given the nature of the visitor offer in this study area, it is unlikely that there would be any disruption from the small amount of wind farm development that exists or is planned.

Visitor Characteristics

6.108 As stated above, Cardiff's 2012 visitor survey (Cardiff City and County Council, 2012) found that a large proportion of visitors are from overseas (25%) which is substantially more than the average for Wales. GBTS data also shows it attracts a large number of business visitors and people visiting friends and relatives, who are unlikely to be deterred by the small amount of wind farm development.

6.109 For those on holiday visits, the visitor survey found a broad mix of ages and visitor types. Cardiff's tourism strategy identifies a number of priority target markets, including "young entertainment seekers" (aged 23-35), "independent explorers" (30+) and "middle of the roaders" (35-50, often with families).

Marketing and Promotion

6.110 Cardiff's marketing and promotional brochures highlight a vast range of cultural and sporting assets. Open, unspoiled landscapes are not portrayed as an important part of the offer. The countryside plays a more important role for Monmouthshire, but here too, unspoiled landscapes are not included in much of the material.

Figure 6-23: Images from Promotional and Marketing Brochures for South Coast Urban Area

Source: Visit Cardiff and Visit Monmouthshire

Key Points for Assessment

- There is limited wind farm development in this study area. Each contains only one or two wind farms and these would not represent a significant intrusion on the existing urban landscape.
- Visitors to the area come primarily for the shopping, cultural, sporting and heritage attractions of Cardiff. None of these markets are likely to be threatened by the minimal wind farm development planned for the area.

North East Wales

Current and Planned Wind Farm Development

6.111 This study area incudes much of Conwy and Denbighshire, a small part of Gwynedd and a small area of Flintshire (due to the presence of one planned wind farm on the Flintshire coast). The area is covered by a Strategic Search Area.

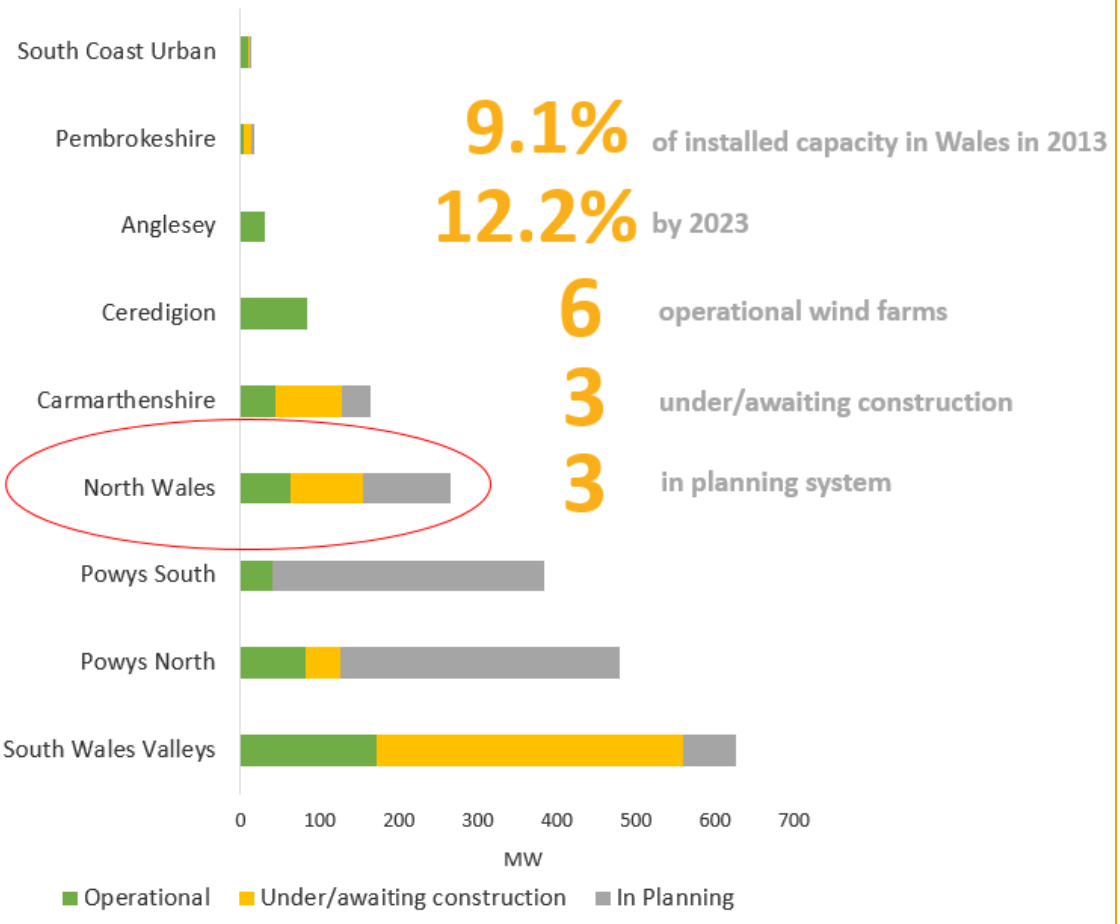
6.112 There are six operational wind farms. The wind farms in the south of the study area are all very small, each comprising three or four turbines. The largest operational wind farm is at Tir Mostyn and Foel Goch, comprising 25 turbines in total over two sites in the centre of the study area.

6.113 All of the future wind farms are considerably larger in terms of the proposed installed capacity. Derwydd Bach, Nant Bach and Brenig wind farms have each received planning permission and each contain between 10 and 16 turbines (37 in total).

6.114 An application has also been submitted for a wind farm in Clocaenog Forest which would be the area's largest wind farm if approved, comprising 32 turbines.

6.115 The wind farms are dispersed over a wide area, however there would be a cluster of wind farms around Clocaenog forest if the above scheme received planning approval.

Figure 6-24: Current and Potential Future Installed Capacity in North Wales Impact Area



Source: DECC
Note: Future capacity assumes all planned wind farms receive consent

Local Landscape

6.116 The area includes a varied landscape, with a number of wind farms in areas assessed by LANDMAP as high, moderate and low in its visual and sensory assessment.

Table 6.13: LANDMAP Visual and Sensory Assessment for North Wales Wind Farms

	Operational	Under/awaiting construction	In Planning	Total
High	3	1	1	5
Low	0	0	1	1
Moderate	3	2	1	6

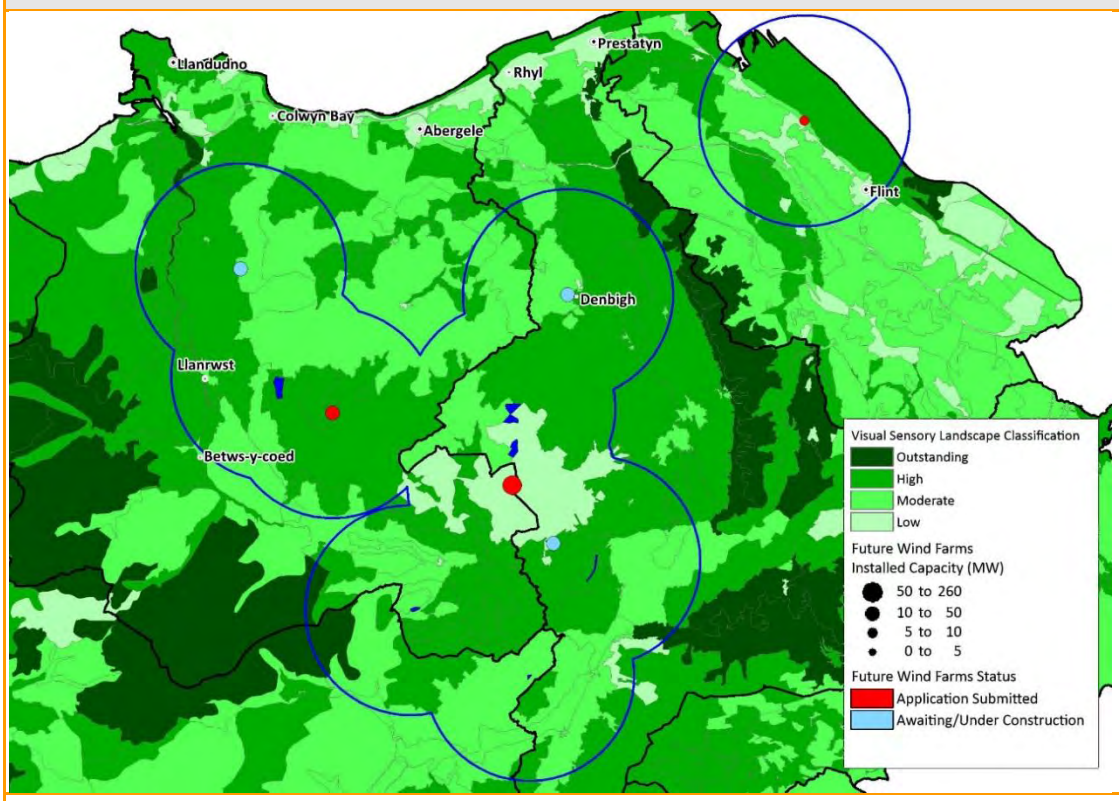
Source: LANDMAP

6.117 The area at the centre of the study area, which includes the largest operational wind farm (Tir Mostyn and Foel Goch) and the largest proposed wind farm (Clocaenog) includes a number of forestry plantations which LANDMAP considers to detract from the scenic quality "Dominant single species tree cover gives a monotonous view of the area.. (which) suppresses underlying landscape qualities".

6.118 To the west of this forested area is an area of open and deserted heathland which is assessed as high quality for its "natural plateau topography" and "panoramic long views to Snowdonia". This area contains both existing and planned wind farms. To the south, the area is also assessed as high quality for its attractive wooded valleys, and its "attractive, traditional, small scale, gentle, intimate and cared for landscape". This area too contains existing and consented wind farms.

6.119 The study area does contain small areas assessed as outstanding in LANDMAP's visual and sensory assessment. These are areas on the eastern edge of Snowdonia National Park from where some of the turbines are visible and likely to detract from the scenic quality for some visitors.

Figure 6-25: LANDMAP Visual and Sensory Assessment



Source: LANDMAP

Scale of Visitor Economy

6.120 The study area contains an estimated 1,800 jobs in tourism related sectors. This represents around 9% of total employment in the study area which is in line with the average for Wales, and also around 9% of tourism employment in the four local authority areas (Gwynedd, Conwy, Denbighshire and Flintshire). Bedstock data shows there are 10,200 bedspaces which represents 4.1% of the total for the local authorities.

6.121 The low percentages here reflect the fact that the study area does not cover any of the main coastal resorts on the North Wales coast (Llandudno, Colwyn Bay etc) and only covers a small proportion of Snowdonia National Park, areas in which there will be much higher concentrations of accommodation.

Table 6.14: Tourism Related Employment and Visitor Bedspaces in North Wales Study Area			
	North Wales LIA	Local Authorities	Percentage in Study Area
Jobs in tourism related sectors	1800	21,700	8.3%
Bedspaces	10,200	250,000	4.1%
Source: BRES and Bedstock data (Visit Wales)			

6.122 Applying these percentages to the tourism datasets provides a range of 1m to 1.9m visitors per annum and £45m to £91m in visitor expenditure for the study area. As described previously, these should be treated as an indicative estimate of tourism volume and value.

6.123 It should also be noted again that these figures do not include visits and expenditure from overseas tourists which may be significant in these local authorities.

Table 6.15: Estimated Tourism Volume and Value in North Wales Study Area						
	Local Authorities		Low Estimate		High Estimate	
	Visits	Expenditure	Visits	Expenditure	Visits	Expenditure
Day Visitors	20.8	569.2	0.8	23.2	1.7	47.2
Domestic Tourists	2.6	527.0	0.1	21.5	0.2	43.7
Total	23.4	1,096.2	1.0	44.7	1.9	90.9
Calculations by Regeneris Consulting						

Visitor Assets

6.124 The key visitor assets for North Wales are the coastal resorts and beaches on the North Wales coast, Snowdonia National Park to the west and the Clwydian Range to the east, which is designated as an area of outstanding natural beauty. The Clywydian Range also includes Offa's Dyke which is the only National Trail in the area. Although some of the wind farms will be visible from these areas, only small parts fall within the 7km boundary which indicates wind farms will not be visually dominant or intrusive for visitors.

6.125 Within the study area itself, the key visitor assets are the area of open heathland containing Mynydd Hiraethog, a site of special scientific interest. This area is likely to appeal to walkers attracted to open, remote and wild landscapes and nature watchers (the area contains a number of upland breeding birds). Walkers in these areas would come very close to operational and planned wind farms.

6.126 In the same area there are two large bodies of water (Llyn Brenig and the Alwen reservoir). These are popular beauty spots, with wide views over the heathland and wooded valleys. The lakes provide opportunities for walking, fishing, cycling, sailing, windsurfing and canoeing. The area also attracts wildlife watchers as the area is home to black grouse, butterflies and red squirrels.

6.127 The area of forestry which includes the largest operational and planned wind farms has good access to the public and is also likely to attract some walkers and mountain bikers.

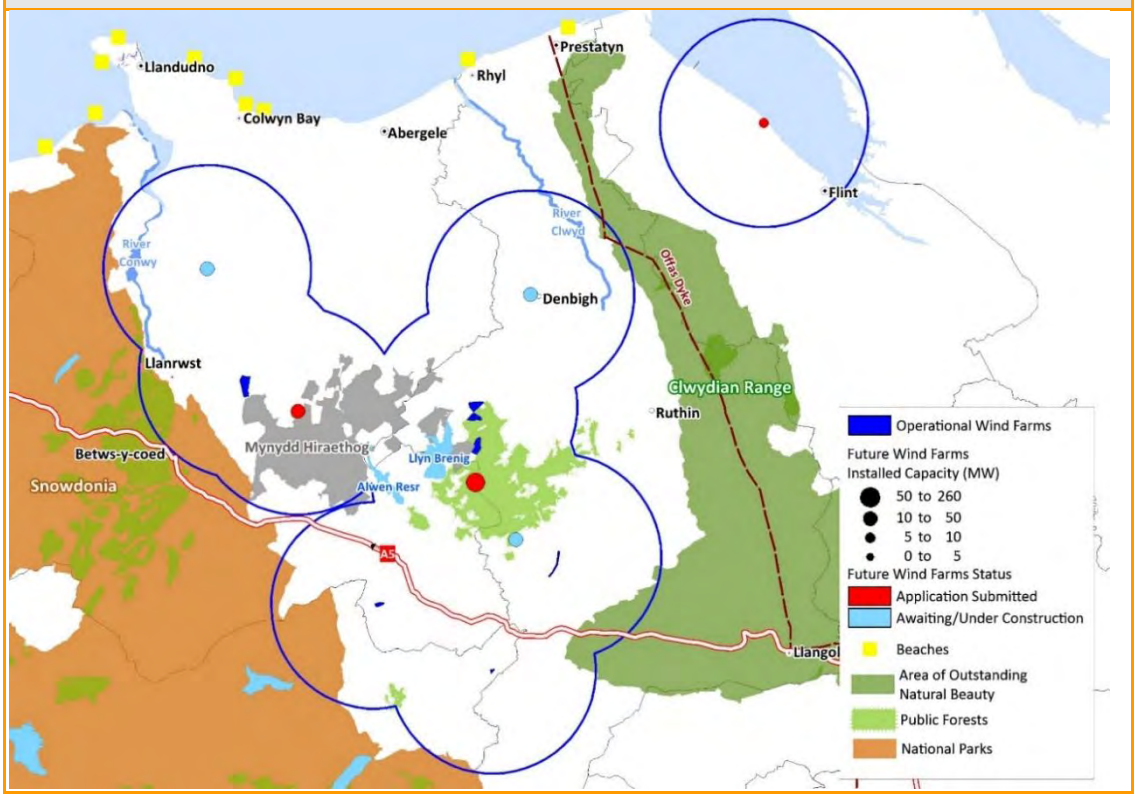
6.128 Again there is uncertainty over the number of tourists who visit these areas, which are in close proximity to more established walking and outdoor activity locations (to the east and west). The North Wales Tourism Strategy (TPNW, 2010) does not identify them as key visitor assets, however they are likely to attract local people and day visitors. The lack of any data on visitor numbers for small areas makes this difficult to determine.

6.129 The Strategy does identify the market towns of Denbigh, Mold and Ruthin as popular visitor assets. Of these, Denbigh is the town most likely to be affected by wind farms, as it is in close proximity to Brenig wind farm (16 turbines).

6.130 The A5 from Llangollen to Snowdonia is an important visitor route. This road comes within close proximity of a number of wind farms, however these are all small and unlikely to be a dominant feature on the landscape.

6.131 Conwy and Denbighshire County Councils have published a joint Sustainable Tourism Development Action Plan for the Hiraethog area (CCC/DCC, 2010). This recognises the potential to exploit the proposed wind farms as a visitor asset. It advocates "using the proposed windfarm development as an asset and opportunity rather than a weakness, or a threat, by maximising the educational potential it generates, seeking to develop an innovative visitor attraction around the concept of sustainable energy, maximising the community benefits made available from the windfarm development".

Figure 6-26: Visitor Assets in North Wales Study Area



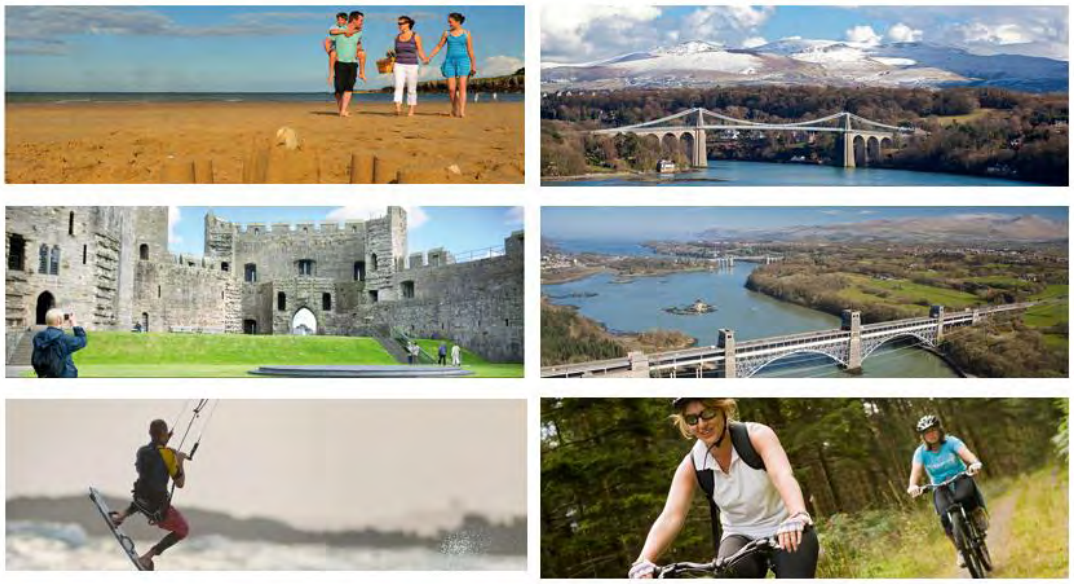
Visitor Characteristics

6.132 The North Wales tourism strategy (TPNW, 2010) identifies its key market segments in order of size as UK adult breaks (45%), family holidays (20%), activity-led holidays (15%), visits to friend and relatives (10%), overseas visitors (10%), and business tourism (5%). It does not provide an age breakdown of visitors, however the area is reported to attract a large share of older visitors enjoying coastal breaks. Of the staying visitors, a large number are repeat visits (82% according to the Strategy). Again, it must be emphasised that this relates to North Wales as a whole and not just the study area.

Marketing and Promotion

6.133 Marketing and promotional material highlights heritage assets, beaches, watersports and outdoor activities. Landscapes featuring Snowdonia in the background are also prominent, although this area does not contain any wind farms.

Figure 6-27: Marketing and Promotional Material for North Wales



Source: North Wales Tourism

Key points for assessment

- Most of the operational wind farms in this study area are small and located over a wide area. The wind farms are not considered to be visually dominant in the landscape across this wide area and are unlikely to be a factor in deterring visitors.

- There are a number of larger consented and planned wind farms in the central part of the study area, around Clocaenog Forest. If these were all developed, there would be a greater clustering of wind farms in some areas, which could have a more significant impact on the landscape. Despite this, these schemes will be spread over a large area and a number are proposed in forested areas which would limit the overall visibility of turbines.

- The wind farms are located or proposed in areas remote from North Wales' key natural assets and visitor attractions. All wind farms are remote from the Clwydian range to the east and Snowdonia National Park to the west. This explains the relatively low estimated volume and value of tourism in the study area.

- The key visitor attractions in close proximity to the wind farms are the area of open heathland in the Mynydd Hiarethog SSI, Clocaenog Forest and the Llyn Brenig reservoir. These areas are popular for nature watching, fishing, walking, mountain biking and watersports. Although a small number of visitors may be deterred from visiting the area, the variety of activities in this area mean there is high potential for replacement of visitors.

- Denbighshire and Conwy County Councils have recognised an opportunity to use the proposed wind farms as a visitor asset by developing a visitor centre around renewable energy.

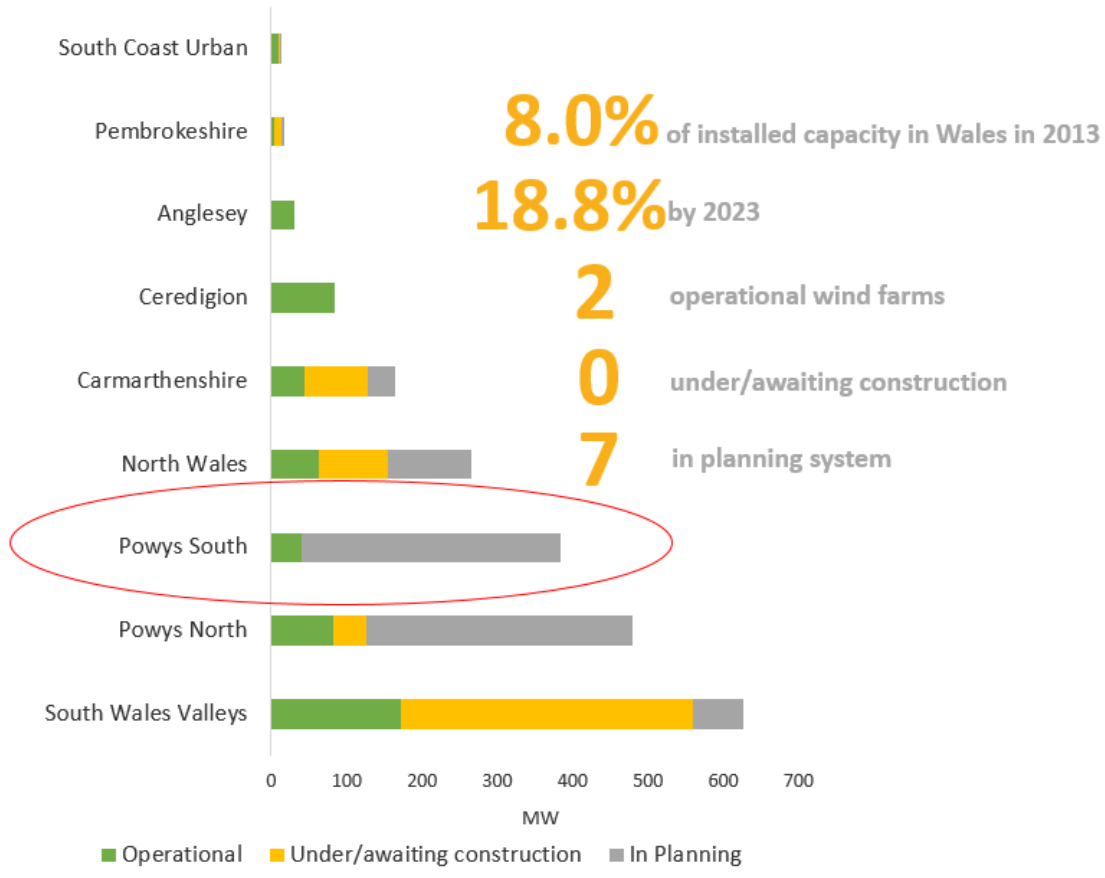
Powys South

Current and Planned Wind Farm Development

6.134 There are two existing wind farms in Powys South. These are large wind farms of 22 and 103 turbines (Bryn Titl and Llandinam), which have been established since the early nineties. There is little evidence of whether these wind farms have affected tourism. However, a social survey of public attitudes towards three wind farm sites in Wales commissioned by the Countryside Council for Wales in 1994 found that 65% of local people felt that the Llandinam wind farm would attract tourists to the area. This evidence is very out of date and the survey was taken at a time when the wind farms are likely to have had novelty value. However there is no evidence that there have been detrimental impacts since then.

6.135 There are seven further wind farms in the planning system, which would cumulatively add to an additional 350 MW in this area of Powys. The proposed sites would all be very close to each other, meaning there would be potential for cumulative effects.

Figure 6-28: Current and Potential Future Installed Capacity in Powys South Impact Area



Source: DECC
Note: Future capacity assumes all planned wind farms receive consent

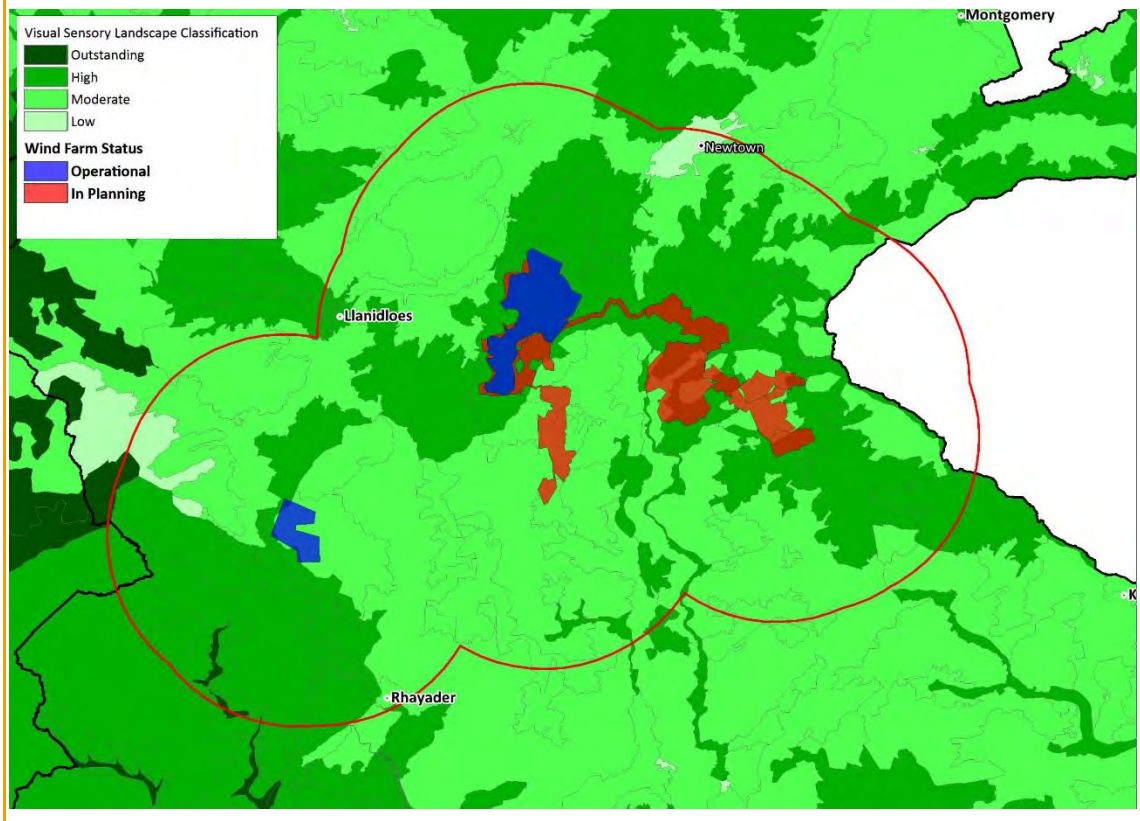
Local Landscape

6.136 The operational and planned wind farms are all located in an area of upland moorland. The areas in which operational wind farms are located are assessed as moderate (BrynTitli) and high (Llandinam) in LANDMAP's visual and sensory assessment. In both case, the turbines influence the assessment of scenic value. In the case of Llandinam, the turbines are judged to "*provide a dramatic visual link looking in to the area*" and complement the expanse of moorland vegetation. For Bryn Titli, the assessment notes that the turbines and recent enclosures "*may detract*" from the scenic quality. Again, these assessments reflect the subjectivity of reactions to wind farms.

6.137 The future wind farms are all in areas assessed as high or moderate in the visual and sensory assessment. A large number of the areas are described as tranquil, remote, attractive and exposed, while some areas are deemed to be of lower value because of intensive farming practices.

6.138 It should be noted that the largest planned wind farm is a repowering of the existing Llandinam wind farm. While these turbines would be likely to be larger than the existing turbines, the fact that wind farms are established in the area means the additional impact on the existing landscape may be limited.

Figure 6-29: LANDMAP Visual and Sensory Assessment for Powys South



Source: LANDMAP

Scale of Visitor Economy

6.139 In contrast to Powys North, tourism accounts for a much lower share of total employment in this study area. 6.6% of jobs are in tourism related sectors (330 in total), which is lower than the

Wales average (8.7%). These jobs only account for 6.2% of tourism related employment in Powys as a whole.

6.140 There are approximately 890 bedspaces in visitor accommodation, comprising a mix of caravans, serviced accommodation and self-catering. This represents just 2.2% of the bedstock in Powys.

6.141 These low percentages partly reflect the size of Powys which is Wales's largest county, and that this area is not as well established as a tourism location as other parts of the County.

Table 6.16: Tourism related Employment and Visitor Bedspaces, 2012

	Powys South Study Area	Powys LA	Percentage in Study Area
Jobs in tourism related sectors	330	5,300	6.2%
Bedspaces	890	40,400	2.2%
Source: BRES and Bedstock (Visit Wales)			

6.142 Applying these percentages to the visitor surveys shows a range of 142 to 401 thousand visitors and £7m to £19m in visitor expenditure in a typical year. This is a low figure for volume and value of tourism but is an important source of income for the local tourism sector. It does imply however, that any changes in visitor behaviour would be small in absolute terms.

Table 6.17: Estimated Volume and Value of Domestic Tourism in North Powys Study Area

	Powys		Low Estimate		High Estimate	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	6,140	222	135	5	381	14
Domestic Tourists	334	84	7	2	21	5
Total	6,474	306	142	7	401	19
Calculations by Regeneris Consulting						

Visitor Assets

6.143 As described in the Powys North case study, the natural environment is recognised as Powys's key visitor asset in the Mid Wales Tourism Strategy (TPMW, 2011). The Powys South study area is also predominantly located in the more gentle areas of rural Montgomeryshire but is in close proximity to the Brecon Beacons in the south and the Cambrian Mountains in the west.

6.144 The Elan Valley lies in the west of the study area and covers 180km^2 of lake and countryside. Over 80% of this valley is designated as Sites of Special Scientific Interest (SSSI). The Elan Valley estate notes that the area is popular with walkers, wildlife watchers, people who come for the peace and quiet and scenery and outdoor activities[20]. The Elan Valley trail is a popular cycling route which makes a loop from Rhayader around the reservoirs, including Pen y Garreg which lies within the study area. Visitors to this area may encounter Bryn Titli, an existing wind farm of 22 turbines.

6.145 The open heath and moorland, where the largest wind farms are planned, are remote from the Elan Valley and unlikely to be visible, except from a very long distance. Large areas of this part of Powys are designated as open country or other statutory access, providing opportunities for walking and wildlife watching. As with Powys North, this area is very sparsely populated and has

[20] http://www.elanvalley.org.uk/visiting-elan/

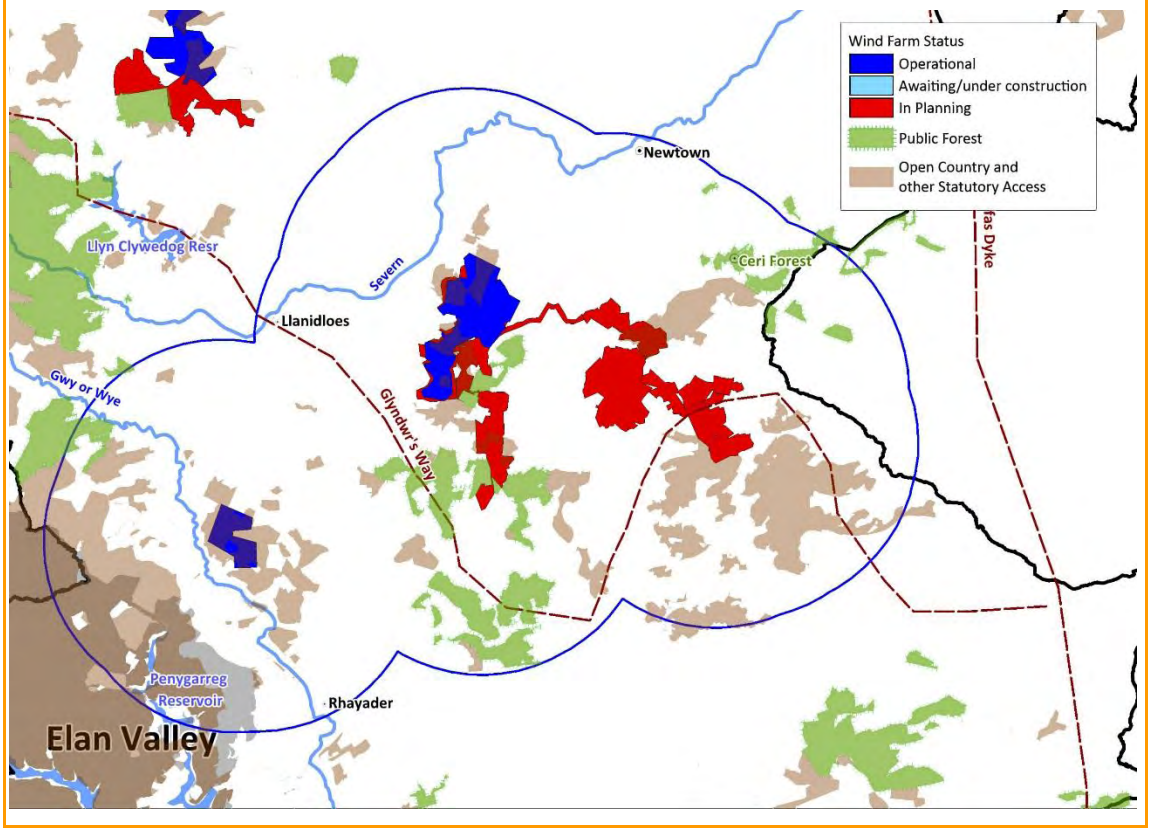
very little development. Although not as dramatic as other areas of Powys the area still attracts visitors for the tranquillity, remoteness and feeling of isolation.

6.146 Glyndwr's Way, the National Trail, also passes through the proposed site for a number of the planned wind farms (Bryngydfa and Garreg Lwyd) and comes in to close proximity to the existing wind farm Llandinam. The proximity of these wind farms means they would be perceived to be dominant features on the landscape.

6.147 There are public forests to the south and to the east (Ceri Forest). The Kerry Ridgeway runs in close proximity to Ceri. This route follows a ridgetop offering panoramic views of England and Wales over a long distance. The route is popular with walkers, horse riders and mountain bikers

6.148 Both the Severn and Wye pass through the study area in close proximity to existing and planned wind farms. Both rivers are popular for fishing.

Figure 6-30: Visitor Assets in Powys South



Visitor Characteristics

6.149 There is no information available for the specific characteristics of visitors to this part of Powys. The information here is therefore taken from the same as the Powys North case study.

6.150 The 2011 Mid Wales Tourism Survey shows that Powys attracts older visitors. Half of the visitors surveyed were "empty nesters" aged 55 or above. A further 22% were families while only 10% were "young independents".

6.151 Over 80% of visitors to Powys were day visitors and only 5% of all visitors were from overseas.

The survey also showed that visitors to Powys tend to be very loyal, with one in ten visitors to Powys being a repeat visitor.

Marketing and Promotional Material

6.152 The promotional material for Powys puts heavy emphasis on open country, unspoiled landscapes and walking holidays (see Figure 6-16). This imagery of Mid Wales as an unspoiled landscape may be considered by some to be inconsistent with the extent of wind farm development proposed for the area. It is noted however that most of the images used in marketing material is from the Brecon Beacons which is remote from wind farm development.

Key Points for Assessment

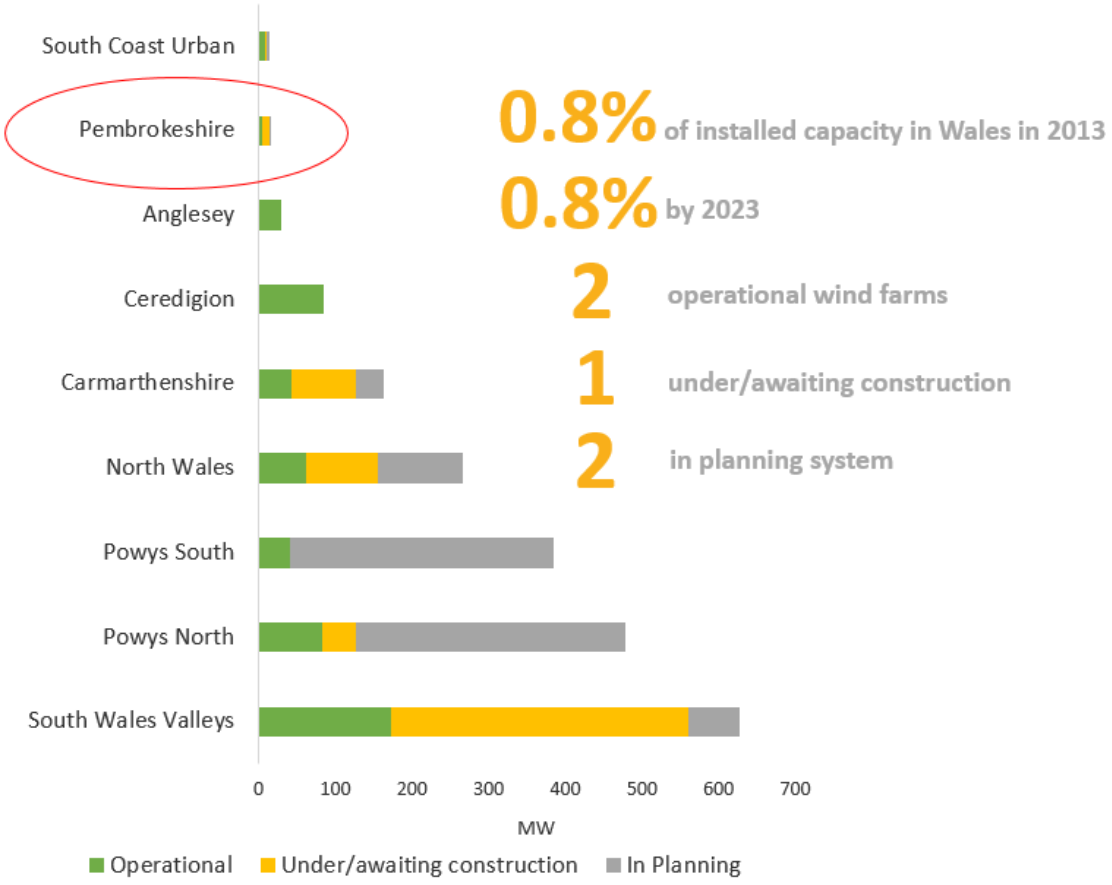
- Tourism volume and value in this area of Powys is low, representing between 2.2% and 6.2% of the total for Powys. Tourism also accounts for a relatively low share of employment, meaning that the local economy may be less sensitive to potential changes in tourism activity than the North Powys study area.
- The existing wind farm developments are in close proximity to some notable visitor assets (Elan Valley and the Glyndwrs Way). These wind farms have been established for 20 years, however there is no evidence to suggest that there has been a fall in visitor numbers to the area.
- The number of turbines would increase significantly if all planned wind farm developments were approved. These would be highly clustered and may be perceived to be dominant features on the landscape across a large part of the study area, including parts of the Glyndwr's Way. The large number of turbines may deter some walkers and other visitors who hold negative views towards wind farms from visiting these areas.
- Like Powys North, the area most affected by wind farm development has fewer visitor assets than surrounding areas, but attracts visitors for feelings of peace and quiet, isolation and wilderness. Visitors also tend to be older and are repeat visitors.
- The area has a narrow visitor offer. Walking, wildlife watching and cycling are all popular activities. However the area is not as established as other areas for these activities.
- Although the literature points to small changes in visitor behaviour as a result of wind farm development, the points above would indicate that this area's visitor economy is more sensitive to wind farm development than other parts of Wales.

Pembrokeshire

Current and Future Wind Farm Development

6.153 There are two existing wind farms in Pembrokeshire, one comprising four turbines (Castle Pill) and one comprising a single turbine (Lodge Farm). There is one further consented wind farm and two in the planning system, however these are all small in scale. The area is not covered by a SSA so is not likely to be the focus for future large scale development.

Figure 6-31: Current and Potential Future Installed Capacity in Pembrokeshire Impact Area

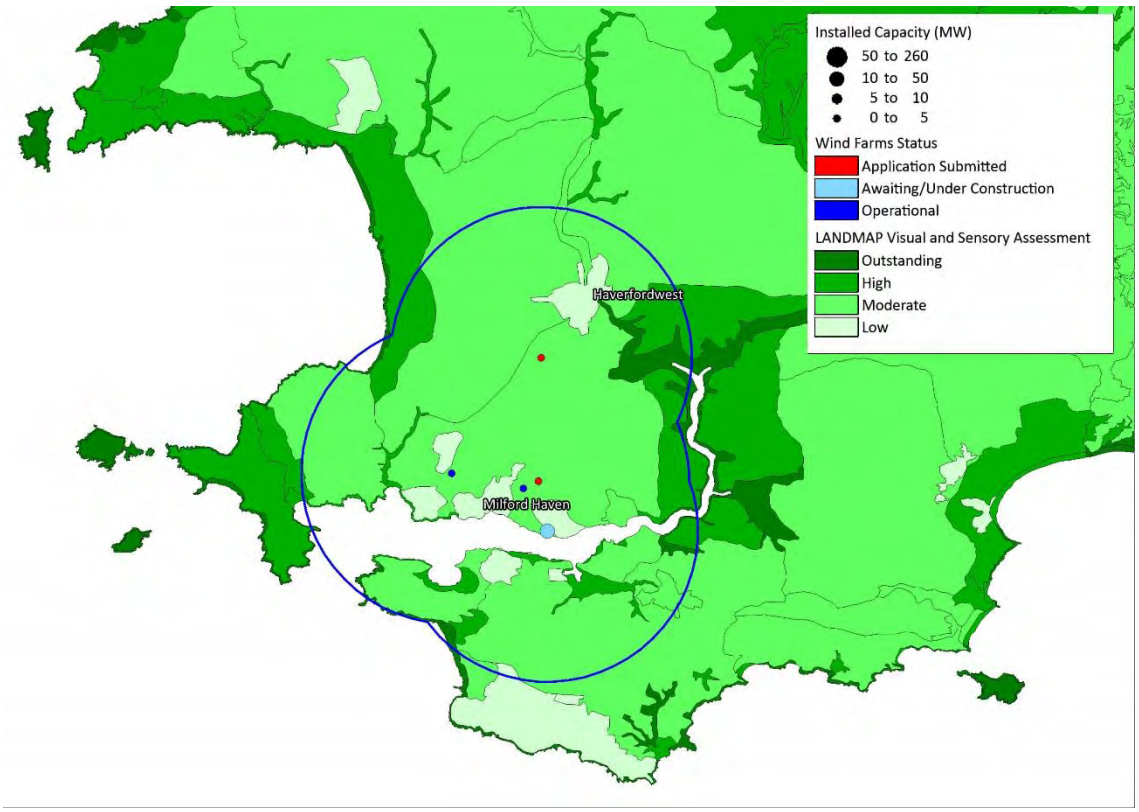


Local Landscape

6.154 All of the planned and operational wind farms are in an area of lowland farmland which has been assessed as moderate in LANDMAP's visual and sensory assessment. It notes: "*The farmland landscape of the Aspect Area is generally pleasant in internal views such as in valleys and to the north, east and west but views to the south are affected by the detractors of industrial works and oil refineries and the area is crossed by imposing pylons".*

6.155 Most of the wind farms are in close proximity to the built up areas. The largest wind farm which has received planning consent is in close proximity to an industrial estate.

Figure 6-32: LANDMAP Visual and Sensory Assessment



Source: LANDMAP

Scale of Visitor Economy

6.156 There were around 2,000 jobs in tourism related sectors in the South Pembrokeshire study area in 2012, accounting for 7.9% of total employment (below the Wales average). These jobs account for just under a third of tourism related employment in Pembrokeshire. This may overestimate the number of jobs supported by tourism since the study area includes the town of Milford Haven. Local residents are likely to support many of the jobs in the food and beverage service sector which accounts for the majority of jobs in tourism related sectors.

6.157 Bedstock data shows there are 6,670 bedspaces, accounting for 6.7% of the total stock for Pembrokeshire.

Table 6.18: Tourism related Employment and Visitor Bedspaces, 2012

	South Pembrokeshire Study Area	Pembrokeshire LA	Percentage in Study Area
Jobs in tourism related sectors	2,000	6,700	29.1%
Bedspaces	6,670	99,330	6.7%

Source: BRES and Bedstock (Visit Wales)

6.158 Applying these percentages to the visitor survey data would imply there are between 0.4m and 1.7m domestic visitors to the study area each year. This is a wide range of estimates. The actual figure is likely to be toward the lower end of the range since a large proportion of the jobs in tourism related sectors are likely to be supported by local's expenditure.

Table 6.19: Estimates of Volume and Value of Tourism in South Pembrokeshire Study Area						
	Pembrokeshire		Low Estimate		High Estimate	
	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)	Visits (000s)	Expenditure (£m)
Day Visitors	5,900	161	395	11	1,717	47
Domestic Tourists	815	223	55	15	237	65
Total	6,715	384	450	26	1,954	112
Calculations by Regeneris Consulting						

Visitor Assets

6.159 Pembrokeshire's key visitor asset is its coastline, most of which is covered by the Pembrokeshire Coast National Park. This area also includes a coastal path and numerous beaches, many of which have blue flag status. Pembrokeshire's Destination Management Plan (DPP, 2011) notes that the county is "*the most popular coastal holiday destination in Wales, with some of the best preserved coastline in Britain*".

6.160 The 2011-12 Pembrokeshire visitor survey found the most important reasons for visiting Pembrokeshire were the award winning beaches, the range of natural assets and opportunities for walking. The coastline and beaches present numerous opportunities for walkers, family beach holidays, watersports and wildlife watching. There are also numerous cycle trails and opportunities for mountain biking.

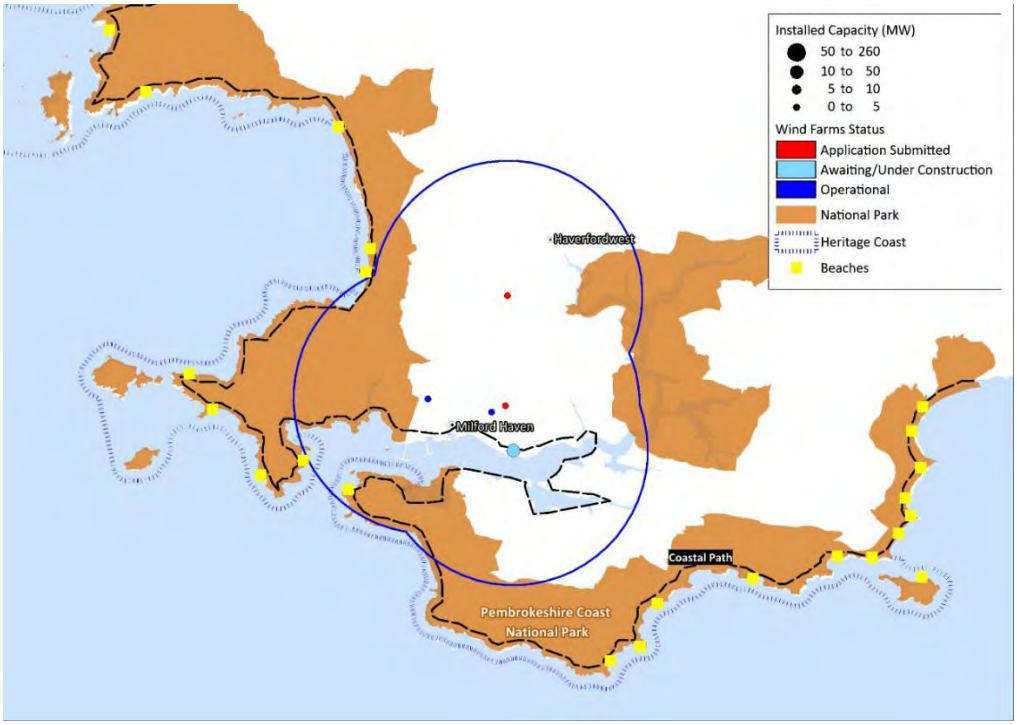
6.161 Although some of the wind farms do come in close proximity to the coastal path and National Park, they are generally on edge of town locations, remote from the most sensitive areas, with the largest consented wind farm being located next to an industrial estate. The small scale of these wind farms also means they are unlikely to be considered to be a dominant feature on the landscape for most visitors to the area.

Visitor Characteristics

6.162 Pembrokeshire attracts a very diverse visitor base, however the 2011-12 Pembrokeshire Visitor Survey found (DPP, 2012) that South Pembrokeshire was popular with younger visitors. 49% of visitors to the area were aged 44 or below.

6.163 Pembrokeshire attracts half of its visitors from within Wales, with the next largest markets being London and the South East (14%). The survey also found a high proportion of repeat visitors to the County (85 % overall).

Figure 6-33: Visitor Assets in South Pembrokeshire Study Area



Marketing and Promotional Material

6.164 Pembrokeshire's marketing material highlights the high quality beaches and coastal landscapes, opportunities for walking, outdoor and family activities. The location of wind farm developments in less scenic, farmland areas would suggest there is limited scope for the turbines to conflict with the images which are used to market the key visitor assets.

Figure 6-34: Images from Marketing Material for Pembrokeshire

Source: Visit Pembrokeshire

Key points for assessment

- The scale of operational and planned wind farm development in Pembrokeshire is very low, and it is unlikely that this area would be the focus for future large scale development.
- The locations of wind farms in less scenic, inland areas of the County mean that they are remote from the most sensitive tourism areas, including the National Park.
- The area attracts a younger profile of visitors who tend to be less sensitive to wind farm developments and may be coming for specific activities, including beach holidays and watersports.

7. Case Studies

Introduction

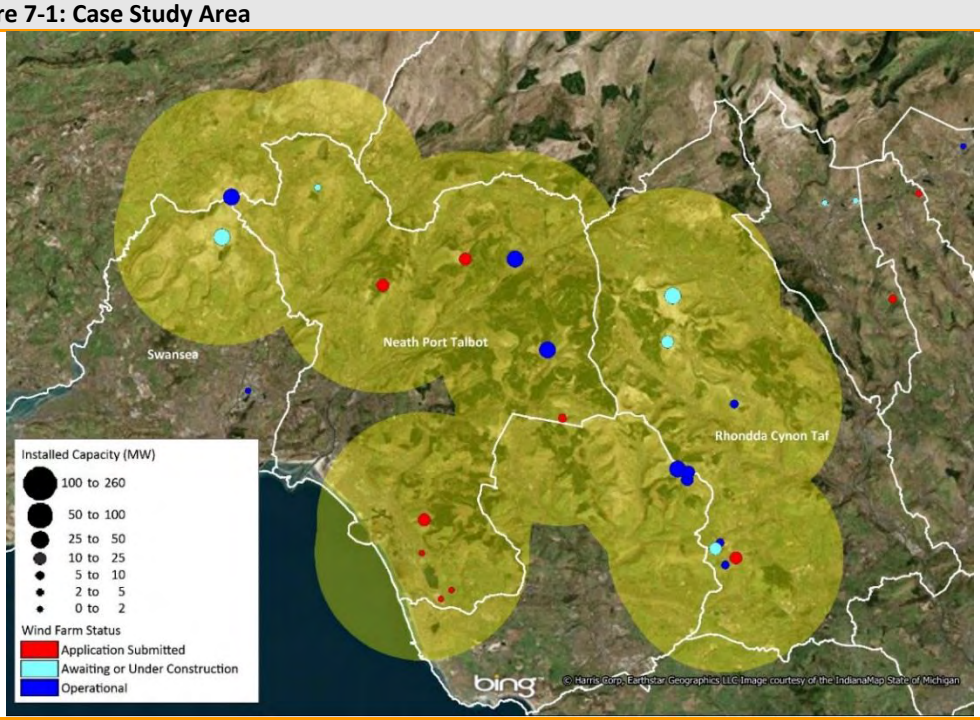
7.1 This section presents the findings of three case studies conducted as part of the study. The purpose of the case studies was to gather actual evidence of the impact of operational wind farms upon tourism in Wales in three different contexts, and to test the findings from the literature review. The case study areas are: Neath Port Talbot and Rhondda Cynon Taf; North Anglesey; and North Powys.

7.2 The case study locations were selected because they each have a number of operational wind farms but differ in terms of the nature of their visitor economy and visitor characteristics. The case studies drew upon the local area profiles in Chapter Six and supplemented these with a desk based assessment of any local research which had been conducted in to wind farms and tourism. The case studies also included a set of structured telephone interviews with local authority tourism officers and tourism trade associations. These organisations were the key consultees as they represent a wide range of tourism businesses and have an understanding of the key factors affecting the local tourism economy. Consultations were also conducted with individual businesses which are located less than 7km from existing wind farms. The purpose of these consultations was to complement the rest of the research by providing a greater understanding of the specific experiences of businesses located in close proximity to wind farms.

Neath Port Talbot/Rhondda Cynon Taff

7.3 This case study has focused on the area shown in Figure 7.1. This area differs from the South Wales Valleys area profile in Chapter Six which includes large areas of other districts. This area was selected for the case study because of the greater number of operational wind farms.

Figure 7-1: Case Study Area



7.4 There is extensive wind farm development in both counties. There are around 90 operational turbines installed across nine separate wind farms, although a number are clustered in close proximity to each other. There are a further eight applications in the planning system and six under or awaiting construction. This includes Pen y Cymoedd, the largest approved scheme in Wales, which will include 76 turbines.

Figure 7-2: Ffynnon Oer Wind Farm in Neath Port Talbot

Source: © Copyright Nigel Davies and licensed for reuse under this Creative Commons Licence

Consultees

7.5 This case study presents the results of a desk based assessment of socio-economic data, tourism data and marketing materials, as well as a set of structured telephone interviews held with the following:

- Tourism Officers from both Neath Port Talbot and Rhondda Cynon Taff Councils.
- Director at Tourism Swansea Bay, a local trade association supporting tourism businesses including those in Neath Port Talbot.
- Ten local businesses located within 7km of existing wind farms, with five from NPT and five from RCT. These included hospitality businesses (holiday cottage owners, B&Bs, camping and caravan sites) and other businesses which are reliant on local tourism including cycle hire companies and outdoor adventure companies. The local authorities provided a list of businesses to contact, and these were supplemented by contacting businesses within 7km of wind farms identified through directory searches.

Local visitor economy characteristics

7.6 The research undertaken for the case studies in to the key reasons why people visit NPT and RCT

was consistent with the local area profile in Chapter Six:

- Outdoor activities (particularly cycling and mountain biking) are identified in local strategies (NPT, 2011; RCT, 2007) as key reasons to visit both areas, and this was echoed by all consultees. Most consultees perceived mountain biking and cycling to be the one thing which differentiates the area's tourism offer from other areas of Wales because of Afan Forest Park's international reputation.

- The peace and quiet and quality of the natural environment are both reasons for visiting, but it was recognised that NCT and RCT are not as well established as other areas of Wales for walking holidays, and a large proportion of the people who walk in the area are either locals or day visitors. This is recognised in RCT's tourism strategy.

- The accessibility of NPT and RCT for people living on the M4 corridor is also perceived as a key strength for the area, and means that many people who do holiday there will use the area as a base and travel to other parts of South Wales, including the Gower peninsula, Pembrokeshire and Cardiff.

- The nature of the tourism offer in the area (geared toward outdoor activities) mean that the typical visitor to the area tends to be younger than the average for Wales (25 to 45). A number of consultees, particularly those running holiday cottages, also said that older couples and families also visit the area.

Recent performance

7.7 GBTS data shows that domestic overnight visits to NPT and RCT have fallen by around 8,000 (15%) over the past five years. Data is not available for day visits which make up the vast majority of tourism visitors to NPT and RCT. The trend of declining visitor numbers was not observed by all consultees. Tourism officers and trade associations believed the performance to have been flat, and some types of businesses reported increasing demand (particularly those running holiday cottages).

7.8 The poor recent performance was attributed to the recession and continuing challenging economic conditions in the area. Businesses who were dependent on the mountain biking market also identified specific reasons why visitor numbers were not as high as they had been when the trails were first opened. The ash dieback disease affecting the valley meant that many trees had to be cut down, thereby changing the landscape, while a large number of routes were closed down. This had deterred some mountain bikers from coming back regularly.

7.9 Most consultees were confident about future business prospects, particularly the local authorities, trade association and cottage businesses. However, a number of businesses suggested more work needs to be done in terms of changing perceptions of the local area, which is characterised as deprived and industrial. Marketing initiatives were seen as having helped (such as through the Valleys Regional Park), however there is more work to be done to change perceptions of the area and make the most of their existing assets.

Wind Farms

Awareness and Perceptions of Wind Farms

7.10 There was divided opinion over the extent of wind farm development in the area, which in part reflects the fact that consultees were drawn from a very wide area. Those which were located closer to concentrations of wind farms were more likely to feel that the extent of wind farm development was already substantial, while those further away thought it was modest. All agreed that they had been positioned in some of the most scenic areas of NPT and RCT, close to a number of popular walking and cycling routes.

7.11 Reported reactions of the public to wind farms were very mixed, with some people very positive about wind farms, many people indifferent and some people vehemently opposed. However there was also evidence that people's reactions can change over time. Local authority officers and other consultees said that many locals had got used to the long-established wind farms and become more accepting of them over time. Others reported that the modest scale of wind farm development meant that they currently have novelty value and were a talking point, but this could change if the number of turbines was to increase.

Impacts on Visitor Enjoyment

7.12 The potential impacts on visitor enjoyment varied according to the visitor markets, according to consultees.

- Bikers/Cyclists: Wind farms are unlikely to impinge upon the enjoyment of people who visit for cycling/mountain biking. There was no reported dissatisfaction from this visitor market, for whom the quality of bike trails is the most important reason for visiting. Indeed, the wind farms have brought considerable investment in to the trails. Since 2005 RWE have been sponsoring the Afan Mountain Bike Trails which run close to the Ffynnon Oer wind farm. Vattenfall has also committed to funding a new £350,000 mountain bike trail as part of the Pen y Cymoedd project which crosses both NPT and RCT boundaries.

- Walkers: it was agreed that the locations of wind farms in scenic areas popular with walkers could affect their enjoyment. However, this was not always due to their impact on the scenic landscape. In RCT, the local council reported more complaints on the grounds of closures and diversions to popular walking routes than the effect on the landscape itself.

- Peace and quiet: people who visit for the peace and quiet are the group most likely to be affected. This was not identified as a particular issue to date due to the limited scale of development, but could become a concern as more wind farms are developed. Proximity to wind farms is also perceived to be an issue for this group because of the dominance of large turbines on the landscape at close quarters, although there are few instances of holiday accommodation in close proximity to the turbines at present.

Impacts on Levels of Business

7.13 All of the consultees including the trade associations and local authorities agreed that it was unlikely that wind farms had so far deterred people from visiting the area, although it was difficult for them to say this categorically. This was true of those people who thought that wind farm

development was already extensive and those who thought it was modest. Those who thought it was modest were concerned about the future scale of development, particularly if they are very large wind farms. The trade association, Tourism Swansea Bay, as well as specific businesses were concerned about reaching a 'tipping point' beyond which turbines become a dominant feature on the landscape, which could deter people from visiting.

7.14 Concerns about the future were greatest for those businesses in very close proximity to proposed wind farm developments where turbines would be between one and two kilometres away and highly visible from the accommodation. This was a particular concern for those businesses which attract visitors because of the peace and quiet and who use images of the local scenery in their marketing material. Some businesses claimed that many guests had reported that they would not return if there was a wind farm located there. They also expressed concern that they could no longer market their cottages as offering tranquillity or use local images, as this would be misleading and would be likely to deter future guests if it was reported on TripAdvisor.

7.15 A key question, therefore, is whether those businesses in close proximity to wind farms who could potentially lose a segment of the market can adapt and attract a greater number of visitors from other markets who do not object to wind farms.

7.16 A small number of consultees (including Tourism Swansea Bay) stated that further wind farm development was one of the most significant threats to the future visitor economy. However, most consultees identified a number of other factors as being of greater importance. These include the continuing challenging economic conditions, transport connections to NPT/RCT and possible delays during the electrification of railways, and the need to invest in the supporting infrastructure for the local tourism sector, including marketing and improved signage.

Potential Positive Benefits

7.17 None of the consultees thought that the turbines themselves were already attracting people to the area and none thought that the turbines on their own would be sufficient to attract people in future. A number of consultees did, however, identify potential opportunities to increase tourism through better use of community benefit funds. This includes the tourism officer at RCT. As described above, a number of consultees cited the example of the investments in mountain biking trails being made by RWE and Vattenfall which have the potential to reinforce the area's reputation for mountain biking and attract more people to the area.

7.18 A number of other consultees, particularly those in RCT, also identified opportunities to use the turbines as part of initiatives to market the area as a centre for renewable energy. RCT stakeholders, including businesses involved in the development of the Destination Management Plan have been supportive of a scheme to develop an Environmental Visitor Centre in the area, which educates people about renewable energy, including but not limited to wind farms. Other businesses identified an opportunity to link this to the area's heritage and longstanding association with energy production. The visitor centre could chart the area's transformation from a coal mining area in to an area at the forefront of renewable energy production.

7.19 When asked about the potential scale of visitor numbers that such a facility could attract, some cited the Whitelee wind farm in Scotland which had attracted large numbers of visitors21.

[21] Whitelee wind farm's visitor centre was reported to have attracted over 120,000 visitors in its first year of being open.

Consultees did not believe that the attraction would be sufficient to increase the number of overnight visits in the area. However, given that the area is reliant on day trips and holiday makers who may travel over a wide area while they are on holiday (combining shopping and rural pursuits), this could offer an additional reason to make a visit the area. There may also be opportunities to attract school visits across a wide area.

7.20 Those that did support the idea of a visitor attraction believed that it could only happen through investment from the community benefit funds. However there was a perception that these are currently being spread over too wide an area and would be far more effective if they were targeted and invested in the areas most affected by wind turbines.

Conclusions

7.21 There is no evidence to indicate that visitor numbers to RCT and NPT as a whole have been affected by the wind farm development which has occurred to date. Even those businesses which were most concerned about the scale of future development (holiday cottage owners), concluded that the operational wind farms have so far not had any detrimental effect on visitor numbers. Indeed, these consultees reported the strongest growth in visitor volumes over the last five years, a period when there has been considerable wind farm development in the area.

7.22 Although a concern for some, wind farms are not considered to be one of the most significant threats to future growth in the overall visitor economy in the case study area. Some consultees were concerned about the scale of future wind farm development. However, even those consultees who considered the scale of development to already be extensive reported no observed impact on visitor numbers. For most consultees, issues such as improving the quantity and quality of visitor accommodation, better marketing and product development were all considered to be more important issues for the future growth of the sector.

7.23 **Wind farms are not likely to pose a threat to some of the main tourism markets.** The area has an established reputation for mountain biking and is perceived to be popular with people who will use the area as a base for exploring areas of South Wales further afield, combining city, coastal and rural activities. Neither of these markets were considered to be under significant threat from wind farm development.

7.24 **There is potential for negative impacts at a very local level.** Hospitality businesses in very close proximity to wind farms (less than 2km) are concerned that a large part of their customer base who visit the area for peace and quiet, will not make future visits because of the dominance of wind farms on the landscape and possible noise effects. Although this was not based on observed impacts, some consultees had anecdotal evidence which suggested visitors would not return to that particular accommodation. The future health of these businesses would then depend on their ability to adapt to cater for those markets and visitors less sensitive to wind farm development. The diversity of the visitor market suggests there is scope for these businesses to adapt compared to other parts of Wales.

7.25 The proposed wind farm developments are in themselves unlikely to attract visitors (although there is the possibility of this occurring in some particular locations), but better targeting of community benefit funds could support the local visitor economy. There were some examples of how community benefit funds are already improving visitor assets (e.g. mountain biking trails). However, there was a perception that, in general, these funds are not being used as effectively

as they could in order to achieve economic development goals and are being spread across too wide an area. There is an opportunity to exploit the turbines as a visitor asset. However this would be dependent on much greater engagement with tourism stakeholders by developers and more focused investment in the areas most affected by turbines.

North Anglesey

Background

7.26 Anglesey currently has four operational on-shore wind farms, which between them have a total of 74 turbines. The wind farms are within 3½ miles of each other and located in a lowland farmland area in the north of the island. The image below shows the Rhyd y Groes wind farm which is the most northerly of the wind farms, in close proximity to Cemmaes Bay.

Figure 7-3: Rhyd y Groes Wind Farm, Anglesey

7.27 Aside from the wind developments referred to above, Anglesey is also the location for other sizeable energy-related infrastructure. Most notable amongst this is Wylfa A nuclear power plant located on the northern coast of the island. Operational since 1971, the plant is currently being decommissioned but is expected to be replaced with a new reactor set to be built from 2017. There is also a major set of pylons and overhead lines running across the island, mainly carrying power from the power station to the National Grid (crossing onto the mainland at the Menai Straits).

Consultations

7.28 This case study presents the results of a set of structured telephone interviews held with the following:

- *Anglesey tourism officers*. Principal Tourism Development Officer and Senior Tourism Officer at Isle of Anglesey County Council
- *Representative of Anglesey tourism trade*. Chair of the Anglesey Tourism Association (ATA)
- *Tourism businesses that operate within close proximity to existing wind turbines*. A total of seven businesses were interviewed. The businesses were all drawn from the accommodation sector, including serviced and non-serviced providers. The local authority was unable to provide a list of businesses to contact so businesses were selected by virtue of being within a mile or two of at least one of the four wind farms listed in the table above.

Local visitor economy characteristics

7.29 The local area profile for Anglesey in Chapter Four described the key visitor assets for Anglesey as the high quality natural landscape and coastline, with a large number of visitors coming for beach holidays and outdoor activities. The consultations confirmed these reasons for visiting Anglesey but also showed a large number of people come for the peace and quiet that the island offers.

7.30 The DMP for Anglesey (IACC, 2012) shows that the main markets attracted to Anglesey are families (during the summer months) and mature couples at other times of the year, and that the main visitor markets are staying visitors as opposed to day visitors. This was also borne out by the consultations with local tourism officers, trade associations and businesses. Businesses were clear that many of their visitors were repeat customers and were very loyal to the island.

Recent performance

7.31 GBTS data shows that the number of holiday visits is unchanged on the level from five years ago, although it has fluctuated over this time, with a fall in visitor numbers during and following the recession. This was consistent with a number of the business consultations which reported challenging conditions but signs of recovery in the last year or so.

7.32 Performance was attributed to a range of factors but the two which received most mentions were the weather and the economic recession. 2012's poor business conditions were largely attributed to the very poor summer weather experienced that year. Likewise, 2013's better performance tended to be linked to a better summer of weather. Tourism officers attributed Anglesey's recent strong performance to the Council employing a more targeted approach to their destination marketing.

7.33 Tourism officers from IACC were the most bullish of the consultees about future prospects for the sector, with others cautiously optimistic. Improving economic conditions lay behind the optimism felt by some whilst others felt that this year's better weather had led to an increase in advance bookings for next year. Key concerns for the future included the building of the new nuclear

power plant in the north of the island. This could result in a great deal of construction activity on the island and a shortage of accommodation for visitors if workers stay in the hotels and B&Bs on the island.

Impact of wind farms

Awareness of wind farms amongst those interviewed

7.34 All of the consultees were aware of the location of the major wind farms, with those from the trade the most aware. All of the businesses spoken to were able to see one or more of the wind farms from their properties. Some said that they were able to see all of the turbines.

7.35 The majority of those representing tourism businesses felt that that the scale of onshore wind development was already considerable. The level of impact was partly attributed to the clustering of the wind farms in relatively close proximity in the northern part of the island, compared to the southern half which has relatively few, individual turbine installations.

Impact on visitor enjoyment

7.36 There are no visitor surveys in Anglesey which have estimated the overall proportion of visitors who feel wind farms detract from the visitor experience. However, the tourism officer did cite focus group research commissioned by the Council which had, amongst other things, asked existing and potential visitors to Anglesey their opinions on wind farms. The research found that most participants did not have strong views on the subject of wind turbines. Overall, they tended to either find them intriguing or to feel neutral about them. However, a very small number of participants strongly disliked them, considering them to be an eyesore.

7.37 There was a divided response among consultees in terms of whether wind farms are affecting visitor enjoyment among business consultees, which largely drew upon anecdotal evidence. However, again, the number of consultees who thought the wind farms were detracting from the visitor experience were in the minority. A small number of consultees believed that the wind farms were having a negative effect based on remarks visitors had made to them. For example, one business owner had been asked how he could live with the turbines, while another stated that visitors had told him that they were a blot on the landscape.

7.38 The businesses that believed that the wind farms were not affecting enjoyment referred to the lack of any negative comments. These included businesses which were in close proximity to the turbines and businesses which had been established for a long time. While some visitors had remarked on the turbines or shown an interest in them, none had made any adverse comments about them or indicated they have detracted from their holiday.

Impact on levels of business

7.39 The focus group research cited above also found that the presence of wind farms would not have a great impact on participants' decisions on whether to visit Anglesey, although some felt that it might affect which accommodation they might choose to stay in on Anglesey (i.e. they might not want to stay too near to wind turbines).

7.40 All of the consultees acknowledged the lack of actual evidence on the issue of wind farms and their impacts on the overall tourism economy. Several expressed a desire to see improvements

in this evidence base so that decisions could be based on factual information rather than conjecture. It was very difficult for most to isolate the specific effects of the presence of wind farms on business performance compared to other factors.

7.41 Although these caveats need to be borne in mind, the majority of consultees believed visitor numbers had not been affected by wind farm development. There were however a small number of consultees who believed they had, and some anecdotal evidence in the form of two groups of visitors who had said that they would not be returning to that part of the island because of the wind turbines. Although this provides evidence that some visitors are deterred, it is not possible to derive from this that the overall level of business would be affected as there is potential for these visitors to be replaced.

7.42 There was some evidence, however, that the presence of turbines was affecting the investment decisions of some businesses, with some consultees stating that they had held back expansion plans because of the threat of further wind farm construction in that part of the island.

Additional observations and findings

7.43 The visibility of turbines from visitor accommodation appeared to be an important factor in determining the attitude of business owners toward turbines and whether they believed them to be having a negative effect on their business. The businesses with uninterrupted views of turbines were more likely to have negative reactions towards them. However this was not true of all consultees with clear views. Proximity to wind farms was a less important factor if the wind farms were not clearly visible, for instance if the views were obstructed by local topography or trees. There were examples of businesses located less than 1/3 mile from turbines, but which had received no negative feedback from visitors.

7.44 Some consultees compared the impact of wind farms with that of other energy-related infrastructure. One or two consultees that felt that pylons were more of an issue than wind turbines. This was because pylons were thought to be uglier, more visually intrusive and more widespread across the island than wind farms. Plans to build a new nuclear power station were also seen as being more of an issue than wind farms amongst some of the consultees.

7.45 Most consultees felt that there were a number of measures that could be implemented to mitigate the future impact of wind farms on tourism, mainly related to the characteristics of the future development. These included avoiding excessive clustering in any particular part of the Island and protecting particularly sensitive views (such as that from Anglesey looking over to Snowdon and Snowdonia).

Conclusions

7.46 Evidence on the impact of wind farms on tourism in Anglesey to date is unclear and hard to assess precisely. None of the existing evidence to date has identified any negative impacts on Anglesey as a whole, despite most wind farms being established for around twenty years. IACC's own research has found the majority of visitors are positive or neutral about wind farm development, but it may affect their choice of accommodation.

7.47 Consultees were divided in their opinion on the impact of wind farms on tourism and in the anecdotal evidence provided, illustrating the differences in the personal perspectives of consultees and the uncertainty which exists on this topic.

7.48 **In general, the impact of the wind farms on overall tourism performance appears to be very limited**, with other factors such as the weather, the state of the economy and public sector investment in the sector being much more important.

7.49 There is some anecdotal evidence that a small minority of visitors react negatively to the wind farms and this may affect their intention to return. However, the nature of Anglesey's visitor market means that even if some visitors are discouraged, there is reasonable potential for substitution with other markets.

North Powys

7.50 The North Powys Case study area is focused on a relatively remote part of mid Wales (see Figure 6-15 in Section Six). There are four operational wind farms in the area and one under construction. A further five developments in the in the planning system would represent a large increase in the installed capacity if consented. The study area also includes the proposed grid infrastructure needed to connect mid-Wales wind farms to the National Grid.

7.51 The case study presents the results of a desk based assessment of socio-economic, tourism data and marketing materials, as well as structured set of telephone interviews held with the following:

- Tourism officers at Powys County Council;
- Nine local businesses located within 7km of existing wind farms, encompassing accommodation providers and tour operators.

7.52 Material submitted by developers, local authorities and the general public as part of the conjoined Public Inquiry for the proposed wind farm development in Powys has also been reviewed as part of the case study analysis.

Local visitor economy characteristics and recent performance

7.53 The visitor economy in the impact area is small in absolute terms and makes a relatively minor contribution to Powys' overall visitor economy. However, tourism is a very important sector locally and accounts for almost a quarter (24%) of local employment (at least as measured by BRES, which understates agricultural employment).

7.54 The area is part of a wider tourism area where the offer is based around the natural environment, outdoor activities, a small number of historic towns and villages, and the overall tranquillity of the area. Tourism attractions, activity and accommodation is highly dispersed. Although day visitors account for the vast majority of visitors, staying visitors are nevertheless important in value terms.

7.55 Key features of the area's visitor economy are outlined below.

- The visitor base is dominated by **day visitors** (more than 90% of annual visits, but far less in terms of expenditure). The accommodation sector is not particularly well developed and is made up predominantly of smaller B&Bs, holiday cottages and a small number of caravan and camping sites.
- As with other parts of rural Wales, the **high quality natural environment** is central to

North Powys' visitor offer although the landscape is less dramatic than other parts of Wales. The gentle landscape, **isolation, peace and tranquillity** differentiate the area from other, higher profile areas such as Snowdonia and the Breacon Beacons.

- The **low volume nature of tourism** is driven by the area's relative inaccessibility and absence of major tourism attractions. This supports to the sense of isolation and tranquillity that is central to north Powys offer and the tendency for the area to appeal to those looking for an alternative to more busy parts of Wales where tranquillity can be more difficult to achieve during busy times of year. For this reason, the area is seen by consultees as **unique within Wales**, competing with areas such as Northumberland and rural Scotland.

- The day visitors which make up a large proportion of the area's visitor base predominantly come from the surrounding parts of Wales and the Midlands and tend to come for sporting and outdoor pursuits related activities, as well as general leisure visits. The area is **popular with cyclists, walkers and ramblers, and nature watchers**.

- The comparatively small base of staying visitors tend to engage in similar activities to day visitors. Staying visitors are reported to be relatively affluent, and attach particular value to the non-traditional nature of tourism in North Powys. Staying tourists tend to remain within a reasonable distance of their accommodation, and rarely use the area as a base to explore other locations.

- The visitor offer in this area appeals particularly to **older people and young professionals** (who together dominate the visitor profile). Although a relatively small part of the staying market, families with teenage children are reported to be a growing segment.

- There is a growing **green and alternative tourism offer** in the northern parts of the case study area which has reportedly been catalysed by the presence of the Centre for Alternative Technology in Machynnlleth (slightly outside of the study area). Linked to this, there has been an expansion in the availability of alternative accommodation options, including tipis, eco-lodges and others.

7.56 Data held by Powys County Council suggests that there has been some fluctuation in visitor numbers and spend over recent years which make it difficult to pick out overall trends. Visitor numbers dipped in 2012 but, in light of the very good weather during summer 2013 are expected to show an increase when the next tranche of data is released. Some businesses report consistent growth over recent years, whilst others pointed to a lack of growth in overall visitor numbers having a dampening effect on the performance of their businesses.

7.57 Consultee businesses highlighted a number of factors affecting the overall performance of the sector. Weather conditions, fuel costs and IT connectivity were highlighted as key drivers of the sector's performance.

7.58 A perceived lack of active promotion of the area is also viewed by some to be a threat - most likely linked to Powys CC's strategy for tourism in the area - the council is not actively looking to grow the overall visitor base but do indicate that they have an aspiration to encourage more staying visitors (and hence higher average spend).

Impact of wind farms

7.59 On the whole, the current level of development is not perceived as an issue (either positive or negative) by businesses or, according to Powys CC, tourists. In spite of the proximity to existing wind farms and, for some consultees, direct and prominent views of turbines, there was no sense amongst business consultees that current developments deter visitors, although some visitors are reportedly not particularly fond of them.

7.60 Proposed wind farm and grid infrastructure developments are perceived by businesses to be amongst the dominant threats to the tourism sector. Although these concerns run counter to the lack of impact of existing developments, consultees emphasise the increased scale of development that proposed wind farms would represent (in terms of turbine height and the number of developments) and suggest that proposed developments are sited in more sensitive locations than existing ones. The Carnedd Wen proposals, which will surround part of Glyndwr's Way are seen as particularly sensitive. The number of separate developments (current and proposed) which would be seen along parts of this particular stretch of the A470 is a major concern for many of the consultees. The debate is also shaped in part by the perception that local communities are shouldering a lot of the risk without accessing much of the benefit.

7.61 The consultees' concerns about the potential effect of future developments on the local visitor economy centre on the following.

Disruption during Construction

7.62 It is difficult to reach a conclusion about the extent to which traffic congestion and disruption during construction will arise until the phasing of construction activities for the proposed developments are known. Business concerns centre on potential for disruption to have a damaging effect on the quiet and relaxing nature of the area. Potential disruption on the A470 (an important visitor route within the area) is also a concern for businesses. We would expect the consenting process for proposed developments to identify any significant adverse effects and agree mitigation measures to minimise congestion and the potential implications for tourism businesses.

Visual impact of developments on the landscape

7.63 The addition of man-made structures to an otherwise natural environment is presented by some businesses as being at odds with the area's tourism offer and having potential to diminish the ability of the area to offer a high quality natural environment.

7.64 This viewpoint is echoed in much of the information in relation to potential tourism effects that has been submitted by the scheme opponents to the Conjoined Public Inquiry. Representations made by members of the public and businesses tend to be underpinned by the assumption that where turbines are visible there will be an effect on tourism activity which arises through a loss of landscape amenity.

7.65 Although a large number of representations in relation to potential tourism impacts has been made, there has been little new primary evidence submitted. Results of a visitor survey undertaken by Welshpool Community Council (slightly outside of the case study area) in March and April 2013 have been submitted. The findings run counter to the findings of the wider evidence base relating to the potential impact of wind farm developments on tourism and appear

to suggest that a large proportion of visitors would respond negatively to the developments. Overall, 48% of visitors replying to the questionnaire indicated that they would not consider taking holidays in mid-Wales if the schemes were to go ahead.

7.66 A full description of the research methodology has not been made available so it is difficult to comment fully on the research and the conclusions that it has informed. As the conjoined inquiry is not yet complete, it is not clear how this evidence has been used or the weight that has been attached to it in the assessment of evidence. We would expect the conclusions drawn from this survey to be carefully interpreted in light of:

- Sample size – the sample consists of a small number of completed questionnaires (48 visitors and 28 tourism business owners)
- Sampling methods – self-completion questionnaires were distributed at Tourism Information Offices and sent to tourism businesses. The survey response rate is not stated, however the small number of completed questionnaires suggests that this might be low. This, together with the potential for self-selection bias in self-completion methods could undermine the validity of results.
- Question phrasing – it is not clear how the proposed developments were presented to visitors (e.g. whether illustrations were used, verbal descriptions etc) and what background information about their locations was given, so it is not possible to comment fully on the validity of the responses.

7.67 North Montgomeryshire Local Council Forum point towards similar survey evidence (from Spring 2012) in their submission to the inquiry. The information available to us was only partial, so it was not possible to draw full conclusions about the robustness of the survey. For example, 10% of tourists are reported as stating that they would stop visiting the area if proposed wind farms and infrastructure were constructed. This proportion must be interpreted in light of the proportion who state that they would not change their behaviour or who may visit more often. These counterpart statistics are not yet available.

7.68 The addition of turbines and pylons would undoubtedly cause a change in the area's landscape which some visitors may view negatively. The extent to which visitors might alter their behaviour as a result is difficult to predict (given the variety of factors which could influence this). However, the nature of tourism in the area (in particular the reliance on the natural environment and narrow tourism base) suggest that visitors to the area (particularly staying visitors) may be more sensitive to change in landscape than that in many other parts of Wales. It is also likely that, in light of the area's narrow tourism base and niche offer it may be more difficult to attract other tourists to replace deterred visitors.

7.69 However, while there may be greater potential for some visitors to be deterred from visiting the parts of the area where the concentration of turbines is greatest, there is no evidence to suggest that the overarching conclusions from the evidence review would not hold. That is, the majority of visitors would be unlikely to alter their behaviour and those who are deterred would be a minority. It should also be noted that there is potential for these deterred visitors to find similar enjoyment in alternative parts of the local impact area or other parts of Mid Wales less affected by wind farm development.

7.70 Although apparently not a material consideration for the consulted businesses, the potential

landscape enhancements that some schemes could deliver should be recognised. The Carnedd Wen scheme (which if consented would extend across Glyndwr's Way to the north of the case study area) involves an extensive habitat management programme which would see a large area of forestry plantation (which resulted in the area's landscape being downgraded in the LANDMAP assessment) being deforested and restored to open moorland over the course of a decade. This would open up views from this stretch of Glyndwr's way (which is currently densely forested) which would potentially enhance the walking experience along this stretch of the footpath.

The Noise impacts of developments once operational

7.71 Businesses in close proximity to proposed developments have concerns about noise associated with construction and operation and the potential for this to undermine their ability to offer guests peace and tranquillity as an integral part of their stay. Evidence from the conjoined inquiry suggests noise related effects would not be widespread, although there is potential for localised noise effects.

7.72 These could disturb the tranquillity of highly localised areas and perhaps discourage some visitors who value this particularly highly.

Potential positive effects

7.73 Awareness of potential benefits of proposed schemes appears to be limited to community benefit payments and discounts on electricity bills which some developers are offering to residents and businesses near to proposed development sites. Few businesses see any opportunities for potential benefits of wind farm developments to mitigate perceived or actual disbenefits for the tourism sector. The potential benefits associated with such payments are not seen as being significant enough to offset the perceived risk to tourism activity.

Effect of grid infrastructure

7.74 Consultees views in relation to the grid infrastructure largely mirrored their concerns about wind turbines and a similar set of mechanisms for impact were proposed. That is, visual impacts, operational noise and construction related disruption are expected to be the primary sources of any negative effects that might arise.

7.75 Although most consultees expressed a view that pylons are more visually unacceptable than wind turbines, their overall level of concern about the proposed grid extension's impact on tourism activity was less pronounced. It should be noted that the distribution of tourism businesses in the case study area means that there are very few businesses in close proximity to the proposed pylon route. Although businesses expressed some concern over the impact of the proposed route on the area's tourism resource in a general sense, concerns about direct effects on business performance were not widely reported.

Conclusions

- Whilst the tourism economy in the North Powys local impact area is relatively small in volume and value terms, it is nevertheless an important economic sector locally. This, together with the comparative narrowness of North Powys' tourism offer, its focus on isolation, tranquillity and remoteness mean that **the area's tourism economy is more sensitive to development than in other parts of Wales**

- The narrowness of the tourism base, dominance of the natural environment and importance of tranquillity to the area's offer means that **the visitor economy is more at risk to wind farm developments than many other parts of Wales**.

- The lack of evidence of impacts of existing wind farms on tourism activity has not reduced concerns about potential future developments. Business concerns about the effect of future developments centre on the changes to local landscapes that could materialise if **all planned developments were to proceed**. There is however recognition that any landscape changes would be interpreted differently by visitors - while some may see developments as detrimental others may view them as an enhancement (through the resulting improvements in access and habitat restoration). Wider evidence on the impact of wind farm developments on tourism activity indicates that even where changes to the landscape are viewed as detrimental this will not always result in a change in visitor behaviour.

- Traffic congestion and delays associated with the construction of the developments could have an **adverse effect on the area's accessibility**. Given the limited capacity on strategic road routes in the summer season in particular, any congestion or delays caused by the movement of heavy vehicles could deter visitors. It is difficult to judge the potential for congestion until the conjoined Inquiry is finished, there is greater clarity on scale and timing of development, as well as any proposed mitigation.

Conclusions and Implications for Assessment

7.76 The three case studies have brought together the experiences of three locations in Wales which have already been the subject of wind farm development. In many cases these wind farms have been established for twenty years, yet there have been no comprehensive and robust studies which have demonstrated any observed impact on the local visitor economies (positive or negative) in any of the case study areas.

7.77 The case studies were designed to provide an additional strand of evidence for the assessment as a whole, rather than as standalone research. They drew upon local research where it was available and a set of structured consultations with local tourism trade associations and local authority tourism officers. Whilst these consultees provided views for their particular communities and stakeholders, these views were also tested through consultations with tourism businesses in close proximity to existing wind farms or catering for visitors most likely to be affected (up to ten additional consultations).

7.78 The limited number of interviews conducted clearly brings some limitations in terms of the comprehensiveness of the case studies and the robustness of the findings. In the absence of any detailed studies, the case studies have relied to a large extent on consultees' own views of the impact of wind farms, however, as many of them observed, it is very difficult to attribute changes in visitor volumes to specific factors such as wind farms.

7.79 Despite these caveats and limitations, there are a number of points of relevance to the study:

- There is very little evidence of any impacts to date from wind farm development in the case study areas. Only in the Anglesey case study was there any anecdotal evidence that visitors had stayed away from an area due to wind farms, however the majority of consultees did not think it had had a negative effect on the local visitor economy to date.

All case studies concluded that other factors are of far greater importance than wind farms in explaining trends in the local visitor economy.

- A number of the findings are consistent with the evidence review, and provide further support for the framework as a means of assessing sensitivity. In particular:

  - The scale of development and dense clustering of wind farms were considered to increase the potential for negative reactions by visitors. It should be noted however that this was based on consultees' concerns for the future rather than observed impacts.

  - The importance of natural scenery, undeveloped landscapes and remoteness in an area's visitor offer may mean its visitor markets are more sensitive to wind farm development, especially where there are very few alternative visitor activities or assets in the area. Again, this was based on concerns for the future.

  - There is some evidence that it tends to be older visitors who are more likely to be sensitive to wind farm development. However, younger visitors and those visitors who come to an area for a specific purpose (eg mountain biking or beach holidays) are less likely to be deterred.

- Proximity to wind farms may deter certain types of visitors, but not all. A number of consultees expressed concern about wind farms deterring visitors from staying in accommodation in close proximity to turbines (especially in Neath Port Talbot). However, many of the businesses in Anglesey and Powys were in very close proximity to existing turbines and had reported no impact. Again, this may be explained by the characteristics of visitor markets and differences in the reactions to wind farms.

- Disruption during construction and closures/diversions to popular walking routes or trails were all identified as annoyances for visitors. Although there is no evidence that these disruptions have deterred people from visiting, they are often raised as frustrations and should be minimised or mitigated through the planning process. This is of particular concern for North Powys which could face a long period of construction if all applications were approved.

- There is scope for positive tourism effects from wind farm development, however the turbines on their own are unlikely to be sufficient. There may, however, be some instances where wind farm development could enhance existing visitor attractions or be an attraction in their own right, where they are accompanied by further investment, for instance through visitor centres.

8. Impact Assessment

Local Assessment

8.1 This section presents the assessment of sensitivity of visitor markets to wind farms in each of the local impact areas. The framework for assessing impact as set out in Section Three has been applied to each of the local impact areas based on the review of local area profiles and case studies. Each indicator has been rated on a scale of one to five, where one equals very low sensitivity and five equals very high sensitivity.

8.2 The final row in each table presents the overall sensitivity and draws out the conclusions for what this may mean in terms of changes in visitor numbers. It is important to note that the assessment for each indicator relates to potential sensitivity to wind farms and not an assessment of impact. The conclusions of the literature review point to very little impact overall, but identify circumstances where **some** visitors may be more sensitive to wind farm development. Even in cases where the assessment points to high sensitivity, this would not translate in to a large impact on visitor numbers.

8.3 The tables show that the majority of impact areas would be unlikely to experience a significant change in the volume and value of tourism. However the tables do identify some areas which are likely to be more sensitive to wind farm development, particularly Powys South and Powys North.

8.4 Although there is very little evidence of any impact to date in these areas, both areas could be the focus for large scale development over the next ten years, with multiple wind farms in close proximity to each other. These areas tend to attract staying visitors who are older and who come for the natural scenery, landscapes and feelings of tranquillity offered by the area, and it is these markets which may be sensitive to large scale wind farm development.

8.5 These areas also attracts a large proportion of day visitors who come for a specific purpose (e.g. to walk the Glyndwrs Way trail), a large proportion of whom may not change their visiting behaviour as a result of wind farm development. The assessment has therefore concluded that the overall change in visitor numbers in these areas would be low, but may be moderate for certain visitor markets.

8.6 Although these areas account for a small proportion of tourism employment in Wales as a whole, the narrow economic base in these areas means the sector is a very important source of local employment and income (particularly for Powys North). The businesses in these locations may be sensitive even to small changes in visitor numbers as a result of wind farm development, and there may be a particular challenge for them replacing those visitors which are deterred.

North Anglesey – Small tourism economy within impact area but important sector locally

Framework Indicator	Sensitivity	Justification
Scale of development	2	Large number of turbines in the north of the island, but are mostly smaller developments. Not the focus for large scale future development over next decade.
Clustering near other wind farms	4	Wind farms are located close to each other, and all wind farms can be seen from certain locations in the north of the island. But confined to a relatively small area.
Dominance of wind farms on landscape in key tourism areas	2	Wind farms are judged to be a dominant presence on the landscape in a large area of lowland farmland. Some are located close to the AONB, however they are unlikely to be visually intrusive on coastal landscapes and beaches for most visitors.
Scenery and Landscape Quality	2	All located in pleasant but unremarkable inland countryside. Assessed by LANDMAP as moderate quality, although presence of turbines influence this assessment.
Unspoiled, open landscapes central to visitor offer	2	Unspoiled coastal landscapes are central to visitor offer, but wind farms not likely to detract from these. Visitor offer is diverse, including beach holidays, watersports and outdoor activities.
Capacity of Local Tourism Sector	3	DMP shows visitor numbers are highly seasonal, so likely to be operating under capacity during winter months. Most visitors during winter months are likely to be older visitors who may be more sensitive to wind farms.
Loyalty of tourist base	3	DMP shows around 60% of visitors to serviced accommodation and 50% of self catering are repeat visitors, but these are not likely to be any more concentrated amongst those more sensitive to WF development.
Age of visitors	3	40% of visitors are aged 55+, attracting a large number of older couples who may be more sensitive to WF development. Families are also an important market, but these are not particularly sensitive to WF development.
Overall Assessment	2	Although a number of indicators point to potential for increased sensitivity to wind farms, IACC's own research has not identified negative effects. Case study identifies some anecdotal evidence of visitors staying away but a large proportion of operators have not experienced fall in visitor numbers due to wind farms. Diversity of offer means there is high potential for replacement of visitors who are deterred. **Overall, minimal visitor economy impacts expected.**

North Ceredigion – Small tourism economy but very important sector given the narrow economic base

Framework Indicator	Sensitivity	Justification
Scale of development	2	Four operational wind farms containing 77 turbines, but spread across wide area. One large wind farm containing 39 turbines. No future wind farms planned.
Clustering near other wind farms	1	Wind farms spread out over a wide area, with little potential for cumulative effects.
Dominance of wind farms on landscape in key tourism areas	3	Some walkers in Cambrian mountains likely to come in close proximity to Cefn Croes but most wind farms further distance from key visitor assets and routes. No evidence that Cefn Croes has affected visitor numbers.
Scenery and Landscape Quality	3	Two of the landscapes containing wind farms assessed as "outstanding" in LANDMAP, including Cefn Croes. Others assessed as "moderate".
Unspoiled, open landscapes central to visitor offer	3	Important part of visitor offer in Cambrian mountains, but part of a more diverse offer which is less sensitive to wind farm development.
Capacity of Local Tourism Sector	3	Tourism is highly seasonal, but large proportion of business turned away during summer months, and smaller proportion during shoulder months. Most tourism visitors to Cefn Croes would be in summer months. So some potential for replacement of visitors.
Loyalty of tourist base	2	Tourism strategy notes that many of the older visitors staying in caravans by coast are repeat visitors to the area, but most of these are remote from wind farm development.
Age of visitors	4	48% of visitors are "empty nesters" over 55, with potential for this group to be more sensitive than average to wind farm development.
Overall Assessment	2	No evidence identified that existing wind farm development has affected visitor numbers. Most sensitive area would be around Cefn Croes. Some visitors could be discouraged, but likely to be limited in extent and potential for these to go to other local destinations not affected by developments. **Overall, minimal visitor economy impacts expected.**

Powys South – Small tourism economy and a small share of total employment

Framework Indicator	Sensitivity	Justification
Scale of development	5	Two large, established wind farms and a number of large wind farms in planning system.
Clustering of multiple wind farms	4	All wind farms in relatively close proximity. Potential for some cumulative effects, although limited to some extent by topography of area.
Dominance of wind farms on landscape in key tourism areas	3	Large wind farms in close proximity to some visitor assets (Glyndwr's Way, open access land), but not major in terms of visitor numbers. Elan Valley another important visitor asset which is further from wind farms.
Scenery and Landscape Quality	3	Some wind farms in areas assessed as high for landscape quality, others assessed as moderate. Landscapes not as dramatic as other areas of Powys (Brecon Beacons). Wind farms may enhance the landscape for some visitors in some locations (eg Llandinam).
Unspoiled, open landscapes central to visitor offer	4	Open, unspoiled landscapes and feeling of isolated wilderness are important part of offer, but fishing, walking, cycling and other outdoor activities also popular.
Capacity of Local Tourism Sector	4	Limited information available for Powys or local area. Mid Wales tourism strategy indicates occupancy levels are low but this covers a very wide area. Likely to be seasonal.
Loyalty of tourist base	4	Visitor surveys indicate one in ten visitors to Powys are repeat visitors who may be more sensitive to wind farm development.
Diversity of visitor base	4	Limited information for the study area itself, but Mid Wales tourism strategy shows that half of visitors to Powys are "empty nesters" aged 55+. These visitors may be more sensitive to wind farm development.
Overall Assessment	4	The scale of development combined with the visitor profile and wilderness offer of this study area leave it more sensitive to wind farm development than other areas of Wales. Narrow visitor offer and proximity to other more established tourism areas mean there may be less potential for replacement of visitors than other areas. **Potential for effect on visitor economy. The effect is likely to be small but there is a risk that it could be moderate for some visitor markets.**

South Coast Urban – Large visitor economy dominated by Cardiff city centre

Framework Indicator	Sensitivity	Justification
Scale of development	1	All operational, consented and planned wind farms are very small (comprising one or two turbines each)
Clustering near other wind farms	1	Two wind farms in close proximity but both very small
Dominance of wind farms on landscape in key tourism areas	1	Size of windfarms and urban context means they are not dominant feature on landscape
Scenery and Landscape Quality	1	All in areas assessed as low or moderate for landscape quality
Unspoiled, open landscapes central to visitor offer	1	Urban context means unspoiled landscapes do not feature in visitor offer
Capacity of Local Tourism Sector	1	Surveys indicate hotel occupancy in Cardiff is below capacity, however this is less relevant in this context
Loyalty of tourist base	1	Day visitors likely to be frequent visitors, but this is for shopping and cultural breaks. Weekend breaks less likely to be repeat visitors
Age of visitors	1	Attracts a broad mix of age ranges
Overall Assessment	1	No threat to visitor economy from wind farm development because of nature of visitor offer (shopping, culture, city breaks) and limited scale of wind farm development. **No specific impacts expected on the visitor economy.**

Carmarthenshire – Sizeable visitor economy and an important source of employment and income

Framework Indicator	Sensitivity	Justification
Scale of development	3	Most operational wind farms are small, but future wind farms will be larger. Largest wind farm will be the consented Brechfa Forest East (28 turbines).
Clustering near other wind farms	3	Operational wind farms are distributed over wide area. Planned and consented wind farms may create a cluster of three wind farms in Brechfa Forest.
Dominance of wind farms on landscape in key tourism areas	2	Small wind farm located close to coast which is a key visitor asset, but unlikely to be intrusive for visitors to beach or walkers. Future wind farms in Brechfa Forest may be dominant in some areas, but dense forestry would limit intrusiveness.
Scenery and Landscape Quality	3	Brechfa Forest landscapes assessed as high scenic value. Presence of wind farms may detract from views and overall enjoyment for some visitors.
Unspoiled, open landscapes central to visitor offer	2	Open landscapes are important part of offer in the east of the County but less so in impact area. Beaches unlikely to be affected by wind farm development. Brechfa Forest is popular with mountain bikers who are likely to be less sensitive to wind farm development.
Capacity of Local Tourism Sector	2	Very little information available, but likely to be seasonal. Mountain biking in Brechfa Forest likely to be less seasonal than other activities.
Loyalty of tourist base	N/A	Very little information available for level of repeat visits to Carmarthenshire as a whole or the impact area.
Age of visitors	2	Limited information available. East Carmarthenshire survey showed area is popular with older visitors. However, area most affected is Brechfa Forest which is likely to attract younger visitors (mountain bikers) who are in general less sensitive to WFs.
Overall Assessment	2	The scale of development in Carmarthenshire is limited compared to other parts of Wales. Some visitors to Brechfa Forest may be deterred by change to landscape, however the area is popular for mountain biking and other outdoor activities. These visitors are less sensitive to wind farm development. **Nevertheless, very little overall visitor economy impacts expected.**

Powys North – Small tourism economy but important sector given narrow economic base

Framework Indicator	Sensitivity	Justification
Scale of development	5	Over 150 existing turbines and a number of consented or planned wind farms in close proximity. Also new proposed grid infrastructure.
Clustering near other wind farms	5	There would be three separate clusters of wind farm developments if all applications were approved.
Dominance of wind farms on landscape in key tourism areas	4	Large wind farms in close proximity to visitor assets (Glyndwr's Way and open country)
Scenery and Landscape Quality	3	Wind farms mostly in areas of upland moorland and grazing land, which are less dramatic than other parts of Powys. Largest wind farms are located in an area assessed as poor for landscape quality because of forestry plantations.
Unspoiled, open landscapes central to visitor offer	4	Open, unspoiled landscapes and feeling of isolated wilderness are important part of offer, but fishing, walking, cycling and other outdoor activities also popular.
Capacity of Local Tourism Sector	4	Limited information available for Powys or local area. Mid Wales tourism strategy indicates occupancy levels are low but this covers a very wide area. Likely to be seasonal.
Loyalty of tourist base	4	Visitor surveys indicate one in ten visitors to Powys are repeat visitors who tend to be more sensitive to wind farm development
Age of visitors	4	Half of visitors to Powys are "empty nesters" aged 55+. This group tends to be more sensitive to wind farm development.
Overall Assessment	4	The scale of development combined with the visitor profile and wilderness offer of this study area leave it more sensitive to wind farm development than other areas of Wales. Narrow visitor offer and proximity to other more established tourism areas mean there may be less potential for replacement of visitors than other areas. **Potential for impact on visitor economy. The impact is likely to be small but there is a risk that this could be moderate for certain visitor markets.**

South Wales Valleys – Growing visitor economy but not an important source of employment

Framework Indicator	Sensitivity	Justification
Scale of development	5	102 turbines already installed, and a large number of wind farms with consent or in the planning system, including Pen y Cymoedd (76 turbines). This will create large scale development in NPT and RCT
Clustering near other wind farms	5	Large cluster of wind farms in NPT/RCT, including existing and consented wind farms
Dominance of wind farms on landscape in key tourism areas	4	Large wind farms in close proximity to visitor assets (Afan Forest Park and upland areas of NPT and RCT). Visibility of wind farms may be reduced in forested areas. Dominance on landscape may be limited by proximity to developed areas.
Scenery and Landscape Quality	2	Half of wind farms are in areas assessed as high for landscape quality. However many are close to former industrial areas and settlements which detracts from "unspoiledness" of landscapes
Unspoiled, open landscapes central to visitor offer	2	Unspoiled, open landscapes are part of offer in some areas. The countryside offer is not fully developed for tourism compared to other locations in Wales. Mountain biking, culture and heritage, beaches and outdoor activities more important.
Capacity of Local Tourism Sector	3	Evidence from case studies showed a mixed picture. Some markets have experienced strong growth, but overall tourism growth has been flat and there is likely to be some capacity.
Loyalty of tourist base	1	Not clear from the evidence, but mountain bikers are a key market and likely to be repeat visitors for mountain bike trails in Afan Forest Park. This market is less sensitive to wind farm development.
Age of visitors	2	Area attracts a large proportion of younger visitors for mountain biking and activities. These markets are less sensitive to wind farm development.
Overall Assessment	2	Large scale development but not established as a visitor location for high scenic value. Visitors tend to be younger and come for specific activities. Case study indicates limited potential for some visitors to be deterred but high potential for replacement of deterred visitors with other markets. **Very little overall impact on visitor economy expected, and some WF related opportunities.**

North Wales – Small visitor economy with average share of employment in tourism

Framework Indicator	Sensitivity	Justification
Scale of development	3	Six operational wind farms, but mostly small or medium in scale (largest has 25 turbines). Potential for six future developments which would be larger.
Clustering near other wind farms	3	Potential for clustering of wind farms around Clocaenog forest if applications were approved, but limited clustering overall. Also some screening in these areas due to forestry locations.
Dominance of wind farms on landscape in key tourism areas	3	Wind farms are in close proximity to Llyn Brenig and Mynydd Hiraethog SSSI. These are popular areas but lower profile than other visitor assets. Wind farms may be visible from parts of Snowdonia and Clwydian Range but would be unlikely to be dominant features on landscape.
Scenery and Landscape Quality	3	Some wind farms in areas assessed as high for landscape quality, but greatest concentration of turbines in an area assessed as low due to forestry plantations.
Unspoiled, open landscapes central to visitor offer	3	Scenery is a key reason for visiting the area. But areas also popular for nature watching, fishing, walking, mountain biking and watersport, so there is potential for replacement of visitors who are deterred.
Capacity of Local Tourism Sector	N/A	Very little evidence about capacity of local tourism sector. Likely to be seasonal.
Loyalty of tourist base	3	Around ¾ of visitors are repeat day visitors who have not travelled far. Some repeat visitors may be deterred by wind farms, but large number of visitors likely to have visited out of convenience and may be less sensitive to wind farm development.
Age of visitors	4	51% of visitors are over 55. Visitors in this age group may be more sensitive to wind farm development.
Overall Assessment	2	Large number of wind farms but mostly dispersed over a wide area. Although some people who visit for the scenery may be deterred, there are numerous alternative visitor markets which may be less sensitive to wind farm development. Also potential for positive effects by using wind farms as a visitor asset, identified by Denbighshire and Conwy County Councils. **Very little overall impact on visitor economy and some WF related opportunities**

Pembrokeshire – Small visitor economy accounting for small share of employment

Framework Indicator	Sensitivity	Justification
Scale of development	1	Two existing wind farms and up to three future developments, but all small in scale
Clustering near other wind farms	2	Four of the wind farms are in close proximity, but these are all small so this does not have significant effect
Dominance of wind farms on landscape in key tourism areas	1	Size and locations of wind farms in less scenic areas means they are unlikely to be dominant presence in key visitor locations
Scenery and Landscape Quality	2	One wind farm is close to scenic areas of Pembrokeshire Coast National Park, but all wind farms are in farmland assessed as moderate by LANDMAP
Unspoiled, open landscapes central to visitor offer	1	Unspoiled coastal landscapes and seascapes are central to the visitor offer, but wind farms are remote from these locations.
Capacity of Local Tourism Sector	1	Highly seasonal, but less relevant for this case study where wind farms would be unlikely to have any effect on visitor behaviour
Loyalty of tourist base	2	85% of visitors to Pembrokeshire are repeat visitors, but this is less relevant when considered alongside other factors which suggest wind farms would have limited effect on visitor behaviour
Age of visitors	1	Pembrokeshire visitor survey shows area is popular with younger visitors who tend to be less sensitive to wind farm development.
Overall Assessment	1	Small scale of development and location of wind farms away from the beaches and coastal areas with high scenic value mean there is likely to be limited potential for impact from wind farms and **no overall impact on the visitor economy.**

National Assessment

8.15 The focus of the study has been a bottom-up assessment of impacts in local impact areas. These have concluded that there has been very little evidence of tourism impacts to date, and that any future impacts are likely to be small in nature and highly localised. Although the study has not conducted a top down assessment at national level, there are strong grounds to conclude that there is likely to be very little change in visitor numbers in Wales as a whole. The key reasons for this are as follows:

- **Any local negative impacts would be very small in the national context**. Those negative impacts which have been identified through the local area assessments are likely to take place in areas remote from the main concentrations of tourism activity. While tourism may be an important sector locally, these areas account for a very small share of total tourism volume and value for Wales, so any negative effects would be small for Wales as a whole.

- **Negative impacts likely to be displaced elsewhere**. Any negative reactions to wind farms would be likely to result in tourism being displaced from some areas to others. The policy to concentrate wind farm development in SSAs means there would be large areas of Wales which are remote from wind farm development, including many of the country's key natural assets and protected areas. These areas would be likely to see a small increase in visitor volume and value at the expense of other areas.

- **Perceptions of Wales would be unlikely to change**. Following on from the above, the scale of development in certain locations may change peoples' perceptions of these areas and make them less likely to visit. However, the large areas of Wales which would be unaffected from wind farms mean it is unlikely that visitor perceptions of the country as a whole and their decisions to visit would be changed.

8.16 The most comprehensive and robust assessment of tourism impacts of wind farms at a national level was the GCU study for Scotland, which provides support for this assessment. The study found very little impact for Scotland as a whole[22], and that where negative effects do arise, these occur in the form of displaced tourism. Clearly a great deal of caution is required when applying the findings of this study to the Welsh context. However, the two countries have similar visitor markets, particularly in the areas affected by wind farms, where a large proportion of visitors visit for the natural scenery and landscape. The scale and density of development is far greater in Scotland than Wales, and there remain large, scenic areas of Wales unaffected by wind farms which offer alternatives to those visitors who are deterred. There are therefore strong grounds to conclude that a similar pattern would occur in Wales.

[22] In the worst case scenario, it found the impact on Scotland in employment terms would be 200 FTEs

9. Conclusions and Recommendations

Conclusions

9.1 This study has sought to address a number of challenging questions on a hotly debated topic; that is, the relationship between current and future onshore wind farm development and the visitor economy of Wales. The potential scale of onshore development over the next ten years could possibly lead to a fourfold increase on the current level of installed generating capacity, much of this concentrated in the Tan 8 Strategic Search Areas. This has raised a number of concerns amongst the tourism sector and local communities about the potential impacts on the visitor economies.

9.2 The study has carefully assessed the evidence of existing tourism impacts, but also taken a future view of potential impact if all planned developments were approved. Whilst this equates to approximately 2GW of installed capacity constructed by 2025, this should be seen as a maximum scale of development. Given the uncertainty affecting the deployment of all of this additional capacity, it could be much lower in practice.

9.3 The study has drawn on the extensive body of evidence examining the relationships between wind farms and tourism in devising the bottom-up assessment method. This method uses local area assessments to better understand the existing and future impacts of the wind farm development on the visitor economy, both for the nine areas in which development is concentrated and Wales as a whole.

Limited evidence of tourism impacts to date for Wales as a whole

9.4 While there are few national studies of the impact of onshore wind development on tourism, the weight of the evidence suggests that at the national level, effects on tourism will be limited. The evidence suggests that, where negative effects do arise, these are typically quite modest in scale and will often occur in the form of displaced tourism. That is, the small proportion of tourists who adjust their visiting behaviour in response to the presence of wind farms are likely to choose to visit other neighbouring locations which are not affected by wind farms.

9.5 While these national studies were not conducted in Wales, there are strong grounds to conclude that the findings can be applied in this context. The scale and density of development in Scotland (where much of this research has been conducted) is much greater than Wales. Given the Welsh policy to focus development in SSAs, there are still extensive scenic areas of Wales unaffected by wind farms which offer alternatives for the small proportion of people who might be deterred.

9.6 The case studies also showed little evidence of impact to date at a more local level, despite the presence of large wind farms in close proximity to tourism centres. While there were clearly challenges for consultees in accurately assessing the effects of wind farms on visitor numbers, the majority believed there to have been no impact to date. This view was view held by most businesses, local authority and trade body consultees.

Planning Policy has ensured wind farms are remote from Wales's key visitor assets

9.7 Following on from the above, the analysis in this study has shown that Wales's key tourism areas and visitor assets are, for the most part, unlikely to be affected by wind farm development. Although TAN8 did not explicitly seek to focus development outside of key tourism areas, this has resulted indirectly by concentrating development away from key natural assets such as areas of outstanding natural beauty and national parks.

9.8 While there are examples of wind farms which can be seen from highly protected areas, these tend to be from a long distance, meaning they are not dominant features on the landscape. It is highly unlikely that visitors to these areas would be deterred from making future visits as a consequence.

9.9 The areas affected by wind farms tend to have relatively low levels of tourism, as reflected in the analysis of visitor accommodation and tourism employment in these areas. However, some of these areas also have a small and narrow overall economic base and so the contribution of tourism, albeit small, is nevertheless quite important to them.

Reactions to wind farms are complex and may change over time

9.10 A consistent finding across much of the evidence is that visitor responses and reactions to wind farms are subjective and depend on the individual's own judgements and interpretation of the relative value of wind farms and their aesthetics.

9.11 A key factor is the reaction of individual tourists to the impact of wind farms in the landscape. This is potentially very important to the performance of tourism in many parts of Wales, where surveys have shown that beautiful and unspoiled countryside is an important reason for the visit and a key contributor to visitor enjoyment. However, previous studies have shown that while individuals vary widely in their reaction to wind farms, a clear majority do not react negatively to them in the landscape and will not change their destination choice on account of the presence of wind farms.

9.12 The breadth of factors which could influence people's perceptions of wind farms is complex. These are likely to include their views on renewable energy and the effectiveness of wind farms as a means of energy production. The research suggests that these wider perceptions play a role in how tourists weigh up the positive and negative aspects of wind farm development.

9.13 Based on current evidence of visitor responses and reactions, and the balance of public support for wind energy over time, there is little to suggest that the planned increase in onshore wind production would result in significant changes in visitor numbers, even in those areas where there may be multiple wind farm developments.

9.14 However, it is important to recognise that the wider perceptions that influence visitor reactions are not set in stone. They are likely to be influenced by a wide set of factors related to climate change and energy production over the next ten years, including changes in energy prices and views on the relative merits of wind energy compared to alternatives, such as fracking or other forms of renewable energy.

9.15 There is also a potential danger that the increased rate of development in some parts of Wales

could change the value judgements made by some visitors if they feel a point is reached when wind farms become too dominant a presence on Welsh landscapes. This could alter their perceptions of the relative merits of wind turbines and in turn change their visitor behaviour.

9.16 While this needs to be acknowledged as a potential risk, the spatial concentration of turbines in areas remote from the main tourism locations means that it is unlikely that Wales as a whole would be perceived to be dominated by turbines for most visitors. The risk also needs to be considered in light of the fact that wind farms will become a more common sight in the UK and Europe in general, including those parts of the UK which may be considered Wales's competitor locations[23]. This increased familiarity with turbines could mean that many visitors become more tolerant of turbines as a feature of rural landscapes, and their visiting behaviour may change little as a result.

Higher sensitivity to wind farms for certain visitor markets in close proximity

9.17 While most of the evidence points toward limited impacts on tourism from wind farms, there are examples of certain locations which are, on balance, more sensitive to wind farm development. This is on account of their landscapes, types of visitor, limited product diversity and proximity to wind farms. This is particularly the case where the key visitor markets are older people visiting for the tranquillity, remoteness and natural scenery offered in some parts of Wales. Remoter parts of Powys are the most notable examples of where this may be the case.

9.18 In these locations, the study has concluded that the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. The case studies have revealed that there is clearly a great deal of uncertainty around the potential impact which may arise in practice. Greatest concern exists amongst areas and businesses closest to wind farms and appealing to visitor markets most sensitive to changes in landscape quality. The case studies did highlight some businesses reporting negative reaction from visitors and also holding back investment on account of the uncertain impact, although a majority were not affected negatively at all.

9.19 Although these areas account for a small proportion of tourism employment in Wales as a whole, the narrow economic base in these areas means the sector is an important source of local employment and income. The businesses in these locations may be sensitive even to small changes in visitor numbers as a result of wind farm development. They may have a particular challenge for businesses replacing those visitors which are deterred in areas where there may be limited appeal for other visitor markets.

Some potential for positive impacts, often requiring further investment

9.20 Although a number of studies point to the potential of the wind farms in their own right to attract visitors, these are often based on visitors' stated intentions in surveys rather than any observed positive impacts. There is little evidence that these positive effects occur in practice, and this was borne out by the case studies where there are established wind farms.

[23] If all wind farms currently in the planning system were approved, Scotland would have 12GW of installed capacity, compared to Wales's 2GW. The density of turbines (in terms of MW per 1,000 sq km) would be 50% higher in Scotland than in Wales.

9.21 There may, however, be some instances where wind farm development could enable the enhancement of existing visitor attractions or be an attraction in their own right through for example investment in related visitor facilities. While it is unlikely that such facilities would be sufficient to attract holiday tourism, they are likely to present opportunities for those areas which attract a large share of day visitors and have a large catchment population in close proximity, such as the South Wales Valleys or North East Wales. These are two areas which are already exploring the potential to utilise wind farms as a visitor attraction. The case studies showed there was enthusiasm for these types of projects among local stakeholders and an opportunity to make better use of community benefit funds to achieve economic development goals.

No evidence that wind farms on visitor routes deter tourists

9.22 The study has shown there are a number of visitor routes which will be in close proximity to large concentrations of turbines. The evidence base on how visitors react to wind farms on these routes is not well developed. However, for most visitors, these encounters will be brief and we believe would be unlikely to affect their enjoyment of the main purpose of their visit. The general survey evidence presented in this study offers the only proxy for how visitors would react to these wind farms. This shows that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there is no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere.

Negative impacts during construction

9.23 The study has not shown there to be any evidence of a fall in visitor numbers as a result of disruption during construction. However, this was identified as a concern for many businesses in the case studies, particularly in relation to noise and traffic, and the closure and diversion of public footpaths or other popular routes. Given that some areas examined in this study could be affected by construction of wind farms for a number of years, it is vital that these disruptions are minimised and mitigated wherever possible through the planning process. There are also several examples of rights of way or trails which were enhanced during construction, and these improvements should be communicated to locals and visitors.

Associated infrastructure

9.24 The evidence base for tourism impacts of associated infrastructure is far less developed than that for wind farms. The few studies which have addressed the subject have focused on visitors' opinions of pylons, which consistently find that reactions are far more negative than toward wind turbines. This strong feeling toward grid infrastructure presents an increased risk for those areas where new pylons are proposed alongside considerable wind farm development, particularly North Powys. However, there is no evidence that the existing National Grid infrastructure which is concentrated in North and South Wales, often in popular scenic areas, discourages visitors.

9.25 Nevertheless, the lack of robust evidence means the assessment of the potential impact of the proposed supporting grid infrastructure is particularly challenging. The proposals by National Grid will now see a significant proportion of the connection to the grid buried undergrown, including the section which crosses the Glyndwr's Way. This would reduce the visual impact upon one of North Powys's key visitor asset and mitigate potential impacts.

Recommendations

9.26 The recommendations are set our below, grouped in three categories: (i) land use planning considerations, (ii) economic development, and (iii) maximising opportunities and minimising disbenefits.

Land Use Planning Considerations:

- There is little guidance available to developers, planning authorities and communities on the best approach to assessing the potential impacts of wind farm proposals on local visitor economies and visitor assets (as part of Environmental Assessments which support planning applications). The fact that the assessment of these effects can be challenging and subject to aspects of uncertainty (especially in terms of cumulative assessment), points to the need for improved guidance. Welsh Government should consider supporting others stakeholders such as the Planning Inspectorate and other devolved administrations to develop this guidance.

- Linked to this point, the assessment framework which has been used in this study for assessing the sensitivity of local visitor economies to wind farm development would provide a helpful tool which could be used within this guidance.

- Although most local tourism economies will face minimal or no threat from wind farm development, the nature of the visitor economies in some parts of Wales does mean they are at greater risk of negative impacts. In these instances, there is a need for developers to undertake thorough research and consultation to understand the nature and extent of the threat, the potential opportunities (if relevant) and any actions which need to be taken. The emphasis should be upon reaching agreement on these issues with the local tourism sectors and other stakeholders where this is possible, prior to submission of the planning application.

- The study has concluded that there is the risk that some future wind farm development could have a minor or even moderate negative impact on local visitor economies. However, these assessments are often subject to a degree of uncertainty and for this reason it is important to monitor the actual impact of new development upon tourism in these areas. Given the shortcomings in visitor data at this localised level and the wide range of factors which influence the visitor economy, it will be important to agree a suitable approach to do this.

- Whilst the potential impact of onshore wind farms on the visitor economy was not a criteria in the selection of the strategic search areas within the TAN 8 policy (although the impact on landscape was), there is merit in it having a more explicit role in informing locational choices for any successor policy. The reason for this is that as the additional generation capacity associated with Tan 8 is implemented, the potential consequences of any further development in these areas on the local visitor economy would need to be carefully considered.

Maximising Opportunities and Minimising Dis-benefits

- The development of renewable energy in general and wind farms more specifically provides some opportunities for linked tourism development (and the report has

highlighted instances where this has been successful). The more significant opportunities for generating additional economic benefit impact are linked to new visitor attractions and facilities. They are more appropriate in locations with large day visitor catchments, good accessibility and a significant degree of complementarity with the local tourism strategies.

- In other instances, there will often be small scale opportunities to improve the visitor offer in close proximity to and linked to a wind farm development, including all weather access, signage and way marking, and information boards. Where landscape and habitats are being improved as part of a wind farm development, this may provide some opportunity to share information with visitors as a point of interest and to raise awareness

- In other instances, it is important to minimise the potential for disbenefits during construction periods. This includes rerouting public access, clear signage and effective communication of the potential disruption to user groups.

- In all of these instances, the scope to link public sector resources (Rural Development Programme and ERDF, for example) with community benefit payments from wind farm developers in creative ways should be explored. This provides potentially important way of providing additional resources to support local, often rural economies

Tourism and Economic Development

- Where a clear link can be established between a specific wind farm development and the likelihood of significant negative impacts upon the tourism economy, this would need to be mitigated through the planning approval.

- Although in other instances wind farm developments are far less likely to result in significant negative impacts, they are nevertheless seen by the tourism sector and other stakeholders as significant threats and may actually discourage some private sector investment as a consequence of the associated uncertainty. There is a role in these areas to use community benefit funds, where they are available and matched by public sector resources (including the new European programmes for the period 2014-20), in a much more strategic way to support the tourism sector. Good practice examples of these strategies and investments should be shared with local stakeholders and the tourism sector.

Bibliography

Aitchison. (2004). Evidence Gathering of the impact of wind farms on visitor numbers and tourist experience.

Aitchison, C. (2012a). Tourism Impact of Wind Farms. Submitted to Scottish Government Renewables Inquiry.

Arup Economics and Planning. (2002). Socio-economic impact assessment of North Hoyle offshore wind farm.

Bell *et al.*. (2005). The 'social gap' in wind farm siting decisions: explanations and policy responses.

Benner, N. a. (1984). Visual preferences for a coastal landscape including oil and gas development.

Bibbings. (2004). Climate concern: attitudes to climate change and wind farms in Wales.

Biggar Economics. (2007). Review of Evidence on the Impact of Wind Farms on Tourism and Recreation. Report to Novera Energy & case studies used in Clyde Wind Farm Public Inquiry.

Butler, R W. and Fennellm D A (1994) The Effects of North Sea Oil Development on the Development of Tourism. Tourism Management 1994 (15) 347 - 357

Cardiff City and County Council (2012). Cardiff Visitor Survey, 2012

Carmarthenshire County Council (2006). Unitary Development Plan

Ceredigion County Council (2011). Tourism & Visitor Economy Strategy for Ceredigion 2011- 2020, the Tourism Company

Centre for Sustainable Energy. (2002). Martins Hill Tourism Survey.

CCC/DCC (Conwy and Denbighshire County Councils) (2010) Hiraethog Area Sustainable Tourism Development Plan

DEFRA. (2008). A Framework for Pro-environmental Behaviors.

Department for Energy and Climate Change (2011): Renewable Energy Roadmap

Department for Energy and Climate Change. (2012). DECC Public Attitudes Tracker - Wave 1 Table of Findings.

Department for Energy and Climate Change. (2012a). Public Attitudes Tracker - Wave 2.

Department for Energy and Climate Change (2013): Renewable Energy Roadmap Udpate

Destination Pembrokeshire Partnership (2012) Pembrokeshire Visitor Survey (2011-12)

Destination Pembrokeshire Partnership (DPP) (2013) Pembrokeshire Destination Management Plan

Devine-Wright. (2007). Reconsidering public attitudes and public acceptance of renewable energy technologies: a critical review. A working paper of the research project “Beyond Nimbyism: a multidisciplinary investigation of public engagement with renewable energy technologies”.

Devine-Wright (2012). Explaining NIMBY Objections to a Power Line: The Role of Personal, Place Attachment and Project Related Factors

Devine-Wright and Howes. (2010). Disruption to place attachment and the protection of restorative environments: a wind energy case study.

Ellis *et al.*. (2007). Many ways to say ‘no’ different ways to say ‘yes’: Applying Q methodology to understand public acceptance of wind farm proposals .

Eltham *et al.*. (2008). Change in public attitudes towards a Cornish Wind Farm: Implications for Planning.

European Commission, Special Eurobarometer 300. (2008). Europeans' Attitudes Towards Climate Change.

EWEA (2009). Wind Energy - The Facts. A guide to the technology, economics and future of wind power

Failte Ireland. (2012). Visitor Attitudes on the environment – Wind Farms.

Firestone, J., & Kempton, W. (2007). Public opinion about large offshore wind power: Underlying factors. Energy Policy, 35, 1584–1598.

Glasgow Caledonian University. (2008). The economic impact of wind farms on Scottish Tourism .

Gossop . (2007). Fullabrook Down Wind Farm: Inspector’s evidence.

Haggett. (2011, February). Understanding public responses to offshore wind power. Energy Policy, 39(2), 503-510.

Hanley, N. a. (1999). Appraising renewable energy developments in remote communities: the case of the North Assynt Estate, Scotland. Energy Policy, 27(9), 527 - 547.

Isle of Anglesey County Council (2012). Anglesey Destination Management Plan

ICM. (2011). Atlantic Array Tourist Survey.

ICM. (2012). North Wales Tourist Survey.

IPSOS MORI Social Research Institute. (2004). Attitudes Towards Renewable Energy in Devon.

Jones and Eiser. (2010). Understanding "local" Opposition to Wind Development in the UK: How Big is a Backyard.

Keuhn. (2005). Sociological Investigation of the reception of Horns Rev and Nysted Offshore Wind Farms in the Local communities.

Ladenburg, J. (2010). Attitudes towards offshore wind farms —The role of beach visits on attitude. Energy Policy, 38, 1297 - 1304.

Lilley *et al.*. (2010). The Effect of Wind Power Installations on Coastal Tourism. Energies, 3, 1-22.

Lutzeyer, L. a. (2012). The economics of visual disamenity reductions of offshore wind farms-Review and suggestions from an emerging field .

McGowan, F., & Sauter, R. (2005). Public opinion on energy research: a desk study for the research councils.

MORI Scotland. (2002). Tourist Attitudes Towards Wind Farms, Research Study conducted for Scottish Renewables Forum and British Wind Energy Association.

MORI Scotland. (2003). Public attitudes to windfarms. Research Findings No.12.

Neath Port Talbot County Borough Council (NPT) (2011) Neath Port Talbot Tourism Development Action Plan

NFO. (2002). Investigation into the Potential Impact of Wind Farms on Tourism in Scotland.

NFO. (2003). Investigation into the potential impact of wind farms on tourism in Wales.

NWP. (2002). Socio-Economic Impact Assessment of North Hoyle Offshore Wind Farm.

ONS. (2012). Public attitudes to climate change and the impact of transport in 2011.

Populus. (2005). Energy Balance of Power Poll.

RCUK. (2009). Public Attitudes to Environmental Change: A Selective Review of Theory and Practice.

Renewable UK and Ipsos Mori. (April, 2012). Wind Power Omnibus Research.

Rhonda Cynon Taf County Borough Council (2007) Reaching Destination. Rhondda Cynon Taf Tourism Strategy 2007-13

Robertson Bell Associates. (1996). North Cornwall Tourists Survey.

Robertson Bell Associates. (2002). Lambrigg Residents Survey.

RWE N Power Renewables. (2005). Socio-economic impact assessment of the Gwynt y Mor offshore wind farm.

Soini et al. (2011) Local Residents' Perceptions of Energy Landscape: The Case of Transmission Lines. Land Use Policy (28) 294 – 305

Scottish Government (2002). PAN 45: Renewable Energy Technologies

The Planning Inspectorate. (2007). Fullabrook Wind Farm Public Inquiry Report to the Secretary of State for Trade and Industry.

Strategic Marketing (2013) East Carmarthenshire Visitor Survey Q1 January-March 2013

Sustainable Energy Ireland (2003) Attitudes Towards the Development of Wind Farms in Ireland

The Tourism Company. (2012). The impact of wind turbines on tourism – a literature review.

Tourism Partnership Mid Wales (2011) Mid Wales Regional Tourism Strategy. The Tourism Company

Tourism Partnership Mid Wales (2011b) Visit Wales Visitor Survey, Beaufort Research

Tourism Partnership North Wwales (2010) Tourism Strategy North Wales

WAG (2005). Ministerial Interim Planning Policy Statement 01/2005 Planning for Renewable Energy, July 2005.

WAG (2005b). Technical Advice Note (TAN) 8: renewable energy

WAG (2008). Renewable Energy Route Map for Wales, Consultation on way forward to a leaner, greener and cleaner Wales, February 2008.

WAG (2012). Energy Wales: A Low Carbon Transition

WAG (2013). Partnership for Growth: The Welsh Government Strategy for Tourism

Warren *et al.*. (2005). 'Green On Green': Public Perceptions of Wind Power in Scotland and Ireland.

Westeberg et al (2012) Offshhore Wind Farms in the Mediterranean Seascaoe – A Tourist Appeal or a Tourist Repellent?

Wolsink. (2005). Wind power implementation: The nature of public attitudes: Equity and fairness instead of 'backyard motives'.

Regeneris Consulting Ltd

Manchester Office
4th Floor Faulkner House
Faulkner Street, Manchester M1 4DY
Tel: 0161 234 9910
Email: [redacted]

London Office
70 Cowcross Street
London, EC1M 6EJ

[redacted]

The Impact of Renewable Energy Farms on Visitors to Cornwall

Final Report

Produced for and on behalf of Good Energy
by
The South West Research Company Ltd.

November 2013

Contents

The Impact of Renewable Energy Farms on Visitors to Cornwall

Key Findings

The South West Research Company

Key Findings

The vast majority of visitors to Cornwall had a positive attitude towards renewable energy (80%) with just 6% having a negative attitude towards it. Opinions towards wind farms and solar farms individually were also positive amongst visitors, although both slightly lower than the overall attitude towards renewable energy in general. The additional comments captured through the survey along with anecdotal evidence captured from interviewer de-briefings would suggest that whilst not all are in favour of wind and solar farms there is a general acceptance of the role that they have to play in protecting the environment and providing energy for the future. It was also evident that many people are now used to seeing such developments close to where they live and as such are not troubled by seeing similar sights whilst on holiday in Cornwall.

Awareness of wind farms in Cornwall was much higher than that of solar farms amongst visitors to the county. The large majority of those who were aware stated for each type that they had no impact on their visit and in each case the proportions reporting negative impacts were outweighed by those reporting positive impacts by the presence of wind and solar farms. Further analysis suggests that the strength of impact on those reporting negative impacts is not enough to deter them from visiting as many are regular visitors to the county.

Overall this report suggests that just 2% of visitors are less likely to visit the county again in the future as a result of the presence of wind and solar farms. However, 4% of visitors are more likely to visit which is likely to be as a result of those that find such developments attractive and, more importantly, those that consider the county to be a more positive place as a result of the presence of renewable energy farms and its support for the environmental causes. That said, the survey focused on visitors' attitudes in response to existing wind and solar farms and therefore no firm conclusions can be drawn as to how these might change with further developments in the future.

When put in context other factors are much more of a threat to Cornwall's visitor economy in the future than the presence of wind and solar farms. Whilst the majority of visitors will remain loyal and will not be deterred from re-visiting in the future, the risk of poor weather and the cost of holidaying in the county are far more likely to deter them to visit than the presence of renewable energy developments.

The Impact of Renewable Energy Farms on Visitors to Cornwall

Executive Summary

The South West Research Company

Executive Summary

- The South West Research Company Ltd. were commissioned by Good Energy to undertake an independent research study during summer 2013 into the attitudes of visitors to Cornwall towards wind and solar farms in the county. The survey was designed to explore visitor attitudes towards renewable energy; levels of awareness of wind and solar farms in Cornwall; and the extent to which these developments affected the visitors' enjoyment of their holidays and/or their willingness to visit again in future.

- A face to face survey was conducted by experienced interviewers at six different holiday locations in Cornwall between the 1st and 30th August 2013. A total of 1,007 questionnaires were completed.

- 80% of visitors were in favour of renewable energy as a means of generating power and on the whole thought it was a good idea whilst just 6% had a negative attitude towards it.

- 74% of visitors were in favour of wind farms as a means of generating power and on the whole thought they were a good idea. 12% of visitors had a negative attitude towards them.

- 75% of visitors were in favour of solar farms as a means of generating power and on the whole thought they were a good idea. 9% of visitors had a negative attitude towards them.

- 90% of visitors were aware of wind farms in Cornwall.

- Of those aware of wind farms, 71% said their presence had no impact on their visit to Cornwall at all, 19% indicated that they actually had a positive impact on their visit to the county and 10% said they had a negative impact on their visit.

- When those who were unaware of wind farms in the county were included in the analysis, the negative impact of wind farms on visits was further reduced to 9% of visitors.

Executive Summary

- 35% of visitors were aware of solar farms in Cornwall.

- Of those aware of solar farms, 71% said their presence had no impact on their visit to Cornwall at all, 22% indicated that they actually had a positive impact on their visit to the county and 7% said they had a negative impact on their visit.

- When those who were unaware of solar farms in the county were included in the analysis, the negative impact of wind farms on visits was further reduced to just 2% of visitors.

- 94% of visitors said the presence of wind and solar farms would make no difference in their decision to visit Cornwall again in the future and a further 4% indicated that their presence would actually make them more likely to visit. 2% of visitors stated that they would be less likely to visit as a result of the presence of wind and solar farms in Cornwall.

- Whilst the majority of visitors did not indicate any factors which would deter them from visiting Cornwall again in the future (69%), the risk of poor weather (17%) and cost compared to other holiday destinations (14%) were the two factors most likely to deter them to visit the county again in the future. Only 2% of all visitors indicated that the presence of wind and solar farms in Cornwall would deter them from visiting again in the future.

The Impact of Renewable Energy Farms on Visitors to Cornwall

Introduction

Background

This report presents the findings of a survey of staying visitors to Cornwall undertaken on behalf of Good Energy by The South West Research Company Ltd. during August 2013.

Good Energy are a South West Company, based in Wiltshire and were the first dedicated 100% renewable electricity supplier. They supply over 35,000 customers and support over 55,000 homes, business and communities generating their own energy, and have their own wind farm in Delabole, North Cornwall.

Good Energy were keen to commission an independent survey amongst visitors to Cornwall to explore their feelings and attitudes towards renewable energy generally as well as wind and solar farms specifically. In addition understanding visitors' current levels of awareness of existing wind and solar farm developments in Cornwall and the impact these have, if any, on their visits to the county now and in the future was a key element of the research.

Since its formation in 2008, The South West Research Company has worked with a wide ranging number of clients across the South West region covering a wide range of market research projects including visitor surveys, festival/event evaluations, marketing campaign evaluations, business monitors and economic evaluations. The business partners have, between them, over 25 years' experience in conducting and undertaking tourism-related research, with particular expertise in planning, developing and undertaking large scale visitor surveys of the nature and type which was required by Good Energy.

Research Objectives

- ✓ To gain an understanding of the attitudes that visitors to Cornwall have towards renewable energy generally and wind and solar farms specifically.

- ✓ To determine the level to which visitors are aware of existing wind and solar farms in Cornwall and whether their presence has any impact on their holiday experience.

- ✓ To determine the extent to which the presence of wind farms and solar farms might affect the willingness of visitors to return to Cornwall on holiday.

- ✓ With regards all the objectives above, the interest was in visitors' attitudes towards wind farms and solar farms separately, but not as an alternative to one another.

Methodology

A face to face survey was conducted by experienced interviewers at six different holiday locations in Cornwall between the 1st and 30th August 2013. The sample points included:

- Padstow
- Perranporth
- Tintagel/Trebarwith
- Widemouth Bay
- Newquay
- Penzance

Adults (aged 16+ yrs) who were on a holiday or leisure related visit to the county staying for at least one night were sampled on a random basis along the seafront/beach areas at each of the holiday locations above.

40 interviewing sessions, each lasting approximately 5 hours, were undertaken over the survey period.

A total of 1,007 questionnaires were completed. Where the total sample detailed in this report in the charts to follow is less than 1,007, this will be due to respondents not providing an answer to a question or where a question was only asked to a sample of the respondents dependent on their responses to a previous question.

As the statistical reliability slide overleaf demonstrates, an overall random sample of this size provides robust results and good margins of error within which one can be 95% certain that the true figures will fall. It is also comparable with the Cornwall Visitor Survey 2012 where a sample of 1,000 visitor interviews was undertaken.

Statistical Reliability

All sample surveys are subject to statistical error. The size of this error varies with the sample size and also with the order of magnitude of the research findings being considered.

The survey results in this report are presented for all visitors, along with a breakdown of the results by each of the six interview locations. The table below shows the sample achieved for all visitors and each of the interview locations and gives the margins within which one can be 95% certain that the true figures will fall (assuming the sample is random).

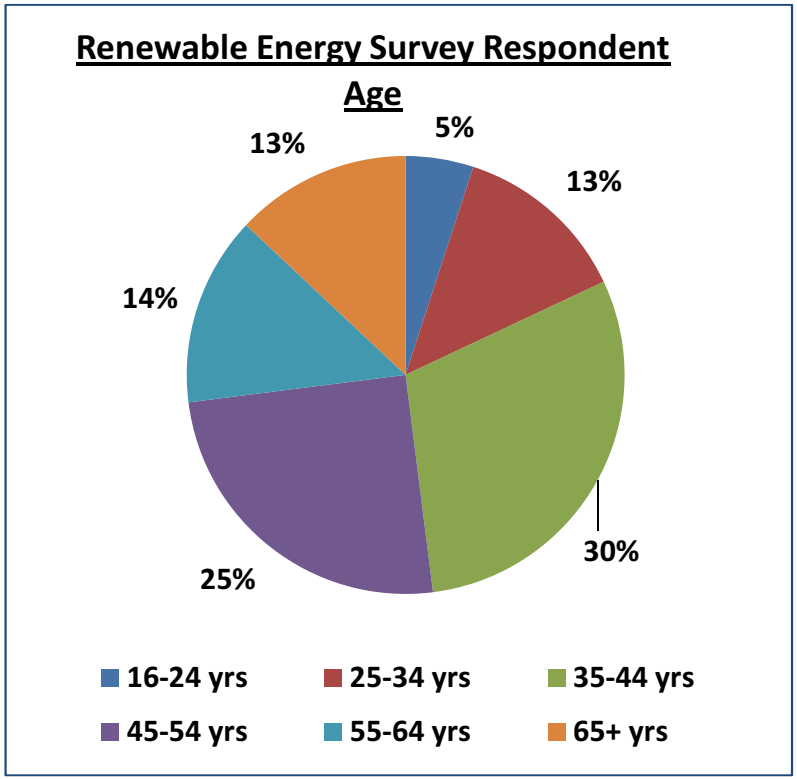
The figures shown are at the 95% confidence limits. Thus, for example, we can be 95% certain that, for all visitors, with a result of 50%, the true percentage is the range 46.9% to 53.1%. For the individual location results the margins of error are much wider and this should be borne in mind when interpreting the results contained in this report.

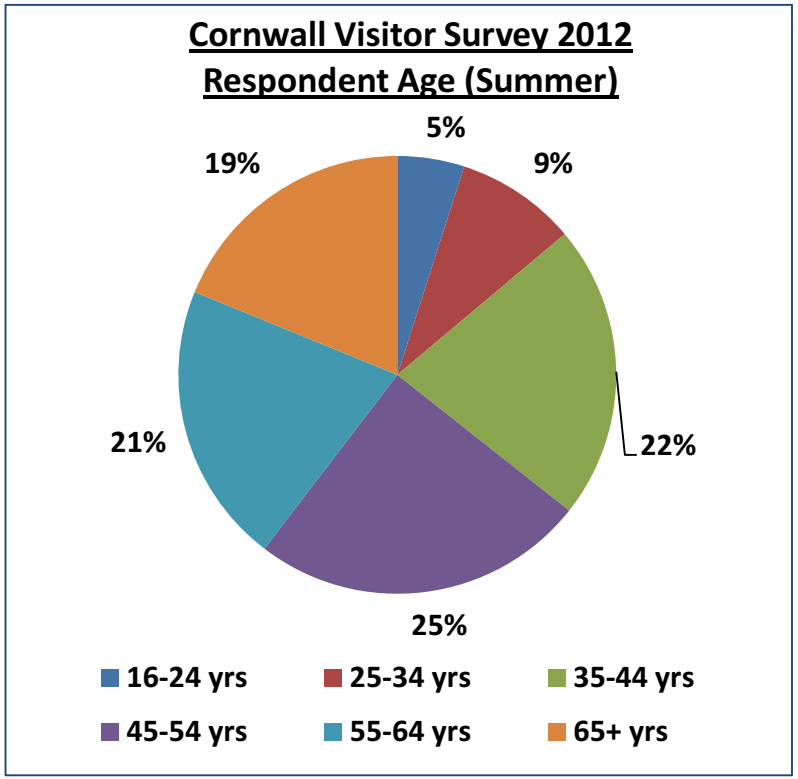
	All visitors	Padstow	Perranporth	Tintagel/ Trebarwith	Widemouth Bay	Newquay	Penzance
Research findings	**Sample: 1,007**	**Sample: 172**	**Sample: 154**	**Sample: 182**	**Sample: 175**	**Sample: 147**	**Sample: 177**
10% or 90%	+/- 1.9%	+/- 4.5%	+/- 4.7%	+/- 4.4%	+/- 4.4%	+/- 4.8%	+/- 4.4%
20% or 80%	+/- 2.5%	+/- 6.0%	+/- 6.3%	+/- 5.8%	+/- 5.9%	+/- 6.5%	+/- 5.9%
30% or 70%	+/- 2.8%	+/- 6.8%	+/- 7.2%	+/- 6.7%	+/- 6.8%	+/- 7.4%	+/- 6.8%
40% or 60%	+/- 3.0%	+/- 7.3%	+/- 7.7%	+/- 7.1%	+/- 7.3%	+/- 7.9%	+/- 7.2%
50%	+/- 3.1%	+/- 7.5%	+/- 7.9%	+/- 7.3%	+/- 7.4%	+/- 8.1%	+/- 7.4%

The Impact of Renewable Energy Farms on Visitors to Cornwall

Sample Profile

Respondent age and gender



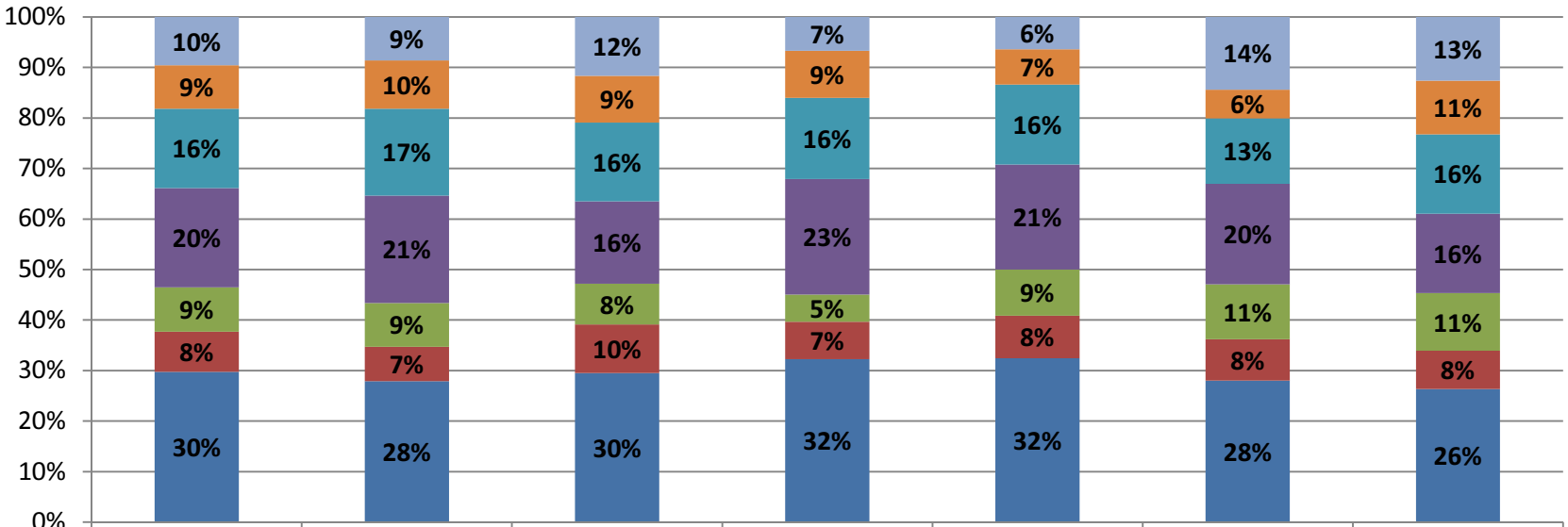


Overall, respondents were well spread across all age groups with almost half (48%) below 45 years of age. 35-44 year olds represented the largest proportion of respondents (30%), followed by 45-54 year olds (25%). 54% of respondents were male and 46% female.

For comparative purposes, the Summer respondent profile sourced from the Cornwall Visitor Survey 2012* (CVS) is also displayed. Whilst the profiles of the two surveys do not exactly match, they are broadly similar suggesting that a representative sample was obtained through the Renewable Energy Survey (RES). Whilst the RES displays a slightly younger respondent profile, this is likely to be as a result of the beach and seafront sample points used whereas the CVS Summer sample was collected from a wider range of geographical locations possibly attracting an older profile.

**Undertaken by Beaufort Research*

Visitor profile

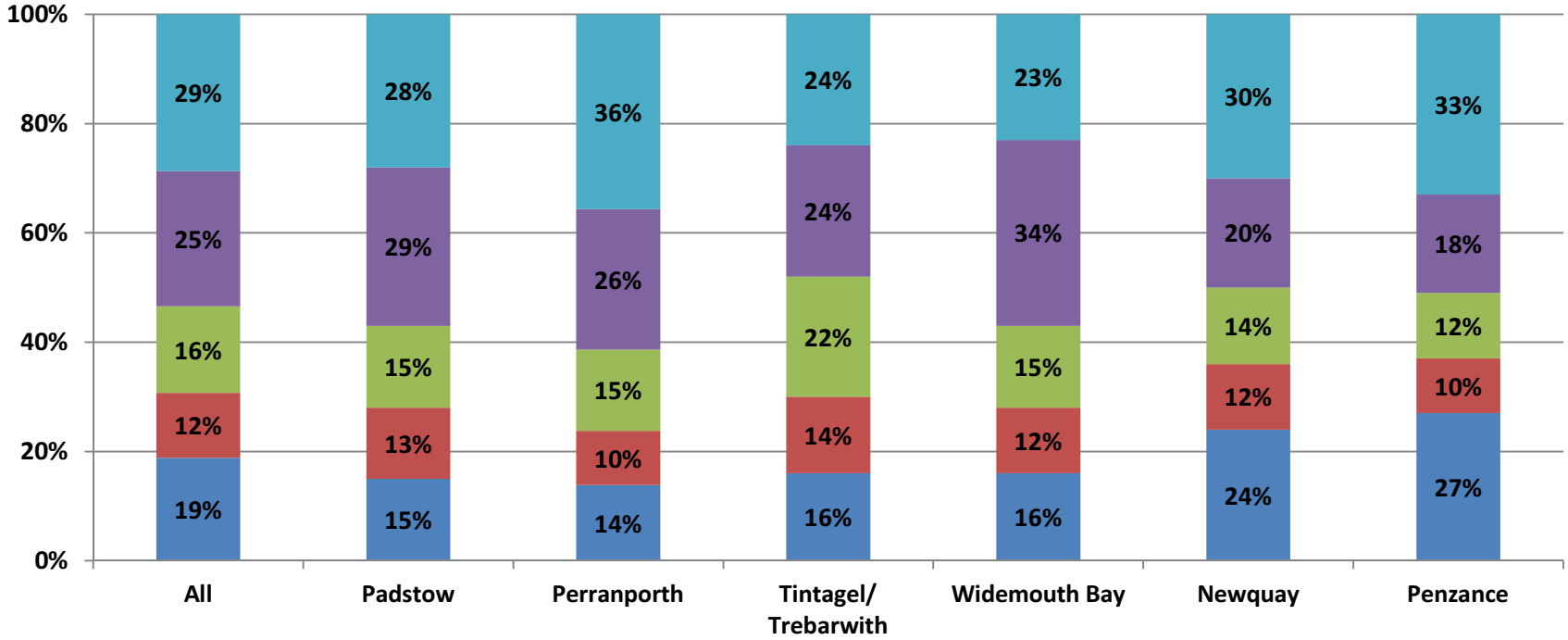


	All	Padstow	Perranporth	Tintagel/ Trebarwith	Widemouth Bay	Newquay	Penzance
65+ yrs	10%	9%	12%	7%	6%	14%	13%
55-64 yrs	9%	10%	9%	9%	7%	6%	11%
45-54 yrs	16%	17%	16%	16%	16%	13%	16%
35-44 yrs	20%	21%	16%	23%	21%	20%	16%
25-34 yrs	9%	9%	8%	5%	9%	11%	11%
16-24 yrs	8%	7%	10%	7%	8%	8%	8%
0-15 yrs	30%	28%	30%	32%	32%	28%	26%

The visitor profile for respondents and those in their immediate party is broadly similar across all sample points.

Unsurprisingly, considering the timing and sample points of the fieldwork, the largest proportion of visitors were in the 0-15 years age group followed by 20% in the 35-44 years age group and 16% in the 45-54 years age group. This suggests a visitor profile dominated by family visitors during the peak holiday season in the county.

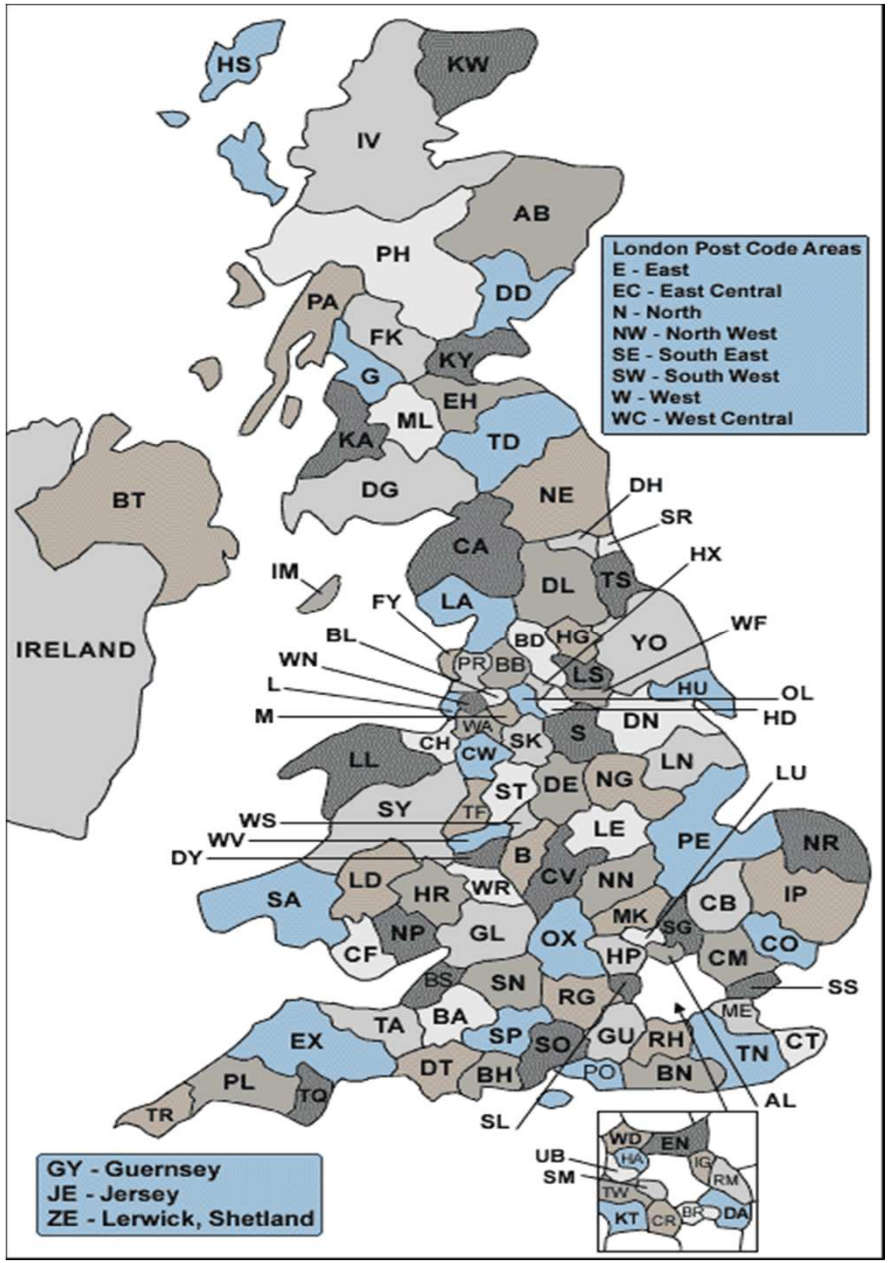
Number of previous visits to Cornwall



Overall, respondents had previously visited Cornwall on a number of occasions in the last five years with more than half (54%) having visited more than three times. Only 19% were on their first visit in the last five years.

Across the sample points the results were broadly similar although Penzance and Newquay attracted the largest proportions of first time visitors (27% and 24% respectively) and Perranporth (62%) had the largest proportion of visitors who had visited on more than three occasions in the last five years. The results portray a large proportion of loyal visitors to Cornwall.

Respondent origins by postal code area



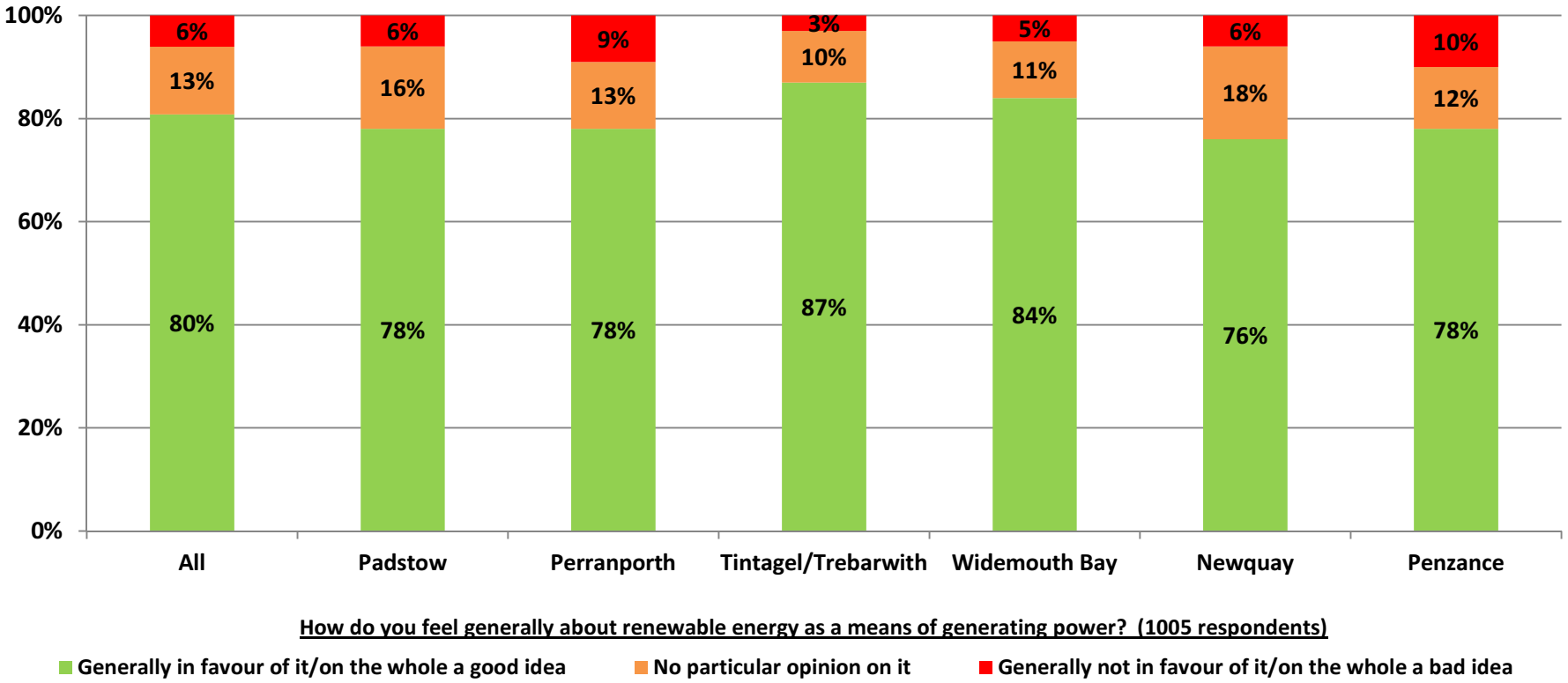
The table below shows the top 11 postal area origins for the full survey sample each of which accounts for more than 2% of visitors..

Postal area	Area code	%
BIRMINGHAM	B	4.1%
BRISTOL	BS	4.0%
NOTTINGHAM	N	3.5%
READING	NG	3.0%
SHEFFIELD	RG	2.5%
NORTHAMPTON	NN	2.4%
BATH	BA	2.2%
DERBY	DE	2.2%
GLOUCESTER	GL	2.2%
STEVENAGE	SG	2.2%
COVENTRY	CV	2.1%

The Impact of Renewable Energy Farms on Visitors to Cornwall

General Feelings Towards Renewable Energy

General feelings about renewable energy

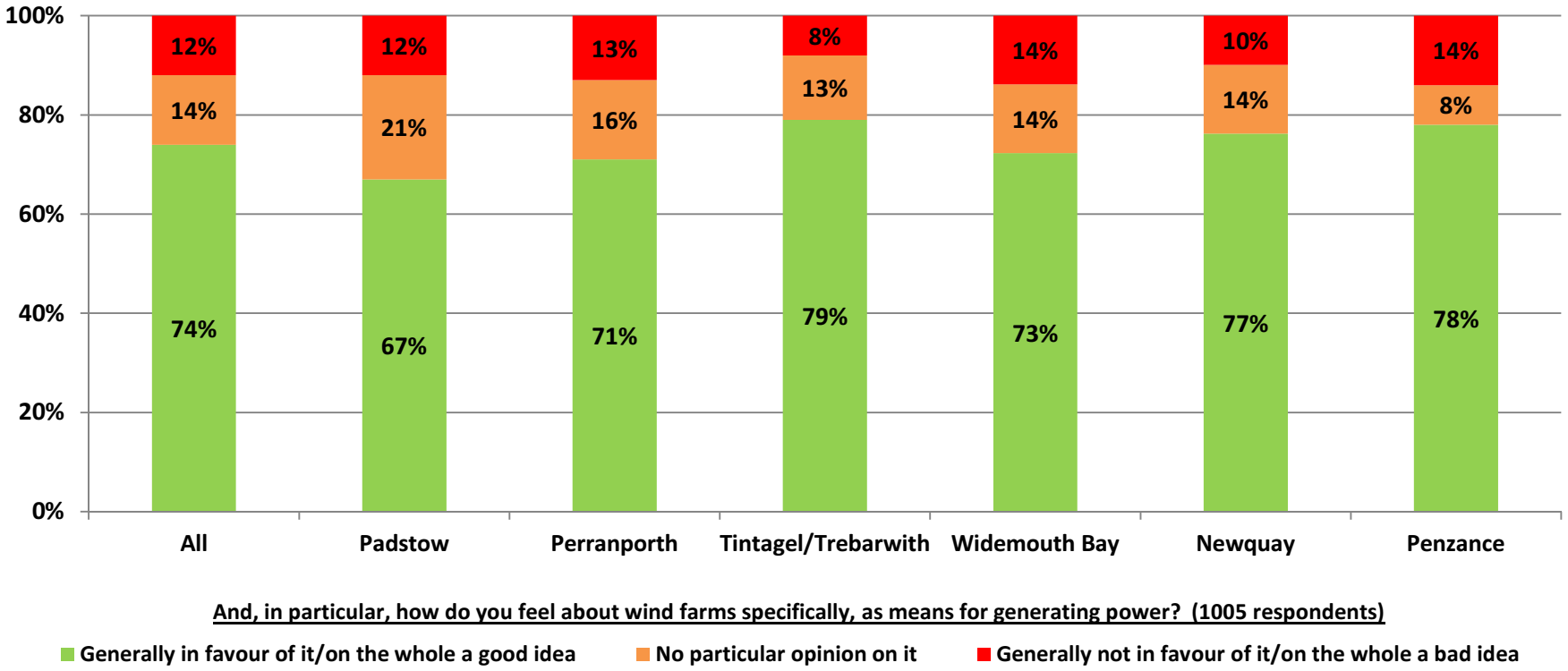


The vast majority of visitors to Cornwall had a positive attitude towards renewable energy.

80% of visitors were in favour of it as a means of generating power and on the whole thought it was a good idea whilst just 6% had a negative attitude towards it.

Whilst there were little significant differences in the results according to interview location, visitors interviewed at Tintagel/Trebarwith and Widemouth Bay showed the highest levels of positivity towards renewable energy and those in Penzance and Perranporth the highest levels of negativity, albeit still very small proportions.

General feelings about wind farms

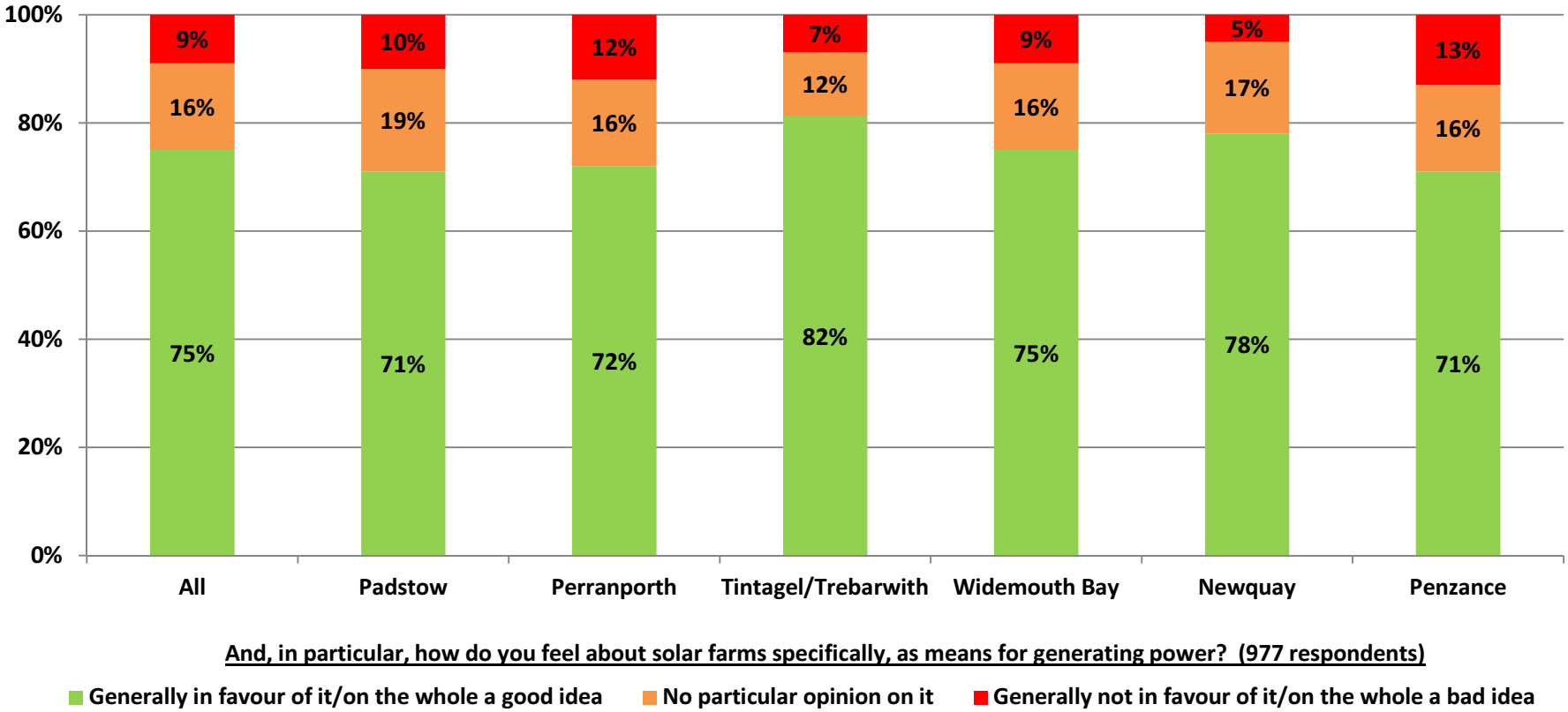


Visitors to Cornwall also showed a high level of positivity towards wind farms, although marginally lower than their opinions when considering renewable energy generally.

Around three quarters (74%) were in favour of them and on the whole thought they were a good idea. 12% of visitors had a negative attitude towards them - double the proportion when compared with those who thought the same for renewable energy generally as a means of generating power (6%).

Again, whilst there was little notable variation in the results according to the interview location, visitors interviewed at Tintagel/Trebarwith and Newquay showed the highest levels of positivity towards wind farms.

General feelings about solar farms



In a similar pattern to wind farms, visitors to Cornwall also demonstrated a high level of positivity towards solar farms with three quarters being in favour of them and on the whole thinking they are a good idea. 9% of visitors had a negative attitude towards them - a slightly lower proportion when compared with those who thought the same for wind farms as a means of generating power (12%).

Again, whilst there was little notable variation in the results according to the interview location, visitors interviewed at Tintagel/Trebarwith and Newquay showed the highest levels of positivity towards solar farms.

The Impact of Renewable Energy Farms on Visitors to Cornwall

Wind and Solar Farms – Visitor Awareness and Impacts on Visits

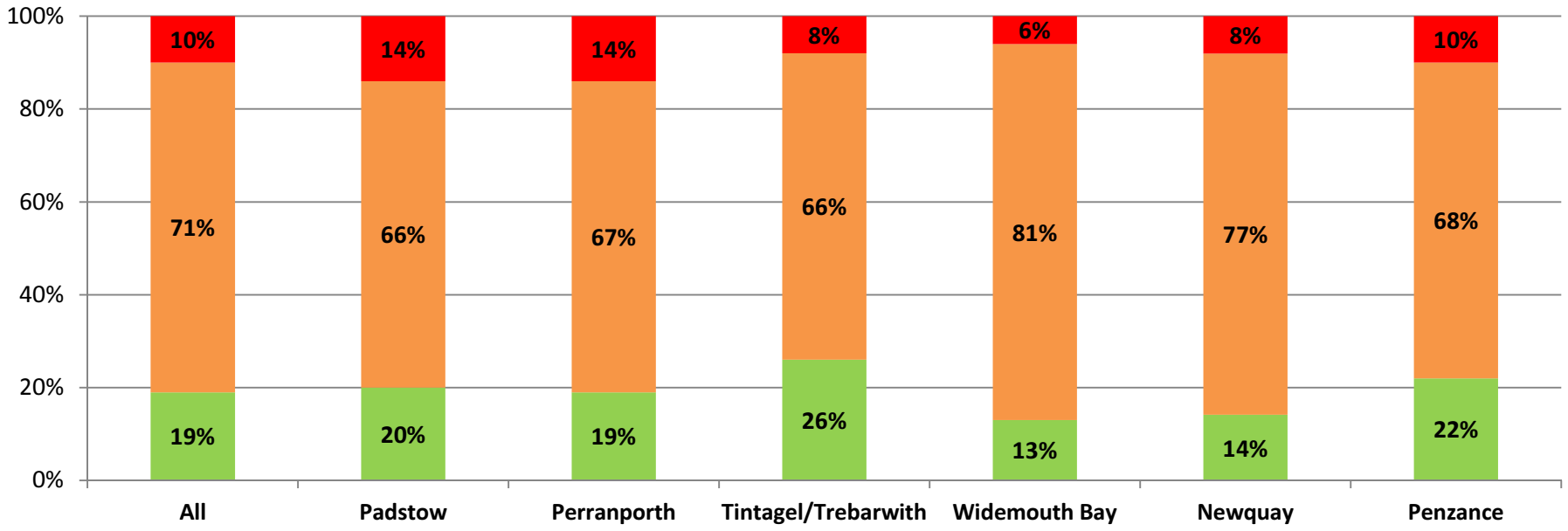
The South West Research Company

Awareness of wind farms in Cornwall

Awareness levels of wind farms in Cornwall were high amongst visitors with nine out of ten being aware of their presence in the county.

Whilst awareness levels of wind farms were high across all interview locations (87% or more) they were highest amongst visitors in Penzance and Perranporth (94% and 93% respectively) and lowest amongst those in Padstow and Widemouth Bay (87% and 88% in each case).

Impact of wind farms on visit to Cornwall



Has the presence of wind farms had a positive or negative impact on your visit to Cornwall, or no impact at all? (907 respondents)

Positive | No impact | Negative

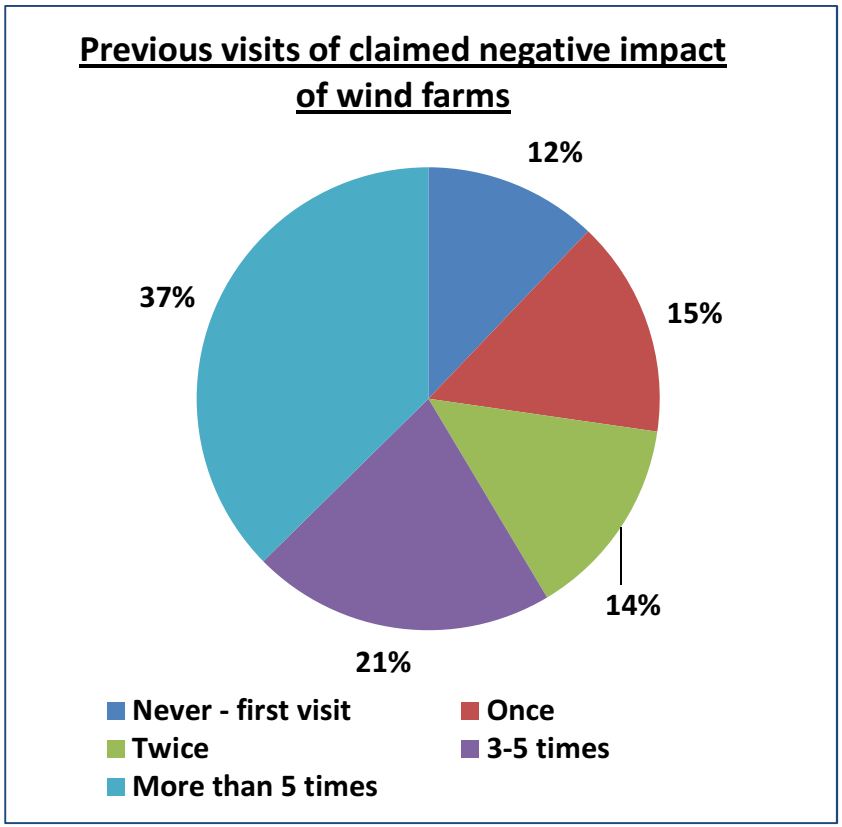
The presence of wind farms in Cornwall appears to have little negative impact on visits to the county amongst those visitors who are aware of them.

Indeed, whilst almost three quarters of visitors (71%) said their presence had no impact on their visit to Cornwall at all, 19% indicated that they actually had a positive impact on their visit to the county with this proportion highest amongst visitors in Tintagel/Trebarwith (26%) and Penzance (22%).

Just one in every ten visitors said that the presence of wind farms in the county had a negative impact on their visit including 14% of visitors in each case in Padstow and Perranporth.

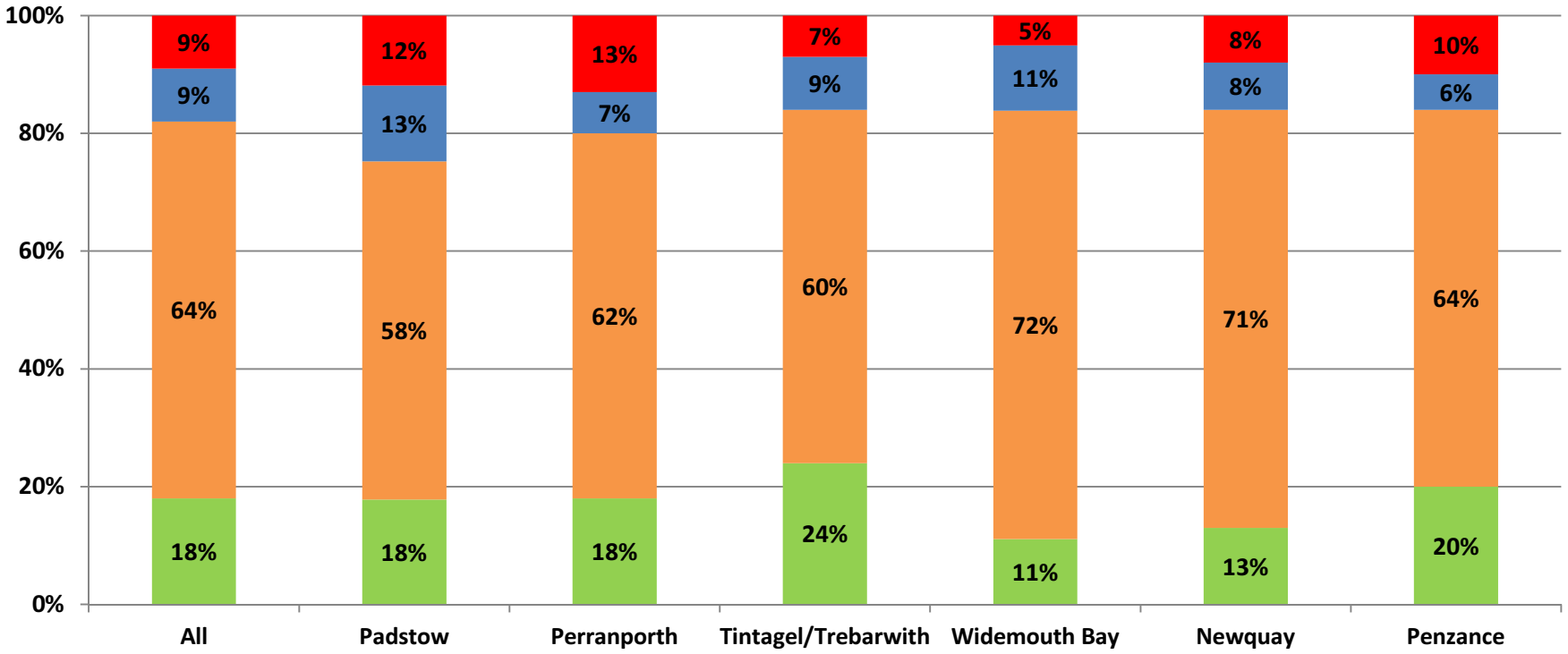
Negative impact of wind farms on visit to Cornwall

The chart below provides an additional analysis and shows the number of previous visits in the last five years of those respondents that stated that wind farms had a negative impact on their visit. It should be noted that this analysis is based upon a relatively small sample (90 respondents) due to the low number of respondents who indicated that the presence of wind farms had a negative impact on their visit to Cornwall.



58% of respondents stating a negative impact on their visit as a result of wind farms had visited Cornwall on three occasions or more in the last five years. Whilst the proportion of those stating a negative impact (10%) remains valid, the level of impact is questionable for the majority of those respondents and it would appear not large enough to consider not visiting the county.

Impact of wind farms on visit to Cornwall



Has the presence of wind farms had a positive or negative impact on your visit to Cornwall, or no impact at all? (999 respondents)

Positive | No impact | Unaware of Wind Farms | Negative

When those who were unaware of wind farms in the county were included in the analysis, the negative impact on visits was further reduced amongst visitors to just 9% including 13% of visitors in Perranporth and 12% in Padstow.

Their positive impact on visits outweighed any negative impact by two to one (18% of all visitors).

Wind farms – positive comments and themes

A quarter of all respondents who were aware of the presence of wind farms in Cornwall commented on their impact on their visit. 56% of these visitors (13% of all visitors) gave a positive comment about wind farms and a summary of the key phrases coming out from the findings are shown below. Recurring themes throughout the comments included them being good for the environment, green and good energy and being nice to look at.

Green energy

Look elegant/beautiful

Good energy

Eco friendly

Good for the environment

Like the look of them

Nice to watch/see them

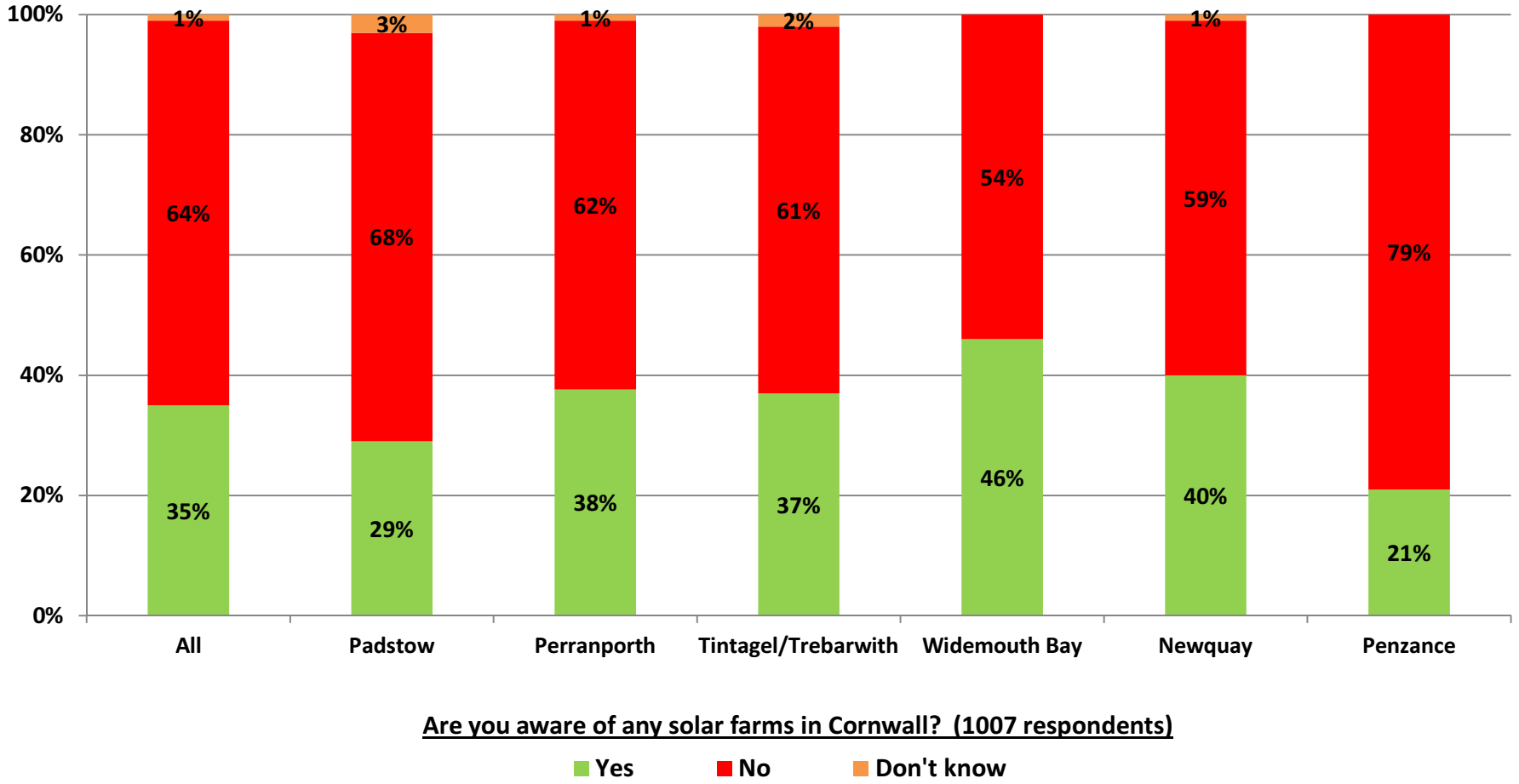
Good idea/renewable energy

Raise awareness

Wind farms – negative comments and themes

A third of visitors who were aware of the presence of wind farms and who commented on them (8% of all visitors) gave a negative comment and a summary of the key phrases coming out from the findings are shown below. Recurring themes throughout the comments included them being an eyesore and spoiling the environment/countryside as well as being inefficient. Is it worth noting however, that a negative comment did not necessarily equate to any negative impact on visits.

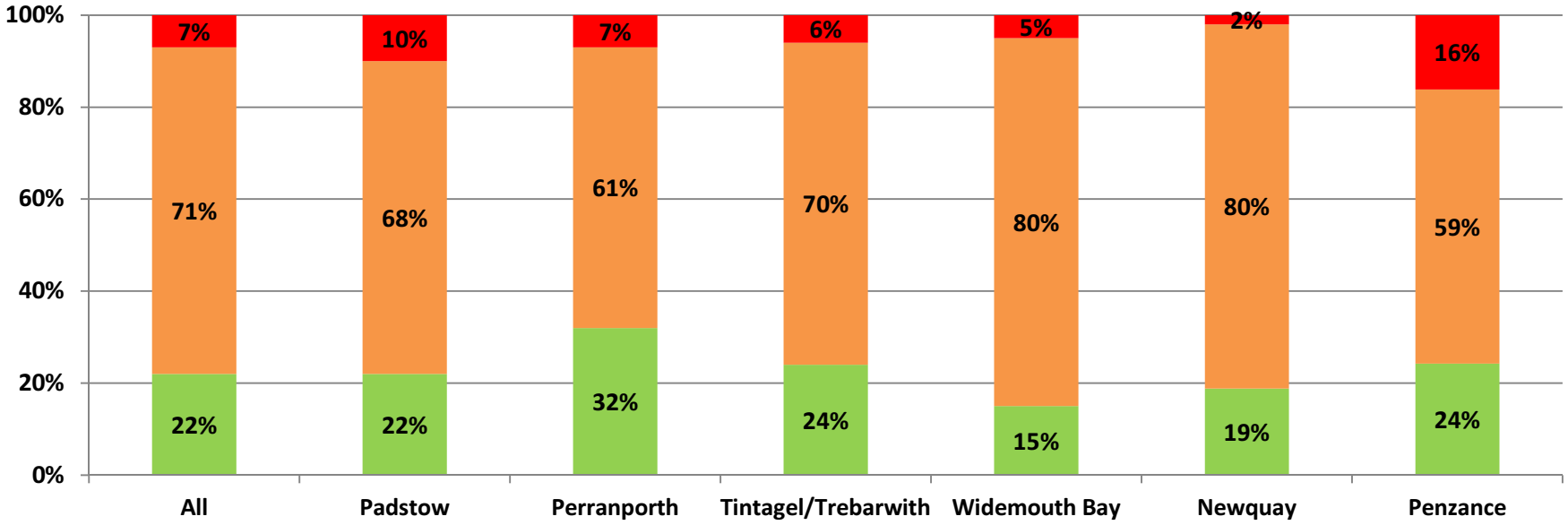
Awareness of solar farms in Cornwall



When compared with wind farms, awareness levels of solar farms in Cornwall were much lower amongst visitors with just over a third of all visitors (35%) being aware of them in the county.

Whilst awareness levels of solar farms were relatively low across all interview locations (46% or less) they were highest amongst visitors in Widemouth Bay (46%) and Newquay (40%) and lowest amongst visitors in Penzance (21%).

Impact of solar farms on visit to Cornwall



Has the presence of solar farms had a positive or negative impact on your visit to Cornwall, or no impact at all? (351 respondents)

Positive | No impact | Negative

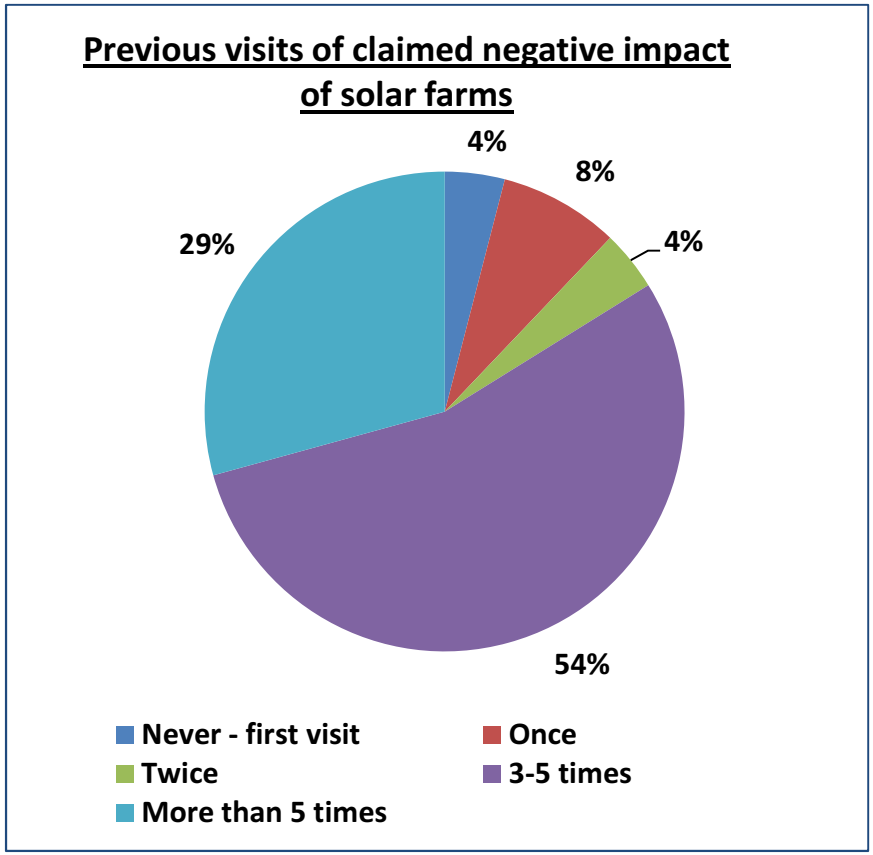
In a similar pattern to wind farms, the presence of solar farms in Cornwall also appears to have very little negative impact on visits to the county amongst those visitors who were aware of them.

Indeed, whilst almost three quarters of visitors (71%) said their presence had no impact on their visit to Cornwall at all (the same proportion as wind farms), 22% indicated that they actually had a positive impact on their visit to the county (19% wind farms) with this proportion highest amongst visitors in Perranporth (32%).

Just 7% of visitors said that the presence of solar farms in the county had a negative impact on their visit including 16% of visitors in Penzance and 10% in Padstow.

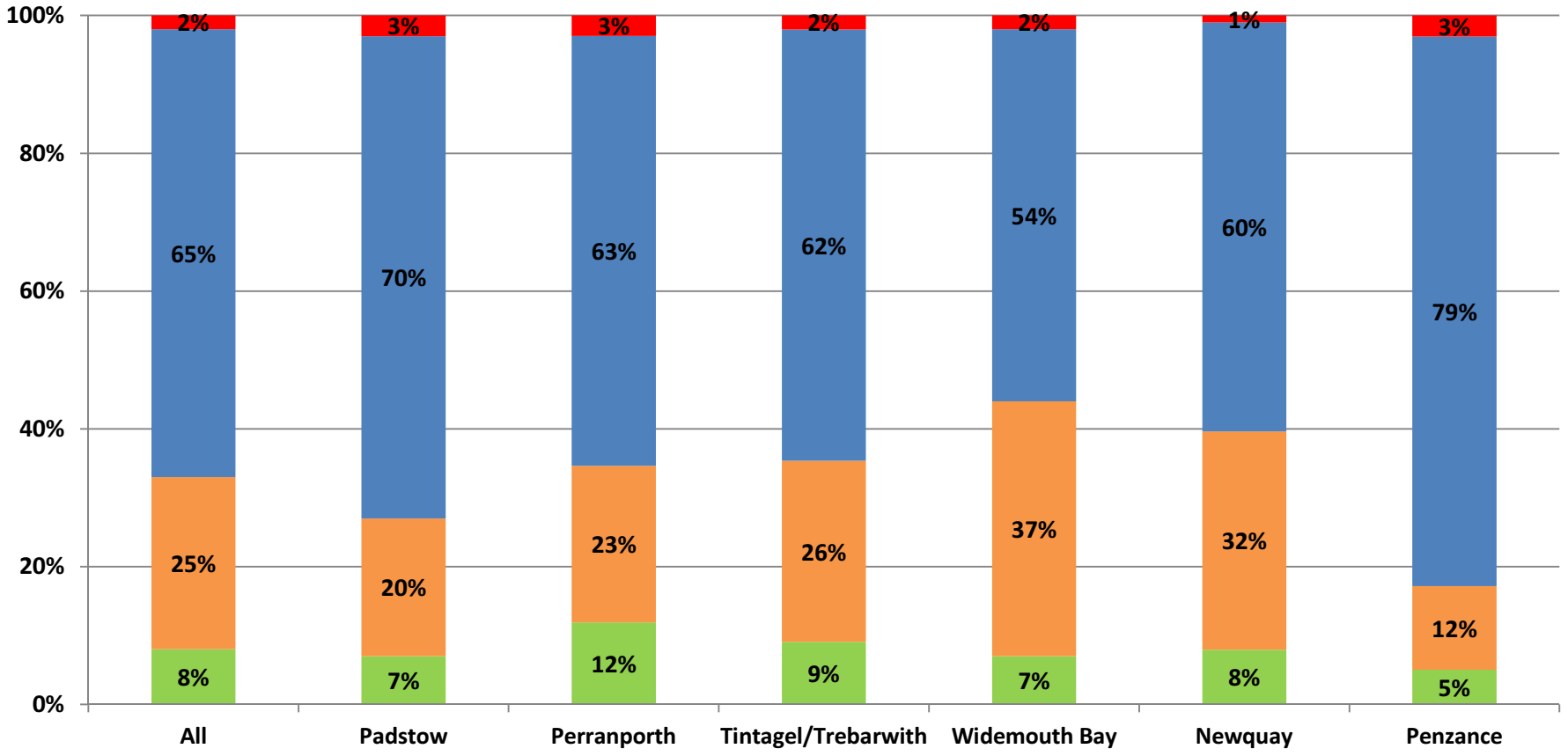
Negative impact of solar farms on visit to Cornwall

The chart below provides an additional analysis and shows the number of previous visits in the last five years of those respondents that stated that solar farms had a negative impact on their visit. It should be noted that this analysis is based upon a small sample (24 respondents) due to the relatively low awareness of solar farms in the county.



83% of respondents stating a negative impact on their visit as a result of solar farms had visited Cornwall on three occasions or more in the last five years. Whilst the proportion of those stating a negative impact (7%) remains valid, the level of impact is questionable for the majority of those respondents and it would appear not large enough to consider not visiting the county.

Impact of solar farms on visit to Cornwall



Has the presence of solar farms had a positive or negative impact on your visit to Cornwall, or no impact at all? (995 respondents)

Positive | No impact | Unaware of Solar Farms | Negative

When those who were unaware of solar farms in the county were also included in the analysis, the negative impact of their presence in the county was further reduced amongst visitors to just 2% and their positive impact on visits to 8%.

Solar farms – positive comments and themes

A fifth of all respondents who were aware of the presence of solar farms in Cornwall commented on their impact on their visit. 64% of these visitors (4% of all visitors) gave a positive comment about solar farms and a summary of the key phrases coming out from the findings are shown below. Recurring themes throughout the comments included them being good for the environment, green and good energy and being out of view/blending in well with the countryside.

Green energy

Low level/don't spoil the countryside

Good energy

Out of view/blend in well

Good for the environment

Better than big power stations

Good source of power/energy

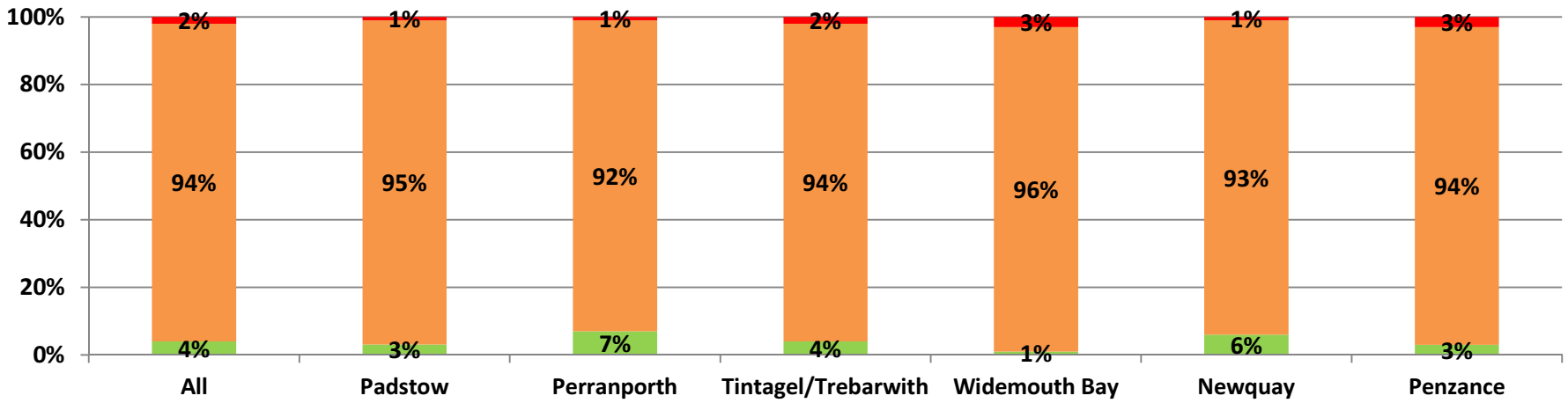
Saves money

Clean energy

Solar farms – negative comments and themes

23% of visitors who were aware of the presence of solar farms and who commented on them (2% of all visitors) gave a negative comment and a summary of the key phrases coming out from the findings are shown below. Recurring themes throughout the comments included them spoiling the environment/countryside as well as being too noticeable and spoiling the land and views. As was the case with comments on wind farms, a negative comment regarding solar farms does not necessarily equate to negative impact on visits.

Impact of wind and solar farms on future visits to Cornwall



How does the presence of wind farms and solar farms in Cornwall affect the likelihood of you visiting the county again in the future? (1003 respondents)

- They make me less likely to visit again in the future
- They make no difference in my decision to visit again in the future
- They make me more likely to visit again in the future

The presence of wind and solar farms in Cornwall appears to have very little impact on visitors decision to visit the county again in the future with just 2% of visitors saying their presence would make them less likely to visit Cornwall again.

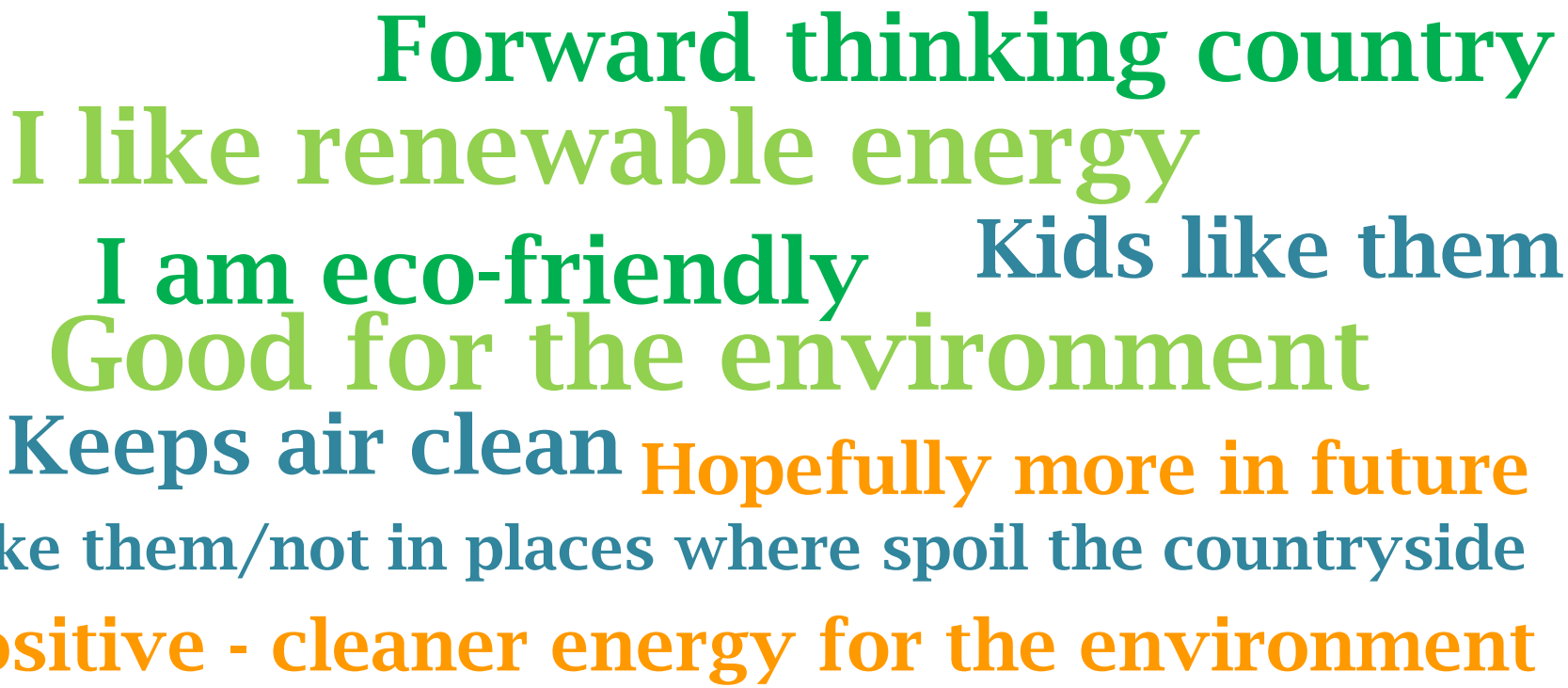
Indeed, whilst 94% of visitors said their presence would make no difference in their decision to visit Cornwall again in the future, 4% indicated that their presence would actually make them more likely to visit again in the future with this proportion highest amongst visitors in Perranporth (7%) and Newquay (6%).

4% of all survey respondents provided a comment on how the presence of wind and solar farms in Cornwall might affect the likelihood of them visiting the county again in the future. A summary of these comments is provided on pages 36 & 37 to follow.

Wind and Solar farms – Further comments and themes - positive

26% of all visitors who provided a comment on the presence of wind and solar farms in Cornwall and their effect on the likelihood of them visiting the county again in the future gave a positive comment (1% of all respondents) and a summary of the key phrases coming out from the findings are shown below.

Recurring themes throughout the positive comments included them being good for the environment/eco-friendly and being a positive form of energy.

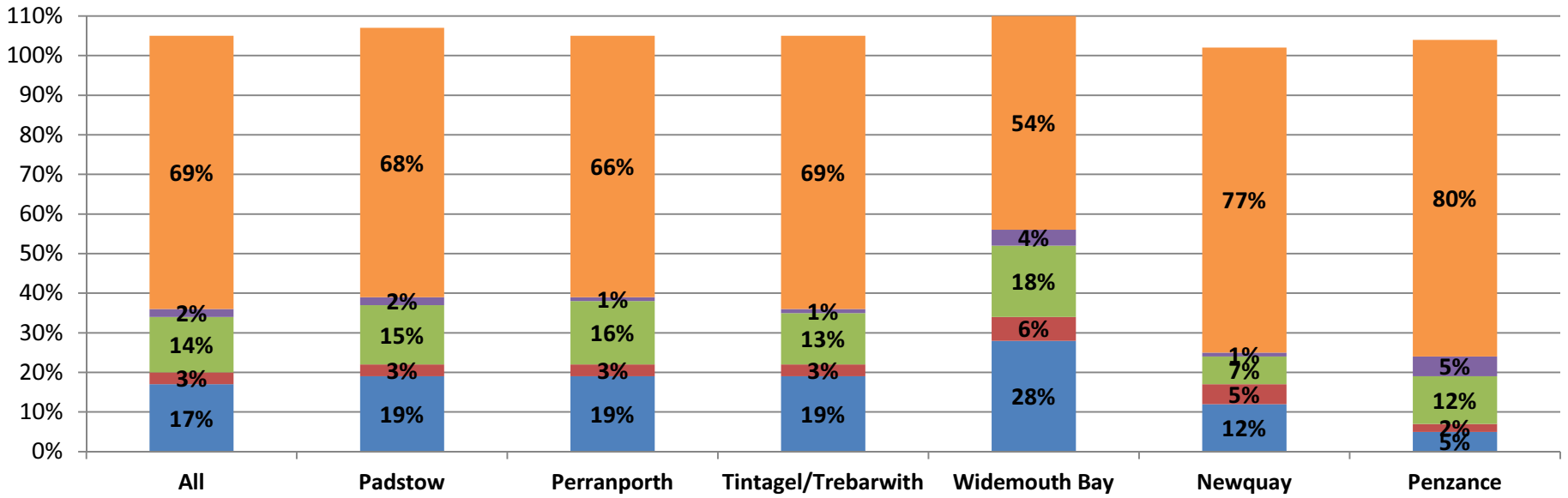


Wind and Solar farms – Further comments and themes - negative

33% of all visitors who provided a comment on the presence of wind and solar farms in Cornwall and their effect on the likelihood of them visiting the county again in the future gave a negative comment (2% of all visitors) and a summary of the key phrases coming out from the findings are shown below.

Recurring themes throughout the negative comments included them spoiling the landscape, being noisy and that if there were more, or too many, visitors may be deterred from visiting. However, it should be noted that the survey focused on visitors' attitudes in response to existing wind and solar farms in the county and it is difficult to draw conclusions on how these attitudes might change with further developments in the future. Once again, a negative comment does not necessarily equate to negative impact on visits.

Factors which deter from visiting Cornwall in the future



Are any of the following factors likely to deter you from taking another holiday in Cornwall in the future? (1007 respondents)

- The risk of poor weather
- The range and quality of local attractions
- Cost compared to other holiday destinations
- The presence of wind and solar farms
- None of these

When considered in the context of a number of other factors which could be likely to deter visitors from visiting Cornwall again in the future, the presence of wind and solar farms in the county appear to be the least likely to have any detrimental impact on future visits.

Whilst the majority of visitors did not indicate any factors which would deter them from visiting Cornwall again in the future (69%), the risk of poor weather (17%) and cost compared to other holiday destinations (14%) were the two factors most likely to deter them to visit the county again in the future.

Only 2% of all visitors indicated that the presence of wind and solar farms in Cornwall would deter them from visiting again in the future with this proportion highest amongst visitors in Penzance (5%) and Widemouth Bay (4%).

Factors likely to deter visits – Comments and themes

18 visitors who said that the presence of wind and solar farms in Cornwall would affect their likelihood of visiting again in the future provided a comment regarding this and these are summarised below (2% of all visitors).

Recurring themes throughout the comments included them being ugly and a waste of money and if there were to be lots more how this would affect future visits.

Would affect quality of holiday

Ugly Waste of money

If lots more/would hate it

Too many

Commercial activity will one day take over

Good Energy Generation, Monkton Reach, Monkton Hill, Chippenham, SN15 1EE
Registered Office: Good Energy Generation Limited, Monkton Reach, Monkton Hill, Chippenham, SN15 1EE
Company Registration No. 2549857, Place of Registration: England and Wales. VAT No. 811 3295 57
Contact us: www.goodenergy.co.uk

BiGGAR Economics

Wind Farms & Tourism Trends in Scotland:

Evidence from 44 Wind Farms

Research Published: 2021

BiGGAR Economics

Contents

1. Summary

Analysis of 44 wind farm case studies in Scotland finds no evidence of a link between wind farm development and trends in tourism employment.

The aim of BiGGAR Economics is to have meaningful impact. This includes providing a high-quality economic evidence base for policy makers and for organisations that wish to understand and maximise their contribution to the economy and to wellbeing.

The sectors in which we have substantial experience include the tourism sector and the renewable energy sector. We are therefore interested in whether there is any relationship between the growth in the deployment of renewable energy technologies as the economy transitions to net zero and the role of tourism in supporting jobs, particularly in the rural economy.

Since onshore wind farms first appeared in the Scottish landscape, concerns have been expressed that some tourists may be discouraged from visiting Scotland in general, or, in particular, areas where wind farms can be seen. The first commercial scale wind farms in Scotland were established in the mid 1990s and so more than 25 years later if wind farms have discouraged tourism activity, there should be some evidence of such effects. This research has looked for such evidence.

Since 2009, the onshore wind sector has expanded considerably in Scotland, from an installed capacity of 1,753.2 megawatts (MW) in 2009 to 7,968.7 MW in 2019. The number of onshore wind turbines in Scotland has grown from 1,082 in 2009 to 3,772 in 2019. Employment in tourism-related sectors in Scotland also grew during the decade, an increase of 20%.

The growth in employment in tourism-related sectors has not been consistent across all parts of Scotland. The growth in tourism employment has been strongest in predominantly rural local authority areas, such as Argyll and Bute, Comhairle nan Eilean Siar, East Lothian, Highland and Stirling whilst there have been reductions in tourism-related employment in some central belt local authorities.

Analysis of the rates of change in the number of onshore wind turbines and in tourism-related employment in local authority areas, finds that there is no correlation between the two factors. This applies whether the analysis covers the decade to 2019, or the more recent 2015 to 2019 period.

The research also analysed trends in tourism employment in the immediate vicinity of wind farm developments. This included 16 wind farms with a capacity of at least 10 MW that became operational between 2015 and 2019. Analysis of trends in tourism employment in the locality of these windfarms (study areas were based on a 15km radius) found that 11 of the 16 areas had experienced more growth in tourism

employment than for Scotland as a whole. For 12 of the 16 windfarms, trends in tourism employment in the locality had outperformed the local authority area in which they were based.

The research also re-examined 28 wind farms constructed between 2009 and 2015 that had been analysed in a previous study published in 2017, finding that the localities in which they were based had outperformed Scotland and their local authority areas in the majority of cases. Moreover, the analysis found that in the seven areas which had underperformed their local authority areas in the 2017 study, four had done better than their local authorities in the 2015 to 2019 period.

This research has analysed trends in tourism employment in the localities of 44 wind farms developed in recent years, providing a substantial evidence base. The study found no relationship between tourism employment and wind farm development, at the level of the Scottish economy, across local authority areas nor in the locality of wind farm sites.

2. Introduction

This report summarises the results of research undertaken by BiGGAR Economics investigating whether this is any link between wind farm development and tourism employment in Scotland.

2.1 About the Authors

The aim of BiGGAR Economics is to have meaningful impact. This includes providing a high-quality economic evidence base for policy makers and for organisations that wish to understand and maximise their contribution to the economy and to wellbeing.

The sectors in which we have substantial experience include the tourism sector and the renewable energy sector. We are therefore interested in whether there is any relationship between the growth in the deployment of renewable energy technologies as the economy transitions to net zero and the role of tourism in supporting jobs, particularly in the rural economy.

BiGGAR Economics has previously published research that has investigated whether there is any evidence to suggest that there could be a link between trends in wind farm development and tourism employment. This included a 2017 report that analysed 28 case study wind farms that had been constructed between 2009 and 2015.

This new research includes an additional 16 case study wind farms, developed between 2015 and 2019. It also revisits the 28 case studies in the 2017 report to review any changes since that research was completed.

The study has been undertaken as part of the research and development programme of BiGGAR Economics.

2.2 Report Structure

The remainder of the report is structured as follows:

- Section 3 summarises trends in tourism-related employment in Scotland and in Scotland's 32 local authority areas;
- Section 4 considers whether there is any correlation between wind farm development and tourism employment trends at local authority level;
- Section 5 presents the findings on tourism employment trends in the vicinity of 16 new wind farm developments constructed since 2015;
- Section 6 updates the analysis of 28 case studies of wind farms developed between 2009 and 2015; and
- Section 7 contains the conclusions of the research.

3. Tourism in Scotland

The tourism sector has long been recognised as important to the Scottish economy. For example, the Scottish Government's 2015 economic strategy identified six 'growth sectors' where there was an opportunity for Scotland to build on existing comparative advantage, including tourism[1]. This chapter provides an overview of employment trends in tourism within Scotland.

3.1 Tourism-related Employment

Both National Statistics and VisitScotland produce statistics on the tourism sector in Scotland. Statistics produced by VisitScotland include the number of visitors from within the UK and overseas and their spending. These statistics are available for Scotland as a whole and for regions within Scotland but are not available at the local authority level nor at a more local level. Other statistics on tourism accommodation occupancy rates and tourist attraction visitor numbers exist, but the coverage and statistical robustness of this data as indicators of tourism trends varies between Scotland's local authorities.

The most accurate indicator of the health of the tourism industry at a local level is therefore based on employment in tourism. The Scottish Government has defined tourism-related employment as consisting of 14 sub-sectors[2] (which it terms 'sustainable tourism'). The data for employment in these sectors is available from the annual Business Register and Employment Survey (BRES) and can be extracted from the National Online Manpower Information Service (NOMIS), a National Statistics service.

Not all of the jobs included in this definition will be supported by tourism. Some jobs, for example in restaurants and bars, will be supported by the spending of residents as well as tourists. However, where the contribution of the tourism-related sectors varies across the country this is more likely to be explained by differences in the level of tourism activity than by differences in resident consumer behaviour.

The surveys on which the data is based will also not include every business and so may be an underestimate of the level of tourism-related employment. Whilst the employment figures do include estimates of self-employment and business owners, they do not include those not registered for Value Added Tax (VAT) or Pay-As-You-Earn (PAYE) schemes. Unless there is some reason to think that the trends that effect non-registered micro businesses will be different from those that effect other businesses, the data includes more than enough of the tourism business base to be a useful indicator of change.

[1] Scottish Government (2015), Scotland's Economic Strategy
[2] Scottish Government (2018), Tourism in Scotland: the economic contribution of the sector

In 2019, tourism-related employment in Scotland totalled 227,975 (Table 3-1). The top three sub-sectors (restaurants, hotels and bars) together account for 80% of tourism-related employment.

Table 3-1 Tourism-related Employment in Scotland (2009-2019)

Sub-Sector	Number Employed, 2009	Number Employed, 2015	Number Employed, 2019
Restaurants and food service	67,000	93,000	87,500
Hotels and similar accommodation	49,000	52,500	62,000
Beverage serving	41,500	38,000	32,500
Sports facilities	13,500	13,500	14,000
Holiday and other short stay accommodation	3,000	3,750	5,500
Historical sites and similar visitor attractions	1,000	2,250	4,500
Other sports activities	2,000	4,000	4,500
Museum activities	4,000	4,500	4,000
Amusement and recreation activities	2,250	2,500	4,000
Camping grounds and trailer parks	2,125	2,500	3,500
Botanical, zoological and nature reserves	2,125	1,875	2,125
Tour operators	1,625	1,375	1,875
Other reservation services	950	1,000	1,375
Amusement parks and theme parks	600	550	600
Total Tourism-related Employment	190,675	221,300	227,975

Source: ONS (2021), Business Register and Employment Survey, 2009, 2015 & 2019

Overall, tourism-related employment has been increasing. There was a 20% increase in the decade from 2009 to 2019, including a 3% increase since 2015 (Table 3-2).

Within the tourism-related sectors there has been an increase in employment in some sectors, notably bars where employment decreased by 22% in the decade to 2019, although this has been more than offset by increases in other areas, including restaurants and hotels.

Table 3-2 Change in Tourism-related Employment in Scotland (2009-2019)

Sub-Sector	2009-15 % Change	2015-19 % Change	2009-19 % Change
Restaurants and food service	39%	-6%	31%
Hotels and similar accommodation	7%	18%	27%
Beverage serving	-8%	-14%	-22%
Other	14%	22%	39%
Total Tourism-related Employment	16%	3%	20%

Source: ONS (2021), Business Register and Employment Survey 2009, 2015 & 2019

3.2 Trends Across Local Authorities

The importance of tourism to employment varies considerably by local authority (Table 3-3).

For Scotland as a whole, one job in 11 (8.9%) is in tourism-related sectors.

The local authorities with the greatest reliance on employment in tourism are predominantly rural areas. The local authority with the highest concentration of tourism workers is Argyll and Bute (17.2%), followed by Highland (15.0%) and Perth and Kinross (12.9%).

The local authorities with the highest number of tourism employees in absolute terms are the cities of Edinburgh (36,795) and Glasgow (30,835). These cities have a wide range of active sectors and therefore the relative importance of the tourism sector in these cities is not as great as it is in more rural areas.

Table 3-3 Tourism Employment by Local Authority 2019

Local Authority	Tourism Employment	% Of Total Employment
Aberdeen City	11,660	6.4%
Aberdeenshire	8,600	7.7%
Angus	3,410	9.0%
Argyll and Bute	7,200	17.2%
Clackmannanshire	1,020	6.7%
Comhairle nan Eilean Siar	1,410	8.9%
Dumfries and Galloway	6,790	10.0%
Dundee City	5,755	7.5%
East Ayrshire	2,645	6.2%
East Dunbartonshire	2,150	8.0%
East Lothian	3,950	11.9%
East Renfrewshire	1,725	7.9%
City of Edinburgh	36,795	10.5%
Falkirk	4,390	6.3%
Fife	11,750	8.7%
Glasgow City	30,835	7.2%
Highland	19,245	15.0%
Inverclyde	2,060	7.7%
Midlothian	2,095	6.5%
Moray	3,545	9.1%
North Ayrshire	4,275	10.1%
North Lanarkshire	6,755	4.7%
Orkney Islands	1,435	10.4%
Perth and Kinross	8,910	12.9%
Renfrewshire	6,090	6.9%
Scottish Borders	4,410	9.3%
Shetland Islands	1,230	7.8%
South Ayrshire	6,020	12.5%
South Lanarkshire	8,975	7.4%
Stirling	6,445	12.3%
West Dunbartonshire	2,880	9.2%
West Lothian	3,550	4.6%
Scotland	227,975	8.9%

Source: ONS (2021), Business Register and Employment Survey

Trends in tourism-related employment also vary considerably by local authority area. Between 2015 and 2019, the level of tourism employment across Scotland grew by 3.0%, with 18 out of 32 local authority areas experiencing an increase in tourism employment.

Local authorities in which tourism accounts for a high proportion of employment have seen some of the highest growth in employment. Tourism employment in Argyll and Bute increased by 7.3% between 2015 and 2019, and employment in the sector in Highland increased by 21.4%. The largest percentage increase was in Na h-Eileanan Siar, where tourism employment increased by 28.2% during this period.

A similar pattern can be seen if tourism employment trends are considered over a longer timeframe. In the decade to 2019, the level of tourism employment across Scotland grew by 19.6%, with 28 out of 32 local authority areas experiencing an increase in tourism employment.

Since the share of tourist related activities as a percentage of all employment does appear to reflect locations where tourists are more likely to visit, this suggests that tourist spending has grown at a faster rate than residential spending, highlighting the importance of the sector to the Scottish economy.

Table 3-4 Tourism Employment Trends by Local Authority

Local Authority	% Change 2009-19	% Change 2015-19
Aberdeen City	15.9%	4.2%
Aberdeenshire	28.1%	0.1%
Angus	7.9%	-2.3%
Argyll and Bute	33.7%	7.3%
Clackmannanshire	25.9%	-10.1%
Comhairle nan Eilean Siar	46.1%	28.2%
Dumfries and Galloway	19.2%	3.0%
Dundee City	14.5%	-4.2%
East Ayrshire	13.0%	-5.0%
East Dunbartonshire	15.0%	-6.7%
East Lothian	44.2%	7.5%
East Renfrewshire	-4.2%	-6.3%
City of Edinburgh	32.3%	4.8%
Falkirk	18.3%	-1.7%
Fife	6.6%	4.2%
Glasgow City	17.5%	-2.1%
Highland	46.8%	21.4%
Inverclyde	9.0%	-3.5%
Midlothian	14.5%	9.1%
Moray	22.9%	13.1%
North Ayrshire	1.7%	5.3%
North Lanarkshire	-1.7%	-2.3%
Orkney Islands	21.1%	18.1%
Perth and Kinross	21.0%	0.1%
Renfrewshire	14.8%	3.2%
Scottish Borders	22.0%	6.6%
Shetland Islands	3.8%	-16.0%
South Ayrshire	12.4%	-2.2%
South Lanarkshire	-2.7%	1.2%
Stirling	48.8%	8.5%
West Dunbartonshire	4.2%	-9.7%
West Lothian	-4.3%	-12.5%
Scotland	19.6%	3.0%

Source: ONS (2021), Business Register and Employment Survey

3.3 Tourism Employment: Key Points

The tourism sector is a significant contributor to employment in Scotland, accounting for 227,975 jobs in 2019, 20% more than in 2009. One job in 11 in Scotland is in tourism-related sectors.

Whilst the local authority areas with the greatest number of tourism jobs are the cities of Edinburgh and Glasgow, the relative contribution of tourism to employment is highest in predominantly rural areas (such as Argyll and Bute, Highland and Perth and Kinross).

Between 2015 and 2019, the sector across Scotland saw growth in employment levels, increasing by 3.0%. This growth was not equally distributed between local authority areas and those local authorities that already had a strong reliance on the sector saw this dependence increase.

4. Onshore Wind Energy and Tourism: Local Authority Area Analysis

This section considers whether there is any correlation between wind farm development and tourism employment trends at local authority level.

4.1 Wind Farm Capacity Trends in Local Authority Areas

The number of onshore wind farm developments in Scotland has continued to increase in recent years.

In 2009, installed capacity was 1,753.2 MW. This had increased to 5,029.8 MW by 2015 and 7,968.7 MW by 2019 (Table 4-1) which means that the installed capacity:

- Increased by 187% between 2009 and 2015;
- Increased by a further 58% between 2015 and 2019;
- Giving a total increase of 355% between 2009 and 2019.

In terms of turbine numbers, there were 1,082 in Scotland in 2009, increasing to 2,613 by 2015 and 3,772 by 2019 (Table 4-2), which means that the number of turbines installed:

- Increased by 141% between 2009 and 2015;
- Increased by a further 44% between 2015 and 2019;
- Giving a total increase of 249% between 2009 and 2019.

The percentage growth in the number of turbines is less than that of the installed capacity, because the size of turbines has increased.

The increase has not been evenly distributed, with 26% of the increased capacity being in Highland Council area (1,609.8 MW out of the total increase of 6,215.5 MW in Scotland between 2009 and 2019). Ten of Scotland's 32 local authority areas saw an increase of more than 200 MW in installed capacity and between them accounted for 90% of the total increase in the onshore wind sector in Scotland in the decade to 2019.

Table 4-1 Onshore Wind Capacity in Scotland by Local Authority (MW)

Local Authority	2009	2015	2019	*2009-19*
Aberdeen City	0.0	0.0	0.0	*0.0*
Aberdeenshire	61.1	397.4	494.9	*+433.8*
Angus	0.0	6.4	6.4	*+6.4*
Argyll and Bute	129.7	255.5	359.7	*+230.0*
Clackmannanshire	0.0	26.0	38.0	*+38.0*
Comhairle nan Eilean Siar	3.9	24.6	37.8	*+33.9*
Dumfries and Galloway	136.1	446.6	709.8	*+573.7*
Dundee City	4.0	4.0	4.0	*0.0*
East Ayrshire	13.2	192.8	325.6	*+312.4*
East Dunbartonshire	0.0	0.0	0.0	*0.0*
East Lothian	48.0	196.4	263.2	*+215.2*
East Renfrewshire	186.1	218.8	218.8	*+32.7*
City of Edinburgh	0.0	0.0	0.0	*0.0*
Falkirk	0.0	0.0	38.0	*+38.0*
Fife	0.0	64.9	84.8	*+84.8*
Glasgow City	0.0	3.0	3.0	*3.0*
Highland	346.2	1,075.2	1,956.0	*+1,609.8*
Inverclyde	0.0	0.0	0.0	*0.0*
Midlothian	48.4	48.4	48.4	*0.0*
Moray	115.6	211.2	452.2	*+336.6*
North Ayrshire	48.0	104.0	123.4	*+75.4*
North Lanarkshire	4.0	15.5	22.7	*+18.7*
Orkney Islands	25.2	50.2	50.2	*+25.0*
Perth and Kinross	63.8	109.6	133.2	*+69.4*
Renfrewshire	0.0	0	0.0	*0.0*
Scottish Borders	121.1	429.5	531.1	*+410.0*
Shetland Islands	3.7	3.7	11.2	*+7.5*
South Ayrshire	120.0	176.0	531.0	*+411.0*
South Lanarkshire	165.6	826.3	1,245.2	*+1,079.6*
Stirling	109.5	129.5	155.9	*+46.4*
West Dunbartonshire	0.0	0.0	0.0	*0.0*
West Lothian	0.0	14.0	124.2	*+124.2*
Scotland	1,753.2	5,029.8	7,968.7	*+6,215.5*

Source: Scottish Government (2021), Renewable Energy Planning Database (REPD): December 2020

Table 4-2 Wind Farm Turbines in Scotland by Local Authority

Local Authority	2009	2015	2019	*2009-19*
Aberdeen City	0	0	0	*0*
Aberdeenshire	40	217	270	*+230*
Angus	0	8	8	*+8*
Argyll and Bute	154	232	280	*+126*
Clackmannanshire	0	13	19	*+19*
Comhairle nan Eilean Siar	3	12	21	*+18*
Dumfries and Galloway	100	268	381	*+281*
Dundee City	2	2	2	*0*
East Ayrshire	20	92	175	*+155*
East Dunbartonshire	0	0	0	*0*
East Lothian	16	81	107	*+91*
East Renfrewshire	76	91	91	*+15*
City of Edinburgh	0	0	0	*0*
Falkirk	0	0	17	*+17*
Fife	0	14	22	*+22*
Glasgow City	0	1	1	*+1*
Highland	210	523	814	*+604*
Inverclyde	0	0	0	*0*
Midlothian	50	50	50	*0*
Moray	50	93	178	*+128*
North Ayrshire	21	45	49	*+28*
North Lanarkshire	2	6	9	*+7*
Orkney Islands	15	34	34	*+19*
Perth and Kinross	34	62	73	*+39*
Renfrewshire	0	0	0	*0*
Scottish Borders	71	228	276	*+205*
Shetland Islands	5	5	11	*+6*
South Ayrshire	63	87	217	*+154*
South Lanarkshire	100	384	543	*+443*
Stirling	50	58	71	*+21*
West Dunbartonshire	0	0	0	*0*
West Lothian	0	7	53	*+53*
Scotland	1,082	2,613	3,772	*+2,690*

Source: Scottish Government (2021), Renewable Energy Planning Database (REPD): December 2020

4.2 Trends in Wind Farm Capacity and Tourism Employment in Local Authority Areas

The analysis in the previous chapter showed that there has been considerable variation in trends in tourism-related employment between local authority areas. The tables above show that the distribution of the new capacity in the onshore wind sector has also varied considerably between local authority areas.

The two figures below plot the percentage change in tourism-related employment against the number of additional wind turbines for all the local authorities in Scotland.

Figure 4-1 shows the changes between 2015 and 2019 when the average number of wind turbines installed in each local authority over the time period was 36, while tourism-related employment increased by 3.0%.

Figure 4-2 shows the changes between 2009 and 2019 when the average number of wind turbines installed in each local authority over the time period was 84, while tourism-related employment increased by 19.6%.

In both graphs, the average for Scotland is shown by a red dot and the line shows the best fit between the trend in tourism employment and wind turbines. If there was a perfect positive correlation between the two variables, the line would be at a 45-degree angle sloping up from left to right. If there was a perfect negative correlation between the two variables, the line would be at a 45-degree angle sloping down from left to right.

The best fit line shows that there is slight positive relationship between tourism-related employment and new wind turbine installation. That is, those areas where there has been an above average increase in wind turbines are more likely to also have seen tourism-related employment increase by more than average for Scotland.

However, the relationship is too weak to draw any conclusions on a relationship. The large variation between the local authorities means that any relationship between growth in turbines and changes to tourism employment is likely to be very weak or non-existent.

Based on the analysis this study has found no relationship between wind farm development and tourism-related employment at the local authority level.

Figure 4-1 Changes in Tourism Employment and Turbines by Local Authority (2015-2019)

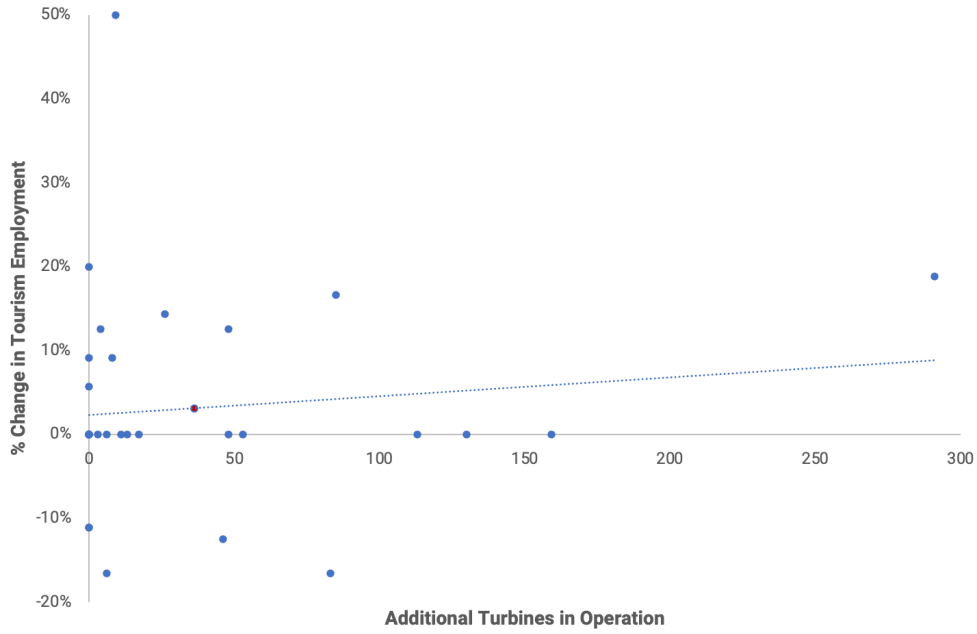
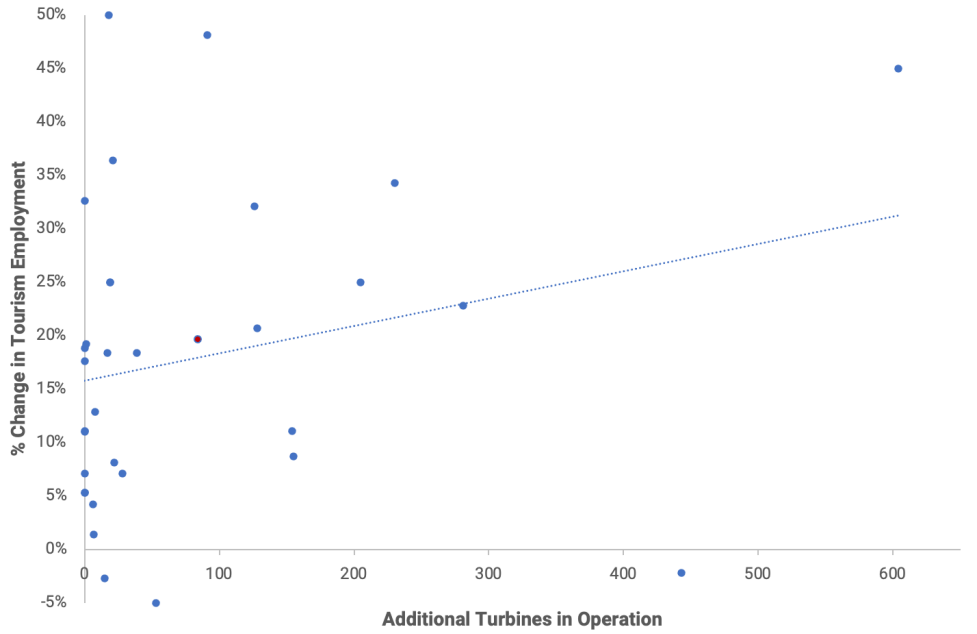


Figure 4-2 Changes in Tourism Employment and Turbines by Local Authority (2009-2019)



5. Case Studies: 16 New Wind Farms

The previous chapters have found that the onshore wind sector in Scotland has grown significantly over the last decade, with no corresponding decline in tourism at either a national or local authority level.

This chapter considered whether there is any evidence of any effects on tourism-related employment in the vicinity of wind farms that have recently been constructed.

5.1 Selected Wind Farms

The 16 wind farm sites that become operational in Scotland between 2015 and 2019 with a capacity of 10 MW were:

- Afton Wind Farm (25 turbines, 50 MW);
- Blackcraig (23 turbines, 53 MW);
- Dorenell Wind Farm (59 turbines, 177 MW);
- Stronelairg Wind Farm (66 turbines, 228 MW);
- Tullymurdoch Wind Farm (7 turbines, 14.4 MW);
- Whiteside Hill (11 turbines, 25.3 MW);
- Airies Farm (14 turbines, 35 MW);
- Freasdail Wind Farm (11 turbines, 10 MW);
- Wathegar 2 Wind Farm (9 turbines, 18.5 MW);
- Quixwood Moor (13 turbines, 29.9 MW);
- Glen App (11 turbines, 22 MW);
- Bhlaraidh (32 turbines, 110 MW);
- Ewe Hill Extension (16 turbines, 36.8 MW);
- Hill of Glaschyle Wind Farm (12 turbines, 27.6 MW);
- Crystal Rig Wind Farm Phase III (6 turbines, 13.8 MW);
- Harburnhead Wind Farm (22 turbines, 51.7 MW).

The immediate surrounding areas were defined as the Scottish Data Zones that lie within a 15km radius of the wind farm.

5.2 Tourism-related Employment in Wind Farms' Immediate Area

In order to assess the impact of development and operation of these wind farms on the local tourism economy, it was necessary to consider the levels of tourism-related employment in each of these local areas between 2015 and 2019. National Statistics notes that the Business Register and Employment Survey estimates are subject to sampling errors that increase as geographic areas become smaller. However, most

surrounding areas examined are made up of 10 or more data zones, and some have more than 200, therefore the risks associated with potential sampling errors have been reduced.

The immediate areas surrounding wind farms in rural areas can cover a diverse geography. Some of the areas most likely to be impacted by the construction and operational activity associated with wind farms can be towns or sparsely populated areas, with some small areas within the wind farm area accounting for a much higher proportion of the total tourism-related employment. Four of the 16 immediate areas surrounding the wind farm developments had fewer than 500 people employed in the tourism sector in 2019, and 14 had fewer than 1,000.

Table 5-1 shows the percentage change in employment in tourism-related industries between 2015 and 2019, in the vicinity of the 16 wind farm case studies and in Scotland. During this time period, tourism-related employment grew by 3.0% in Scotland. Overall, 11 out of the 16 local areas saw tourism-related employment increase by more than the Scottish average over the period in which a wind farm was constructed and became operational.

Table 5-1 Change in Tourism-related Employment 2015-2019

Wind Farm Area	Tourism Employment 2015	Tourism Employment 2019	2015-2019
Stronelairg	475	680	43.2%
Bhlaraidh	450	640	42.2%
Dorenell	465	615	32.3%
Blackcraig	230	290	26.1%
Ewe Hill Extension	820	970	18.3%
Crystal Rig Phase III	810	945	16.7%
Wathegar 2	515	595	15.5%
Hill of Glaschyle	1,315	1,500	14.1%
Freasdail	250	285	14.0%
Quixwood Moor	695	765	10.1%
Airies Farm	375	405	8.0%
Scotland	220,850	227,350	3.0%
Harburnhead	1,310	1,285	-1.9%
Glen App	670	655	-2.2%
Afton	830	800	-3.6%
Tullymurdoch	815	780	-4.3%
Whiteside Hill	345	300	-13.0%

Source: ONS (2021), Business Register and Employment Survey 2019

5.3 Tourism-related Employment Relative to Local Authority

Analysis has also been undertaken to compare the areas around wind farms with the relevant local authority area, which would help to identify any regional effects to employment.

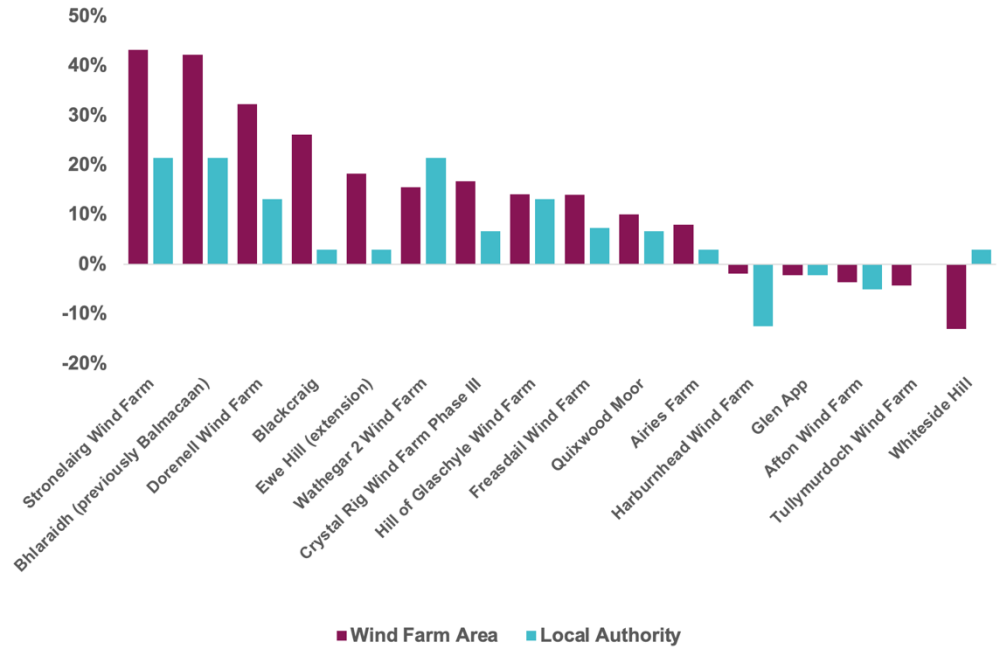
Table 5-2 shows the change in tourism-related employment in both a wind farm development's immediate vicinity and the local authority it is in. Of the 16 case studies, tourism-related employment had grown more or declined less than the average for the local authority area in 12 cases.

Table 5-2 Change in Tourism-related Employment, 2015-2019

Wind Farm Area	Local Authority	Change in Tourism Employment (2015-2019)	
		Wind Farm Area	Local Authority
Stronelairg	Highland	**43.2%**	21.4%
Bhlaraidh	Highland	**42.2%**	21.4%
Dorenell	Moray	**32.3%**	13.1%
Blackcraig	Dumfries and Galloway	**26.1%**	3.0%
Ewe Hill Extension	Dumfries and Galloway	**18.3%**	3.0%
Crystal Rig Phase III	Scottish Borders	**16.7%**	6.7%
Wathegar 2	Highland	15.5%	**21.4%**
Hill of Glaschyle	Moray	**14.1%**	13.1%
Freasdail	Argyll and Bute	**14.0%**	7.3%
Quixwood Moor	Scottish Borders	**10.1%**	6.7%
Airies Farm	Dumfries and Galloway	**8.0%**	3.0%
Harburnhead	West Lothian	**-1.9%**	-12.5%
Glen App	South Ayrshire	-2.2%	-2.2%
Afton	East Ayrshire	**-3.6%**	-5.0%
Tullymurdoch	Perth and Kinross	-4.3%	**0.1%**
Whiteside Hill	Dumfries and Galloway	-13.0%	**3.0%**

Source: ONS (2021), Business Register and Employment Survey 2019

Figure 5-1 Change in Tourism-related Employment in Wind Farm Areas and Local Authorities (2019)



Source: ONS (2021), Business Register and Employment Survey 2019

5.4 Summary: 16 New Case Studies

This section considered trends in tourism-related employment in the immediate vicinity of 16 new onshore wind farm developments, compared with the trend for Scotland as a whole and compared with the trend in the local authority area in which the wind farm had been developed.

This found that the majority of areas surrounding wind farm developments constructed in the period between 2015 and 2019 saw an increase in tourism-related employment in that time. Furthermore, the majority of areas saw a change in employment above the average for the local authority area.

6. Case Studies: Revisiting 28 Wind Farms from 2017 Study

A previous research report[3], published by BiGGAR Economics in 2017 included an analysis of tourism trends in the immediate vicinity of 28 wind farms that had been developed between 2009 and 2015. The chapter revisits those case studies to examine trends in tourism employment in these areas since 2015.

6.1 2017 Case Study Wind Farms

The 28 wind farms with a capacity of 10 MW or more than were constructed in Scotland between 2009 and 2015 and included in case studies in the 2017 BiGGAR Economics report were:

- Allt Dearg:
- Arecleoch;
- Clyde;
- Drone Hill;
- Glenkerie;
- Gordonbush;
- Griffin;
- Hill of Towie;
- Kelburn;
- Kilbruar Extension;
- Little Raith;
- Mark Hill;
- Millennium Extension;
- Millour Hill;
- Muirhall;
- Novar Extension;
- Spurness;
- Whitelee Extension;
- Beinn an Tuirc Phase 2;
- Berry Burn;
- Carscreugh;
- Earlseat;
- Easter Tulloch Wind Farm;
- Harestanes;
- Lochluichart;
- Mid Hill Phase 2;
- Tullo Wind Farm South; and
- West Browncastle

[3] BiGGAR Economics (2017), Wind Farms and Tourism Trends in Scotland

6.2 Tourism-related Employment in Wind Farms' Immediate Area

There is significant variance in the tourism employment between the 28 case study areas. The area with the highest level of tourism employment, Arecleoch, has over thirty times more tourism-related employment than the smallest, Spurness. Overall, of the 28 wind farms included in previous studies, eight had fewer than 500 people employed in tourism in 2019, and 18 had fewer than 1,000.

Table 6-1 shows the percentage change in tourism-related employment between 2015 and 2019 for the immediate areas surrounding the wind farm developments and Scotland as a whole. Of the 28 areas surrounding the previously studied wind farms, 18 experienced an increase in tourism-related employment above the Scottish average in the period following construction.

One wind farm included, Beinn a Turic P2, saw tourism employment increase by 1.0%, below the Scottish average of 3.0% during this period. In the remaining nine immediate areas surrounding wind farm developments, tourism-related employment decreased between 2015 and 2019, with reductions in employment between 1.0% and 16.5%.

Table 6-1 Change in Tourism-related Employment, 2015-2019

Wind Farm Area	Tourism Employment 2015	Tourism Employment 2019	2015-2019
Spurness	30	65	116.7%
Mark Hill	110	230	109.1%
Earlseat	1055	1405	33.2%
Lochluichart	260	345	32.7%
Kilbraur Extension	690	915	32.6%
Milour Hill	835	1085	29.9%
Millennium Extension 2	305	380	24.6%
Whitelee Extension	590	735	24.6%
Mid Hill Phase 2	970	1190	22.7%
Allt Dearg	685	835	21.9%
Carscreugh	395	475	20.3%
Kelburn	1200	1420	18.3%
Glenkerie	360	425	18.1%
Berry Burn	960	1105	15.1%
Drone Hill	635	730	15.0%
Gordonbush	265	295	11.3%
Griffin	1660	1835	10.5%
Hill of Towie	880	950	8.0%
Scotland	220,850	227,350	3.0%
Beinn an Tuirc P2	480	485	1.0%
West Browncastle	1005	995	-1.0%
Muirhall	610	600	-1.6%
Harestanes	2040	1945	-4.7%
Easter Tulloch	1160	1000	-13.8%
Tullo South	1160	1000	-13.8%
Little Raith	925	795	-14.1%
Arecleoch	2525	2125	-15.8%
Clyde	340	285	-16.2%
Novar Extension	1155	965	-16.5%

Source: Source: ONS (2021), Business Register and Employment Survey 2019

6.3 Tourism-related Employment Relative to Local Authority

Table 6-2 shows the change in tourism-related employment in both a wind farm development's immediate vicinity and the local authority it is in. Of the 28 case studies, tourism-related employment had grown more than the average for the local authority area in 16 cases.

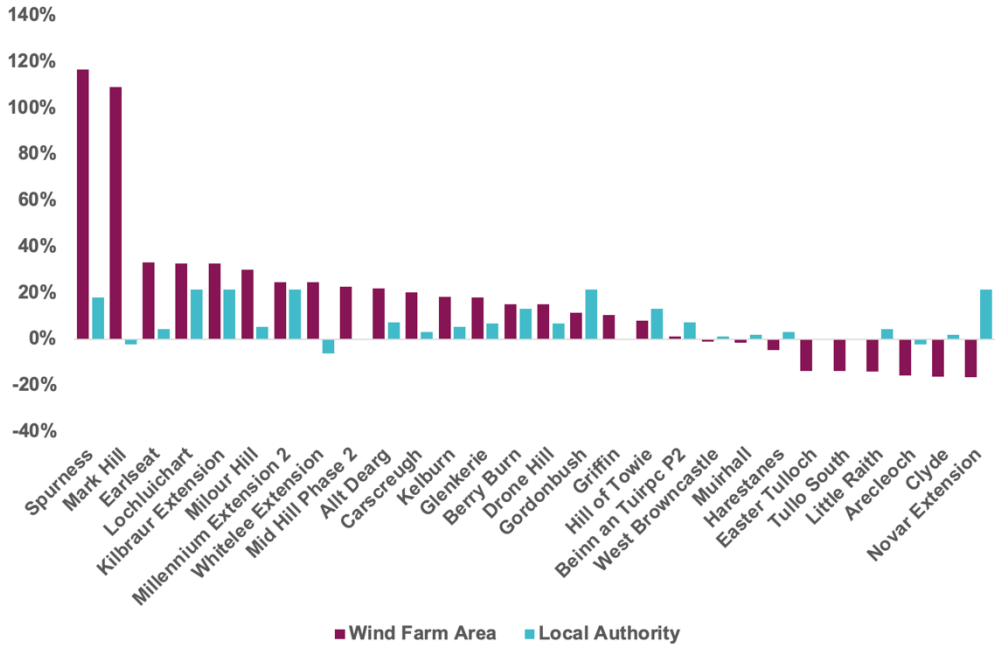
In the previous 2017 study, in the period between 2009 and 2015, seven of the small areas surrounding the wind farms experienced a decline in tourism-related employment. These were Little Raith, Millour Hill, Kelburn, Earlseat, Glenkerie, West Browncastle and Clyde. In the five years following the construction of these wind farms, tourism employment increased in four of the small areas; Earlseat, Milour Hill, Kelburn and Glenkerie. Tourism employment in all four these areas increased faster than in their local authority areas.

Table 6-2 Change in Tourism-related Employment, 2015-2019

Wind Farm Area	Local Authority	Change in Tourism Employment (2015-2019)	
		Wind Farm Area	Local Authority
Spurness	Orkney Islands	**116.7%**	18.1%
Mark Hill	South Ayrshire	**109.1%**	-2.2%
Earlseat	Fife	**33.2%**	4.2%
Lochluichart	Highland	**32.7%**	21.4%
Kilbraur Extension	Highland	**32.6%**	21.4%
Milour Hill	North Ayrshire	**29.9%**	5.3%
Millennium Extension 2	Highland	**24.6%**	21.4%
Whitelee Extension	East Renfrewshire	**24.6%**	-6.3%
Mid Hill Phase 2	Aberdeenshire	**22.7%**	0.1%
Allt Dearg	Argyll and Bute	**21.9%**	7.3%
Carscreugh	Dumfries and Galloway	**20.3%**	3.0%
Kelburn	North Ayrshire	**18.3%**	5.3%
Glenkerie	Scottish Borders	**18.1%**	6.7%
Berry Burn	Moray	**15.1%**	13.1%
Drone Hill	Scottish Borders	**15.0%**	6.7%
Gordonbush	Highland	11.3%	**21.4%**
Griffin	Perth and Kinross	**10.5%**	0.1%
Hill of Towie	Moray	8.0%	**13.1%**
Beinn an Tuirc P2	Argyll and Bute	1.0%	**7.3%**
West Browncastle	South Lanarkshire	-1.0%	**1.2%**
Muirhall	South Lanarkshire	-1.6%	**1.8%**
Harestanes	Dumfries and Galloway	-4.7%	**3.0%**
Easter Tulloch	Aberdeenshire	-13.8%	**0.1%**
Tullo South	Aberdeenshire	-13.8%	**0.1%**
Little Raith	Fife	-14.1%	**4.2%**
Arecleoch	South Ayrshire	-15.8%	**-2.2%**
Clyde	South Lanarkshire	-16.2%	**1.8%**
Novar Extension	Highland	-16.5%	**21.4%**

Source: ONS (2021), Business Register and Employment Survey 2019

Figure 6-1 Change in Tourism-related Employment in Wind Farm Areas and Local Authorities (Previous Study Wind Farms)



Source: ONS (2021), Business Register and Employment Survey 2019

6.4 Summary: 28 Case Studies from 2017

This section considered trends in tourism-related employment in the data zones that surrounded previously studied onshore wind developments, 28 wind farms developed between 2009 and 2015. This found that the majority of areas saw an increase in tourism-related employment between 2015 and 2019, outperforming the trend for Scotland as a whole and compared with the trend in the local authority area in which the wind farm had been developed.

Additionally, of the six small areas included in previous studies which experienced decline in tourism-related employment between 2009 and 2015, four saw tourism employment increase in the period following construction, 2015-2019, with all four areas experiencing growth faster than their corresponding local authority area.

7. Conclusions

This study was undertaken to find empirical evidence of a relationship between the development of onshore wind farms and the tourism sector in Scotland.

Tourism-related employment and the onshore wind sector both experienced growth in the decade to 2019 and in the 2015 to 2019 period on which the study focused.

The analysis of trends at the local authority area found no relationship between the growth in the number of wind turbines and the level of tourism-related employment.

This research has also considered the possibility of more local effects, by examining trends in tourism-related employment in the immediate vicinity of 16 wind farms constructed between 2015 and 2019 and revisiting previous case studies of 28 wind farms constructed between 2009 and 2015. This analysis found that in the majority of cases, tourism-related employment in the vicinity of wind farms had outperformed the trend for Scotland as a whole and for the local authority area in which the wind farm was based.

This research has analysed trends in tourism employment in the localities of 44 wind farms developed in recent years, providing a substantial evidence base. The study found no relationship between tourism employment and wind farm development, at the level of the Scottish economy, across local authority areas nor in the locality of wind farm sites.

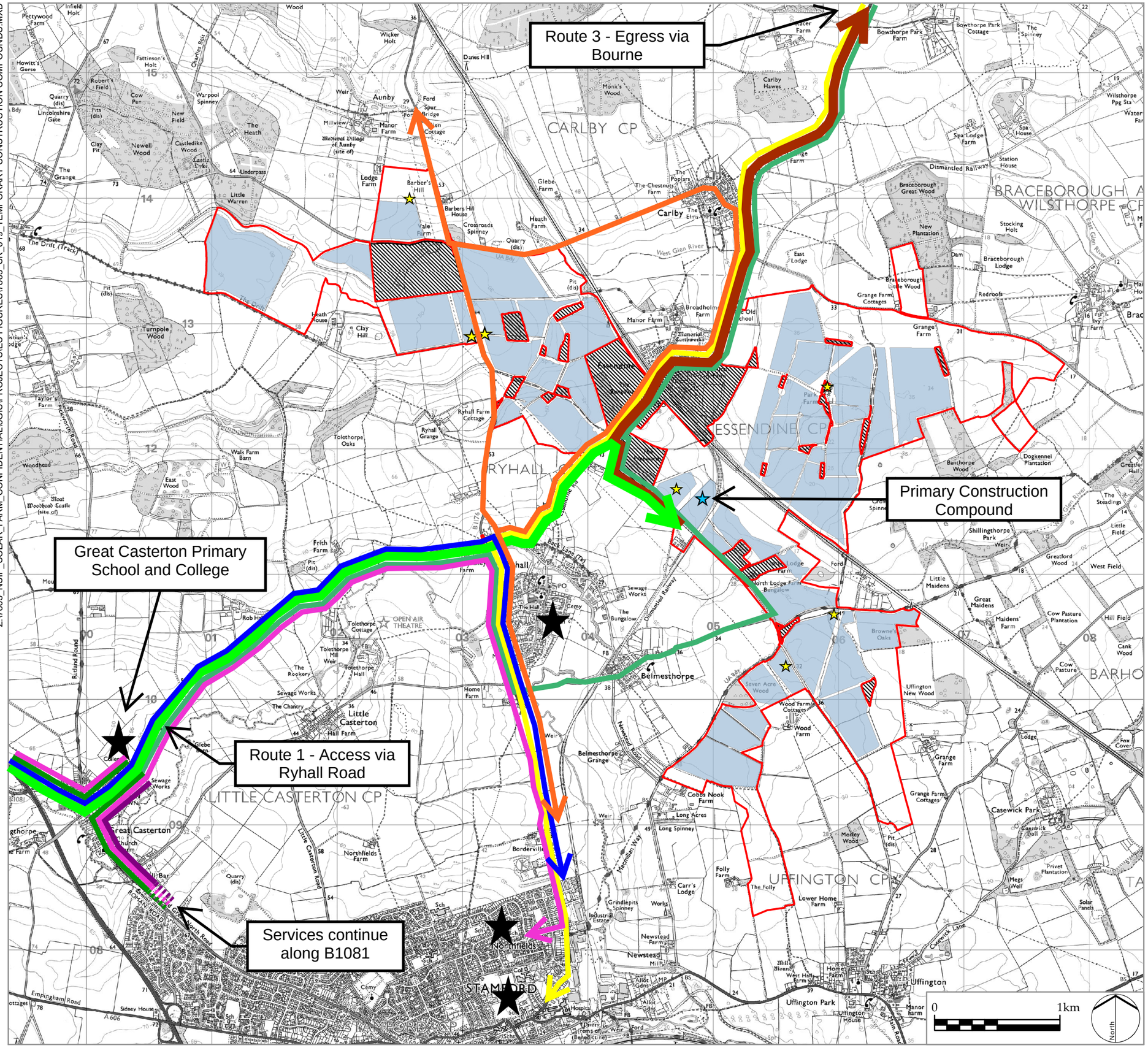
BiGGAR Economics, Pentlands Science Park,
Bush Loan Penicuik, Midlothian, Scotland EH26 0PZ

info@biggareconomics.co.uk

biggareconomics.co.uk

Appendix R Q11.0.10 Drawing Reference Exq1 - 11.1

Z:\7863_NSIP_SOLAR_FARM_CONFIDENTIAL\8GIS\PROJECTSIES FIGURES\7863_SK_619_TEMPORARY CONSTRUCTION COMPOUNDS.MXD



Infrastructure Planning (Examination Procedure) Rules 2010

PINS REFERENCE NUMBER
EN010127

LEGEND

- Order limits
- Solar PV Site
- Area out the Order limits
- Primary Construction Compound
- Secondary Construction Compounds
- Local School
- Route 1 (Access to Primary Construction Compound)
- Route 3 (Egress from Primary Construction Compound)

Bus Routes/Services:
- 4 Service
- 182 Service
- 183 Service
- 184 Service
- 185 Service
- 201/202 Service
- R5 Service

REV.	DESCRIPTION	APP.	DATE
P0	Examination	CR	05/06/23

Mallard Pass Solar Farm

PROJECT TITLE
MALLARD PASS SOLAR FARM

DRAWING TITLE
Bus Route Overview

ISSUED BY	Oxford	T: 01865 887050	
DATE	Jun 2023	DRAWN	AG
SCALE @A3	1:30,000	CHECKED	PD
STATUS	Final	APPROVED	RP

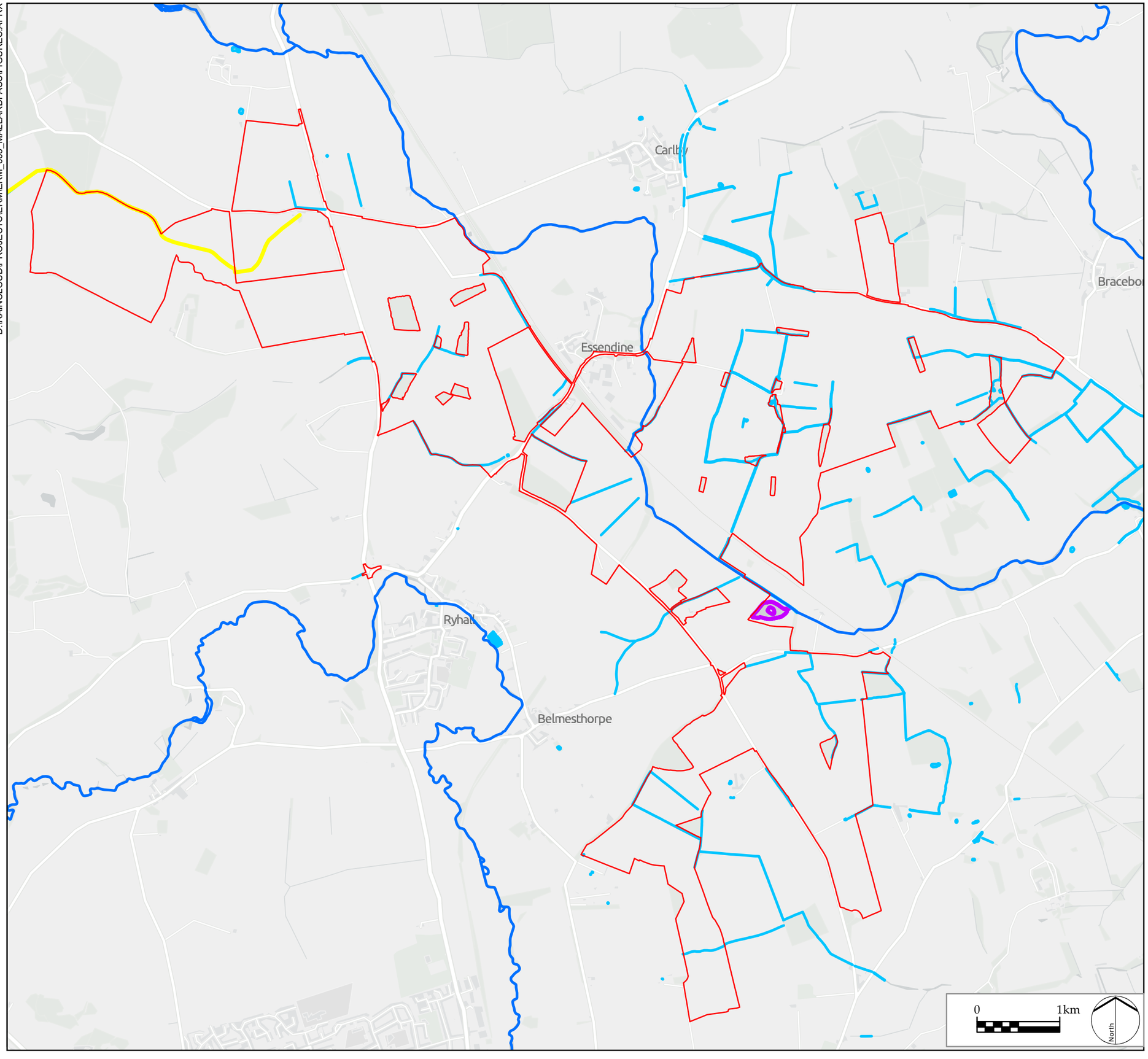
DWG. NO. ExQ1 - 11.1 **REV: P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

Appendix S Q12.0.1 Natural watercourses, drainage ditches and potentially modified watercourses Plan

D:\RAINCLOUD\PROJECTS\ERM\ERM_003_MALLARDPASS\FIGURES.APRX



Infrastructure Planning (Examination Procedure) Rules 2010.

PINS REFERENCE NUMBER

EN010127

LEGEND

- Order Limits
- Potentially Modified Watercourses
- Watercourses
- Linear Drainage
- Uunnamed Pond

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

PROJECT TITLE

MALLARD PASS SOLAR FARM

DRAWING TITLE

Natural watercourses, drainage ditches and potentially modified watercourses

ISSUED BY	Oxford	T: 01865 887050	
DATE	Jun 2023	DRAWN	LN
SCALE @A3	25,000	CHECKED	EH
STATUS	Draft	APPROVED	RP

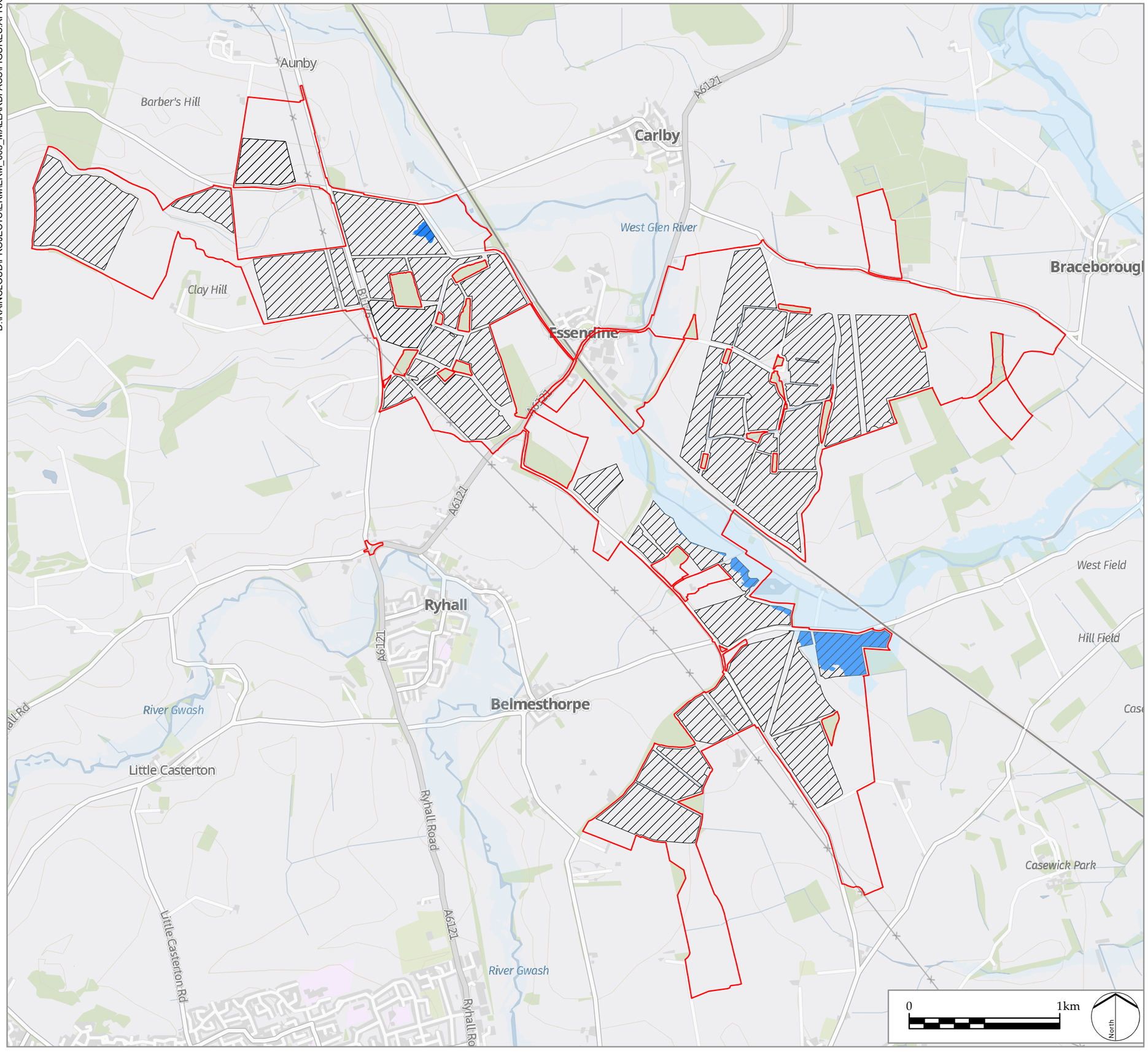
DWG. NO. 910 **REV: P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

Appendix T Q12.0.9 PV Array areas within Flood Zone 2

D:\RAINCLOUD\PROJECTS\ERM\ERM_003_MALLARDPASS\FIGURES.APRX



Infrastructure Planning (Examination Procedure) Rules 2010.

PINS REFERENCE NUMBER

EN010127

LEGEND

- Order Limits
- PV Array Area
- Flood Zone 2
- PVs in Flood Zone 2

REV.	DESCRIPTION	APP.	DATE
P0	Examination Deadline 2 Submission	RP	14/06/23

PROJECT TITLE

MALLARD PASS SOLAR FARM

DRAWING TITLE

PV Array areas within Flood Zone 2

ISSUED BY	Oxford	T: 01865 887050	
DATE	Jun 2023	DRAWN	LN
SCALE @A3	25,000	CHECKED	EH
STATUS	Draft	APPROVED	RP

DWG. NO. 9.11 **REV: P0**

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

Appendix U Q13.0.1 RAF Wittering - Stage 1 Consultation Response (Redacted)

Ministry of Defence

Defence Infrastructure Organisation

FREEPOST
Mallard Pass Solar Farm

Safeguarding Department
Statutory & Offshore
St George's House
Defence Infrastructure Organisation Head Office
DMS Whittington
Lichfield
Staffordshire
WS14 9PY

Tel: [redacted]

E-mail: [redacted]

www.mod.uk/DIO

Our reference: 10053754

05 January 2022

Dear [redacted],

MOD Safeguarding – RAF Wittering

Proposal: Mallard Pass Solar Farm Community Consultation Launch

Location: This project falls partly in South Kesteven, Lincolnshire, and partly in Rutland

Approx Grid Ref's: 506660,312996 – 506498, 308920 – 504559, 309370 – 504182, 312108 502661, 314225 – 501027, 313914

Thank you for consulting the Ministry of Defence (MOD) on the above proposed development which was received by this office on 05/11/2021.

This relates to the Mallard Pass Solar Farm Community Consultation Launch.

The application site falls within the Statutory Safeguarding Aerodrome Height (91.4m) and Birdstrike Zones surrounding RAF Wittering.

Aerodrome heights

The proposed development site occupies the statutory height and technical safeguarding zones that ensure air traffic approaches, and the line of sight of navigational aids and transmitters/receivers are not impeded.

At this location we would only have to consult our Advisors for any building structure or works exceeding 91.4m in height above ground level.

Birdstrike

Within this zone, the principal concern of the MOD is that the creation of new habitats may attract and support populations of large and, or, flocking birds close to the aerodrome.

As proposals are only at the early stages precise detail is not yet known, therefore in order that a full assessment can be undertaken information regarding elevations, location co-ordinates (Easting & Northing) landscaping and drainage proposals need to be provided at future planning stages.

I trust this is clear however should you have any questions please do not hesitate to contact me.

Yours sincerely

[redacted]
Assistant Safeguarding Manager