

Great North Road Solar and Biodiversity Park

Design Approach Document

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SCHEDULE OF REVISIONS

Date	Page Reference	Revisions
10.12.2025	iv	Removed reference to NG+ Flood Alleviation
	10	Removed reference to NG+
	16 to 20	Revised formatting/layout
	20	Re-added missing landscape considerations
	42, 43	Re-added pages as they were omitted by error
	33 to 37	Updated due to errors in formatting
	37	Removed reference to NG+ flood alleviation
	59, 60	Updates to Table 1 to clarify the Development benefits
	61	BNG % removed
	Various	Removed the word 'around' in front of 800 MW

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EXECUTIVE SUMMARY

This Design Approach Document describes the design process and progress for Great North Road Solar and Biodiversity Park ('the Development') – a new solar, energy storage and biodiversity park, located to the north west of Newark-on-Trent, Nottinghamshire with a potential generation and storage capacity of 800MW AC.

The project vision is that:

The Development will support the UK's clean power mission by providing secure and sustainable energy to help tackle the climate crisis. It will respond positively to its local context, delivering multiple benefits for the environment, meaningfully boosting biodiversity and community.

The design process and key principles relating to the development of the design have been, informed by national and local policy and guidance on good design. Project-specific design principles have been established, focusing on **Climate**, **People**, **Places** and **Value**.

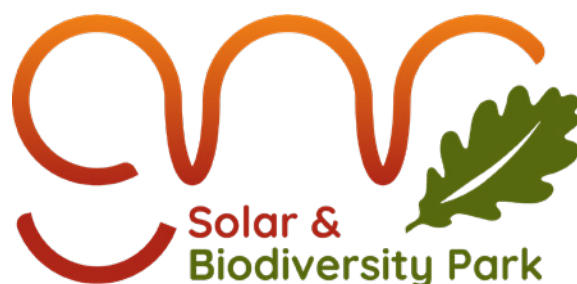
The design has been informed from the earliest stages by environmental considerations. Site selection and early design has taken account of community, technical and environmental factors including:

- Identifying land that is physically and technically suitable for the Development;
- Avoiding development within designated landscapes, heritage assets and ecology designations and maintaining separation from these;
- Maintaining separation from settlements and homes;
- Avoiding development within Green Belt, Local Plan allocations and minimising use of land identified as being of the best agricultural quality;
- Limiting development within areas identified as having a higher risk of flooding, and
- Working with willing landowners to avoid the need for compulsory purchase.

As the design has developed from site selection, more detailed research and site surveys have been undertaken as part of the Environmental Impact Assessment (EIA); technical design, and input from Statutory Consultees and local communities has shaped the locations identified for solar panels, substations, cable routes and BESS and for construction (traffic routes and compound locations). Changes have been made to the design between the EIA Scoping, PEIR and Submission to take account of the more detailed information now available.

The design set out within the masterplan includes measures to both mitigate impacts and provide enhancements. These measures include extensive planting; the provision of new permissive routes and a long distance circular walking route to enhance recreational opportunities; new woodlands and extensive areas of land managed for ecological benefit to provide biodiversity net gain.

The Design Approach Document has taken account of consultation feedback; further development of the technical design, and continued research and survey work as part of the EIA process.



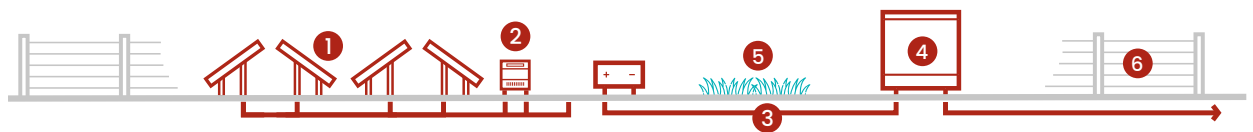


Solar panels from above (image by Red Zeppelin via Pexels)

1 INTRODUCTION

1.1 OVERVIEW

- 1 This Design Approach Document (DAD) has been prepared to describe the process of design of the Great North Road (GNR) Solar and Biodiversity Park ('the Development'). This would entail the construction, operation, maintenance and decommissioning of a new solar, energy storage and biodiversity park, located to the north west of Newark-on-Trent, Nottinghamshire. With a potential generation capacity of 800 megawatts (MW) AC of solar energy, the Development has the potential to provide enough clean, affordable energy to meet the power needs of approximately 400,000 homes while avoiding many thousands of tonnes of CO₂ emissions every year.
- 2 The Development would comprise ground mounted solar panels alongside an on-site Battery Energy Storage System (BESS), substations and associated infrastructure required to connect the scheme into the national grid at the existing Staythorpe Substation. The overall Order Limits (OL), currently extending to approximately 1,765 ha, also incorporate extensive areas which would remain undeveloped and areas which would be used for landscape and ecological mitigation and enhancement along with improvements to public access. Collectively these elements are described as 'the Development' and the scheme is known as the Great North Road (GNR) Solar and Biodiversity Park.
- 3 The principal components of the Development are illustrated in the diagram below.



Solar array

1. Solar panels

Mitigation and enhancement measures

5. Landscape area

Electrical connection infrastructure

2. Inverter
3. Underground cable
4. Substation/BESS

Ancillary works

6. Fencing

- 4 GNR Solar and Biodiversity Park is classified as a Nationally Significant Infrastructure Project (NSIP) as it would generate more than 50 MW of electricity. The Planning Act 2008 defines the consent regime for a NSIP and requires a Development Consent Order (DCO) application to be submitted through the Planning Inspectorate (PINS). The application will be submitted to PINS by Elements Green Trent Ltd ('the Applicant') and will be determined by the relevant Secretary of State.

1.2 SCOPE AND PURPOSE

- 5 The National Design Guide¹ notes that:

“Well-designed places and buildings come about when there is a clearly expressed ‘story’ for the design concept and how it has evolved into a design proposal. This explains how the concept influences the layout, form, appearance and details of the proposed development.” (Para. 16)

- 6 This Design Approach Document has been prepared to tell the design story of the GNR Solar and Biodiversity Park, drawing together information relating to the design of the Development and explaining in an accessible, non-technical manner what physical, environmental, human, technical and commercial factors have fed into the overall project design and how they have shaped it. It also sets out the national policy context and guidance that has informed the early design of the Development. It does not provide a full appraisal against current planning policy, which is set out within the Planning Statement.
- 7 The level of detail provided within this document sets out the process and story of the design to date and is based on information currently available. Environmental and technical work has informed the iterative process of consultation, design and appraisal to shape the proposals between PEIR and the submission of the DCO application.
- 8 In order to maintain flexibility within the design whilst providing an adequate degree of certainty in relation to potential effects for ongoing assessment work, a range of development parameters have been fixed, as set out in Chapter 5 of the PEIR, which align with the principles and descriptions set out within this document.
- 9 Other documents relating to the design, construction, management and decommissioning of the Development are encompassed within the Environmental Statement and should be read in conjunction with this Design Approach Document, including:
- Chapter 5, Development Description;
 - Technical Appendix A5.1, Draft Outline Landscape and Ecological Management Plan (LEMP);
 - Technical Appendix A5.2, Draft Outline Construction Traffic Management Plan (CTMP);
 - Technical Appendix A5.3, Draft Outline Construction Environmental Management Plan (CEMP); and
 - Technical Appendix A5.4, Draft Outline Fire Safety Management Plan (FSMP).

¹ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2021). National Design Guide: Planning practice guidance for beautiful, enduring and successful places. Available at: <https://www.gov.uk/government/publications/national-design-guide>.

1.3 GOOD DESIGN

- 10 Overarching National Policy Statement (NPS) for Energy (EN-1)² sets out expectations with respect to good design for energy infrastructure at section 4.7. It states (inter alia) that:

“Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.” (Para. 4.7.2)

- 11 Government guidance³ on the pre-application stage for NSIPs expands on this and sets out what is needed for consideration of good design and notes that:

“Good design is not simply about the look of a project; it is about the whole process of putting a project together so that it achieves the elements of good design including choice of location, vision, narrative, design principles and consultation programme.” (Para. 014)

- 12 The guidance goes on to note that applicants should explain how the design of a project responds to the overarching design principles for national infrastructure⁴ as set out by the National Infrastructure Commission (NIC). These are defined as:

- **Climate** – mitigate greenhouse gas emissions and adapt to climate change;
- **People** – reflect what society wants and share benefits widely;
- **Places** – provide a sense of identity and improve our environment; and
- **Value** – achieve multiple benefits and solve problems well.

- 13 The concept of good design has been integral to the project from the outset. The following sections of this Design Approach Document set out the overarching vision for the project and the design principles that have guided its development before setting out the site context and describing the development of the design at each key stage of the project.

2 Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for energy (EN-1). Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1>.

3 Department for Levelling Up, Housing and Communities (2024). Planning Act 2008: Pre-application stage for Nationally Significant Infrastructure Projects. Available at <https://www.gov.uk/guidance/planning-act-2008-pre-application-stage-for-nationally-significant-infrastructure-projects>.

4 National Infrastructure Commission (No Date). Design Principles for National Infrastructure. Available at: <https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/#tab-summary>.

2 THE GNR VISION AND DESIGN PRINCIPLES

2.1 PROJECT VISION

- 14 *The Development will support the UK's clean power mission by providing secure and sustainable energy to help tackle the climate crisis. It will respond positively to its local context, delivering multiple benefits for the environment, meaningfully boosting biodiversity and community.*

2.2 PROJECT SPECIFIC DESIGN PRINCIPLES

- 15 Using the framework set out by the NIC's⁵ overarching design principles and drawing on good design criteria set out in NPS EN-1⁶ and technology specific guidance provided in NPS for Renewable Energy Infrastructure (EN-3)⁷, the following project specific design principles have been adopted:
- **Climate**
 - **CL1** - make an important contribution to achieving net zero greenhouse gas emissions by 2050 or sooner;
 - **CL2** - seek to minimise whole life emissions of the project; and
 - **CL3** - ensure the project can adapt flexibly to climate change.
 - **People**
 - **PE1** - communicate openly with local communities and stakeholders;
 - **PE2** - minimise the need to use compulsory purchase powers;
 - **PE3** - seek local knowledge and views to inform and improve the project;
 - **PE4** - deliver wider societal benefit;
 - **PE5** - be a good neighbour to local residents and businesses.
 - **Places**
 - **PL1** - design at a human scale and embed nature-based solutions;
 - **PL2** - seek opportunities to enhance access and recreation to improve health and well-being;
 - **PL3** - deliver biodiversity net gain that exceeds mandatory requirements;
 - **PL4** - facilitate understanding and appreciation of local cultural heritage throughout the life of the project; and
 - **PL5** - design with local landscape character in mind, providing a legacy of landscape enhancement.
 - **Value**
 - **VA1** - seek opportunities to grow planting materials within the site and nearby, for example, seed mixes and hedgerow plants;
 - **VA2** - measure performance of all aspects of the project against its objectives and use lessons learned to improve; and
 - **VA3** - encourage engagement and provide learning opportunities.

5 National Infrastructure Commission (No Date). Design Principles for National Infrastructure. Available at: <https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/#tab-summary>.

6 Department for Energy Security and Net Zero (2024). Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/media/64252f3b60a35e00120cb158/NPS_EN-1.pdf.

7 Department for Energy Security and Net Zero (2024). National Policy Statement for renewable energy infrastructure (EN-3). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3>.

- 16 As set out in NIC guidance on Project Level Design Principles⁸, development of design principles is an ongoing and iterative process and these may evolve through the pre-consent stages of the project.

2.3 THE DESIGN PROCESS

- 17 Planning Practice Guidance (PPG) on Design: Process and Tools⁹ and the National Design Guide both place a clear emphasis on the role of local communities in achieving good design with the PPG highlighting that:

“Early engagement and linking engagement activities to key stages of design decision-making and plan-making can empower people to inform the vision [...] and the design of schemes.” (Para. 19)

- 18 Separately from government policy and guidance, the Institute of Environmental Management and Assessment (IEMA) has produced guidance on Shaping Quality Development¹⁰ which considers the role of Environmental Impact Assessment (EIA) in shaping the design of projects. It sets out four principles to assist in shaping the design via the EIA process:

“Early, effective and ongoing interaction – occurs between environmental thinking and the design process;

Appropriate stakeholder engagement – is used to gather external views on the approaches that could be taken, before a decision is made and only where the opportunity to actually influence the decision exists;

Consenting risk is managed – saving time and costs by taking effective account of environmental issues within a responsive design process;

A clear narrative – is developed that provides a record of how the project’s design has responded to the environmental issues identified...”

- 19 Both government and industry guidance establish these clear themes of people/community and environmental considerations as being critical to the design process and achieving good design.
- 20 More recently, in 2024, further guidance on design and process specifically relating to NSIPs has been set out in the NIC Project Level Design Principles¹¹ guidance and PINS have also set out their own guidance in NSIPs: Advice on Good Design¹². These both note the inherent complexity and challenges involved in development of large scale

8 National Infrastructure Commission (2024). Project Level Design Principles. Available at <https://nic.org.uk/app/uploads/NIC-Design-Principles-Handbook-Digital-PDF.pdf>.

9 Department for Levelling Up, Housing and Communities (2019). Design: Process and Tools. Available at: <https://www.gov.uk/guidance/design>.

10 IEMA (2015). Environmental Impact Assessment Guide to Shaping Quality Development. Available at: <https://www.iema.net/download-document/328273>.

11 National Infrastructure Commission (2024). Project Level Design Principles. Available at: <https://nic.org.uk/app/uploads/NIC-Design-Principles-Handbook-Digital-PDF.pdf>

12 Planning Inspectorate (2025). Nationally Significant Infrastructure Projects: Advice on Good Design. Available at <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design#design-principles-parameters-and-codes>

infrastructure and place an emphasis on a structured design process, proportionate to the size and complexity of the development, being key to achieving desired outcomes, reducing risk and delivering multiple benefits for communities and the environment.

- 21 The PINS guidance illustrates the iterative design process as shown in the diagram below. To date the project has progressed through the 'Assemble', 'Research' and 'Co-ordinate' cycles through scoping, consultation and the production of the Preliminary Environmental Information Report (PEIR) and PEIR stage design, and the production of the Environmental Statement (ES) and the ES Design. This iterative process will continue past the EIA Stage, into the pre-construction stage of the Development.
- 22 The diagram overpage illustrates the design process for the Development, showing how design, consultation and the EIA interact and influence each other. It does not set out every detail of the process but sets out key stages where community/stakeholder consultation and environmental information feed into the ongoing design process. Technical and commercial factors also have an influence on the design process and feed into the design at every stage.

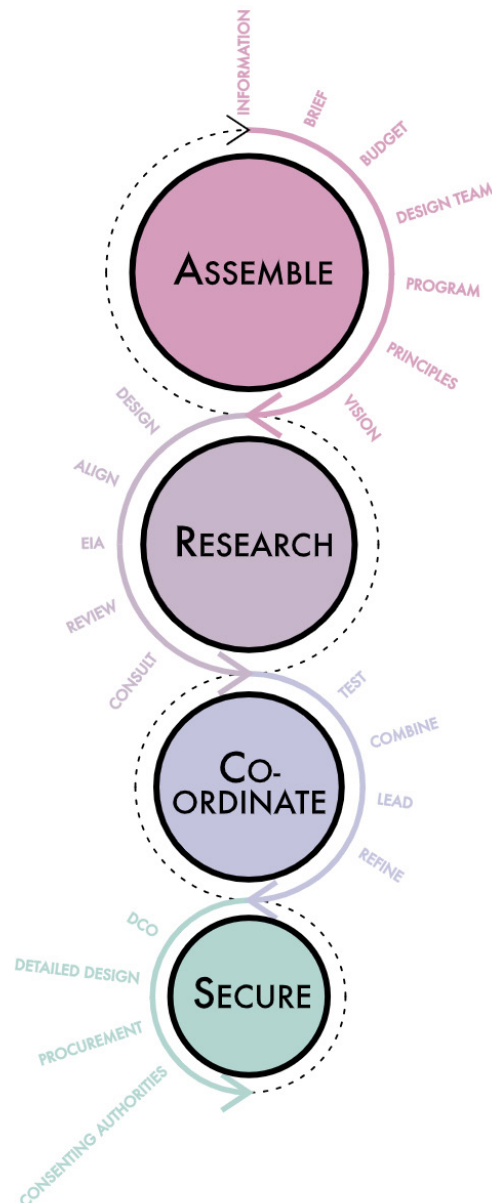
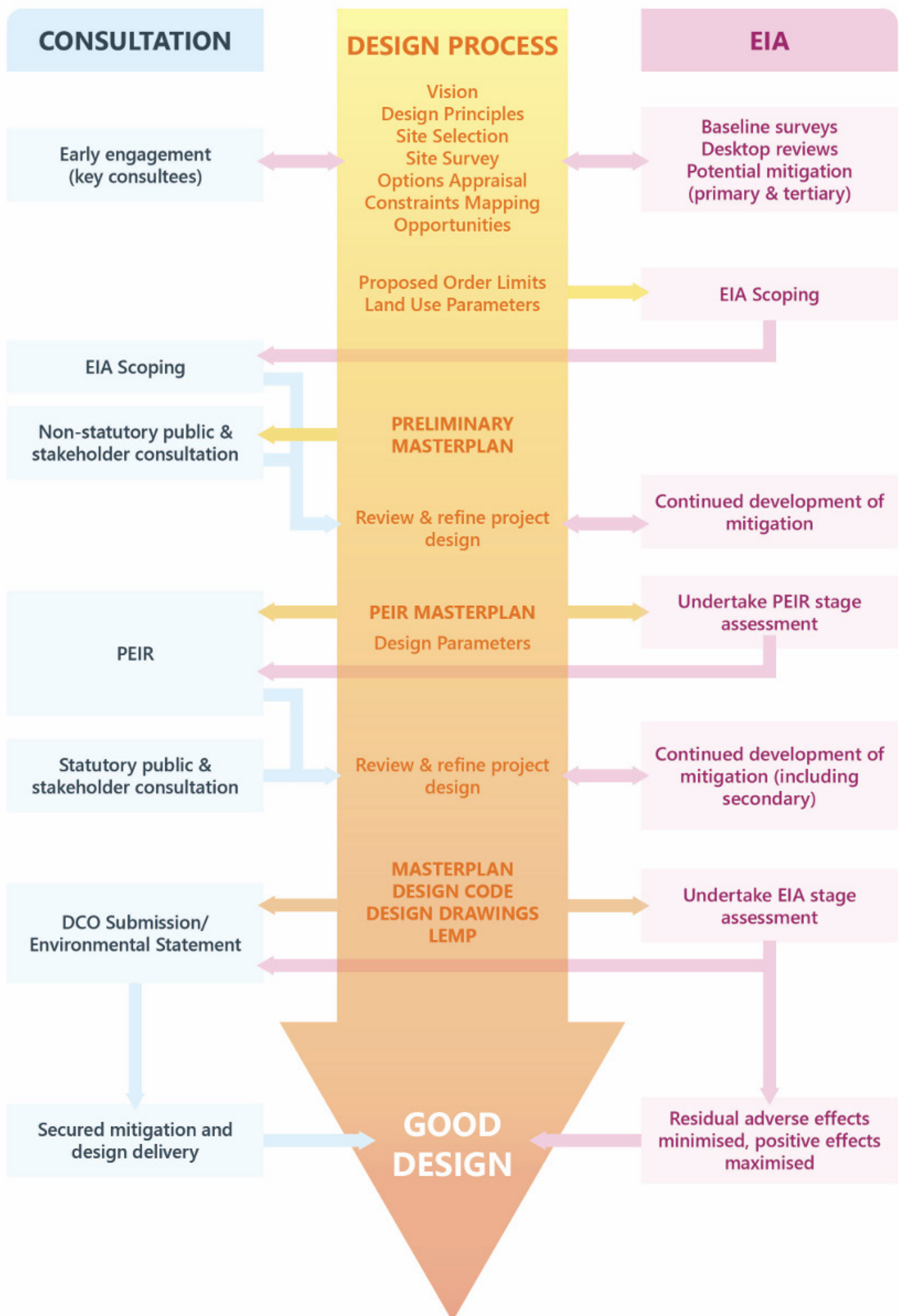


Diagram of design process from PINS guidance

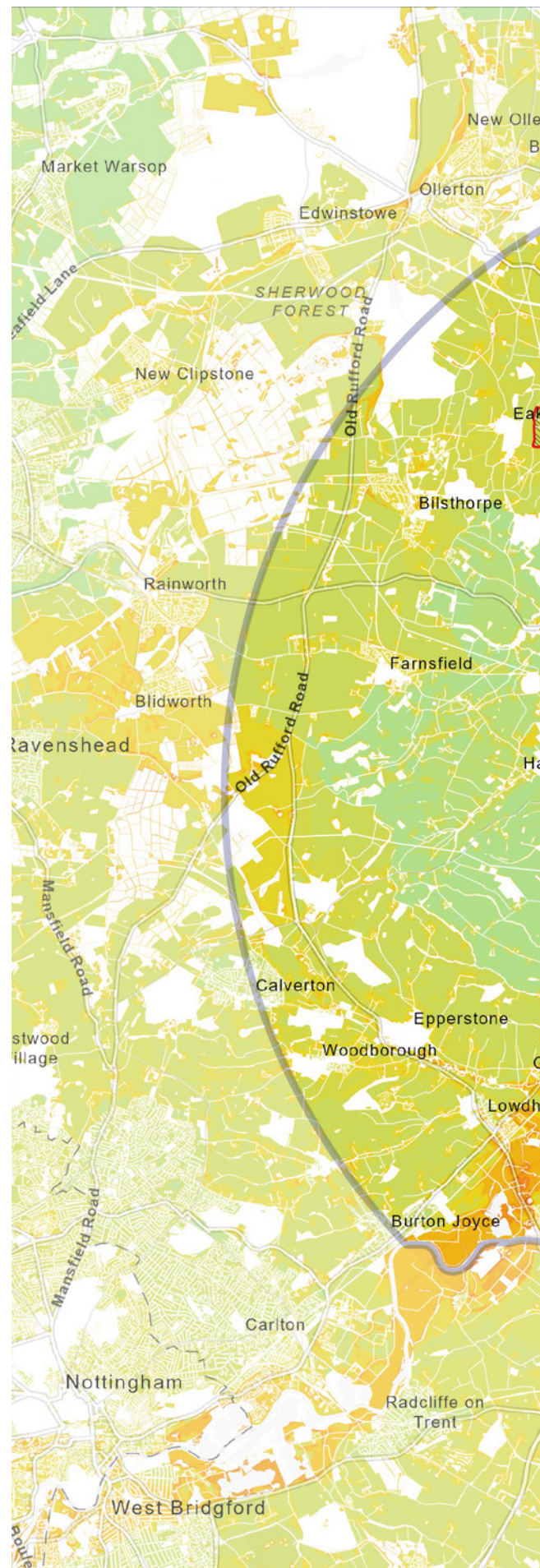
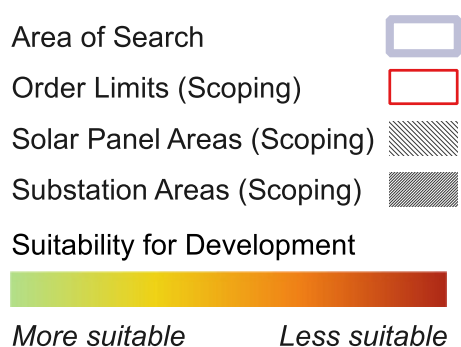


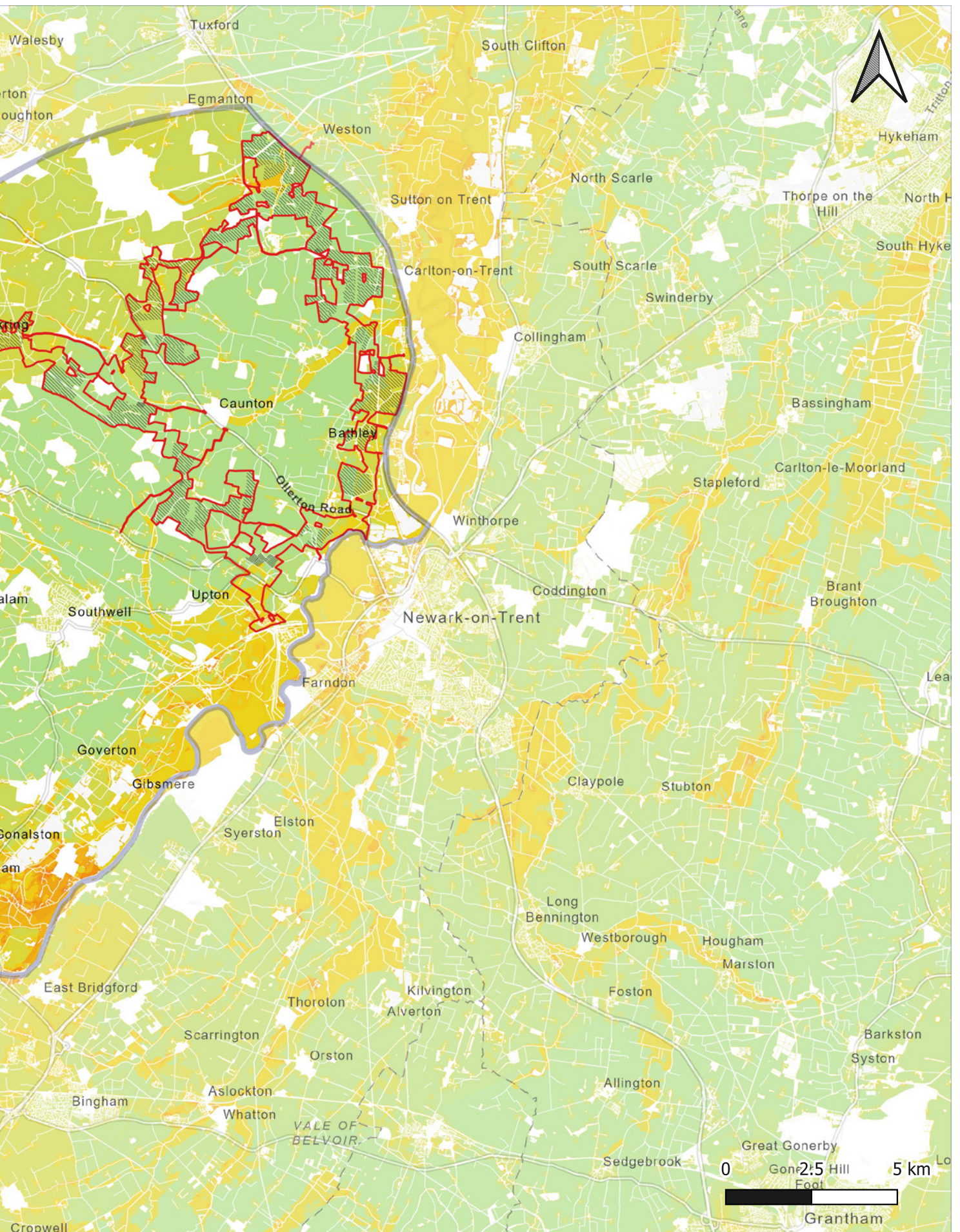
3 SITE SELECTION

3.1 INTRODUCTION

- 23 The starting point of the site selection process was the acceptance of the Development to connect the project to the National Grid at Staythorpe substation and defining a site search area as set out in Section 4.3 of Chapter 4 Alternatives [EN010162/APP/6.2.4]. Once the site search area was identified the project design principles, environmental factors, physical constraints to solar development and developer considerations all informed the site selection process.
- 24 The outcome of this process is shown on Figure 1 which illustrates the way in which those factors combine, showing the scoping stage Order Limits (Scoping Order Limits) and development areas, overlaid on a 'heat map' that shows the most suitable areas shaded green, through yellow to orange areas which are least suitable (all subject to detailed professional review). Areas shown in white are not suitable.
- 25 Factors included within the analysis meet the following criteria:
- **Readily available data** - downloadable national data or shown on local plans.
 - **Likely to influence the extent or performance of the development** - factors easily designed around and likely to affect any site (e.g. hedgerows) are not included.

Figure 1: Site Selection Outcomes





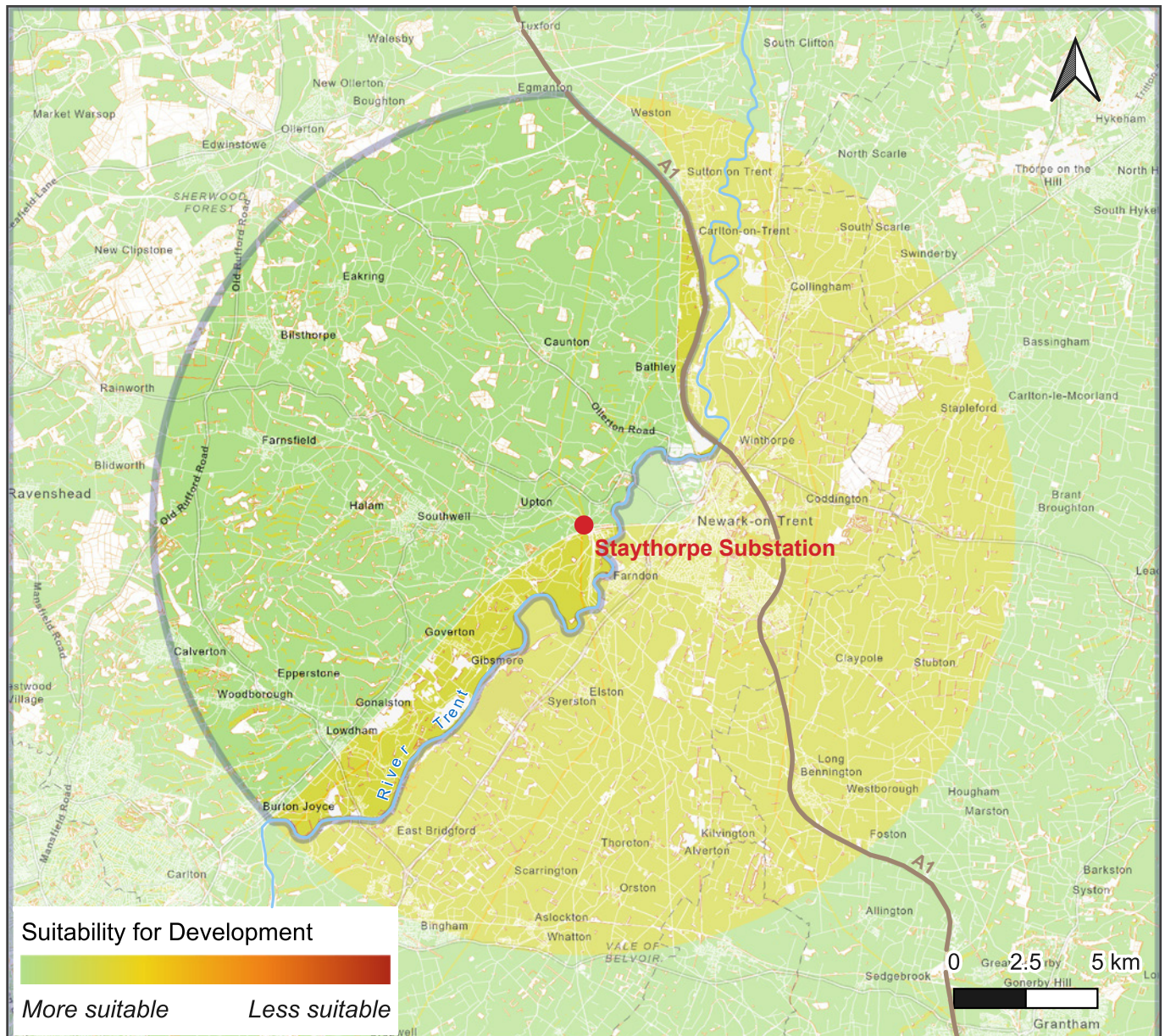


Figure 2: Physical and Developer Considerations

- 26 Figures 2-6 show the factors included in the 'heat map' analysis. In the analysis, areas identified as 'best avoided' carry greater weight than those identified as 'not preferred'.
- 27 The area of search shown on Figure 2 was identified as 15 km from the Staythorpe substation where the Development will connect to the National Grid. Greater distances involve the laying of longer cables resulting in additional costs, transmission losses and potential for increased environmental effects. The area south and east of the A1 and River Trent were also excluded due to the multiple environmental factors affecting the road and river corridor and the additional costs of crossing the Trent.
- 28 The physical and developer considerations included in the analysis are as follows:
 - **Areas not suitable for development** - buildings and woodlands;
 - **Areas identified as best avoided** - land within 15 m of woodland land within 50 m of motorways, 20 m of A roads, 10 m of other roads and within 15 m of railway lines; land within 10 m of water bodies/courses; land within 11m of 132 kV overhead lines



- **Areas identified as not preferred** - north facing slopes with a gradient steeper than 5°; areas within 30 m of 400kV pylons and land to the south and east of the railway lines (reflecting potential difficulties with cable connections across the railway).

- **Areas not suitable for development** - parks and recreation areas.
- **Areas identified as best avoided** - local plan allocated development sites; local plan safeguarded areas; Agricultural Land Classification (ALC) Grade 1 land; and Green Belt.
- **Areas identified as not preferred** - minerals safeguarded areas; ALC Grade 2 land; land within 5 m of a Public Right of Way; open access land (including commons).

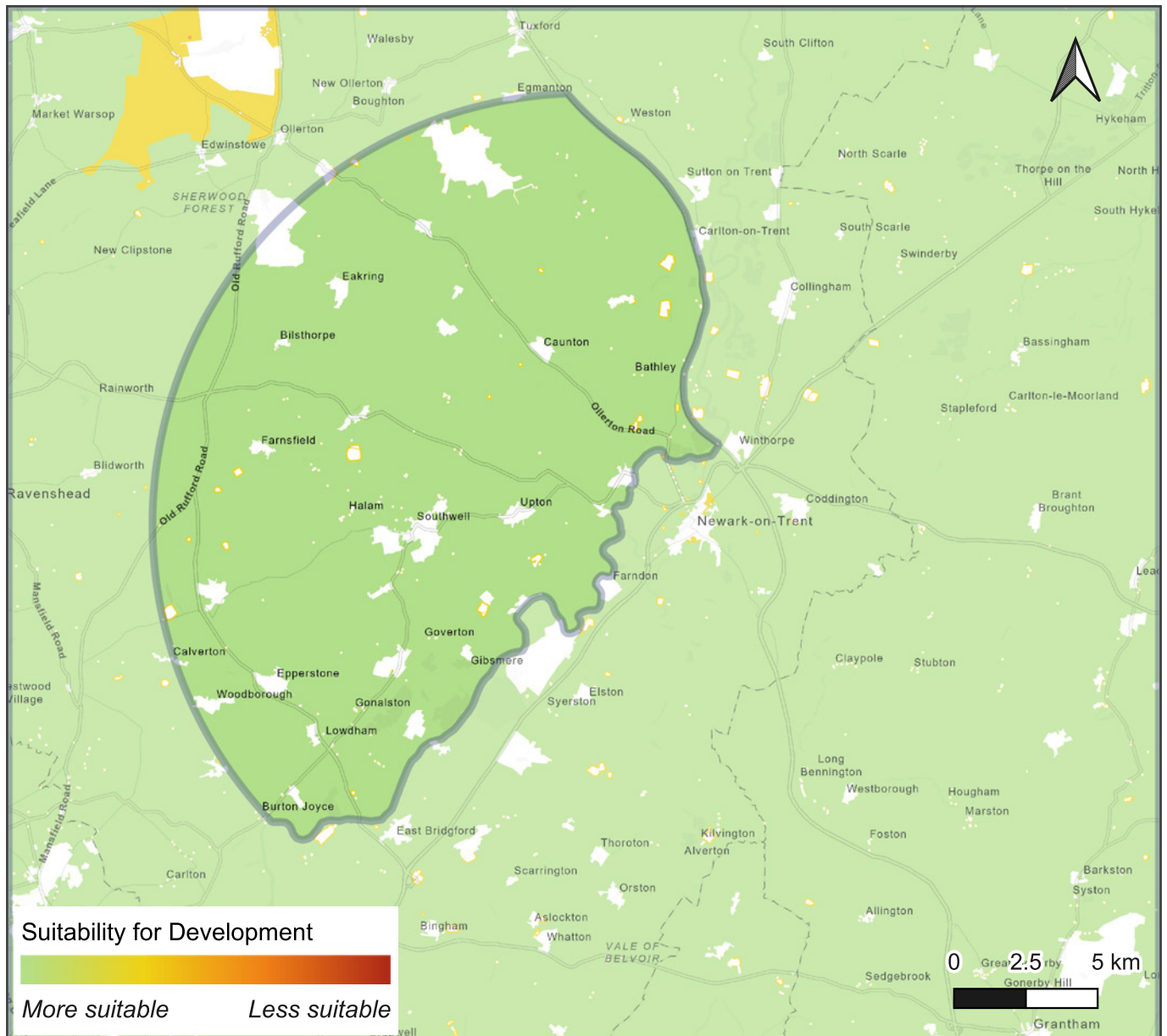


Figure 4: Heritage Considerations

30 There are no World Heritage Sites in the area of search. Heritage factors included within the analysis are as follows:

- **Areas not suitable for development** - listed buildings; scheduled monuments; conservation areas; historic parks and gardens; and battlefields.
- **Areas identified as best avoided** - local heritage designations (Historic landscape at Laxton and Sherwood Forest Heritage Area); land within 50 m of scheduled monuments, and land within 50 m of listed buildings.

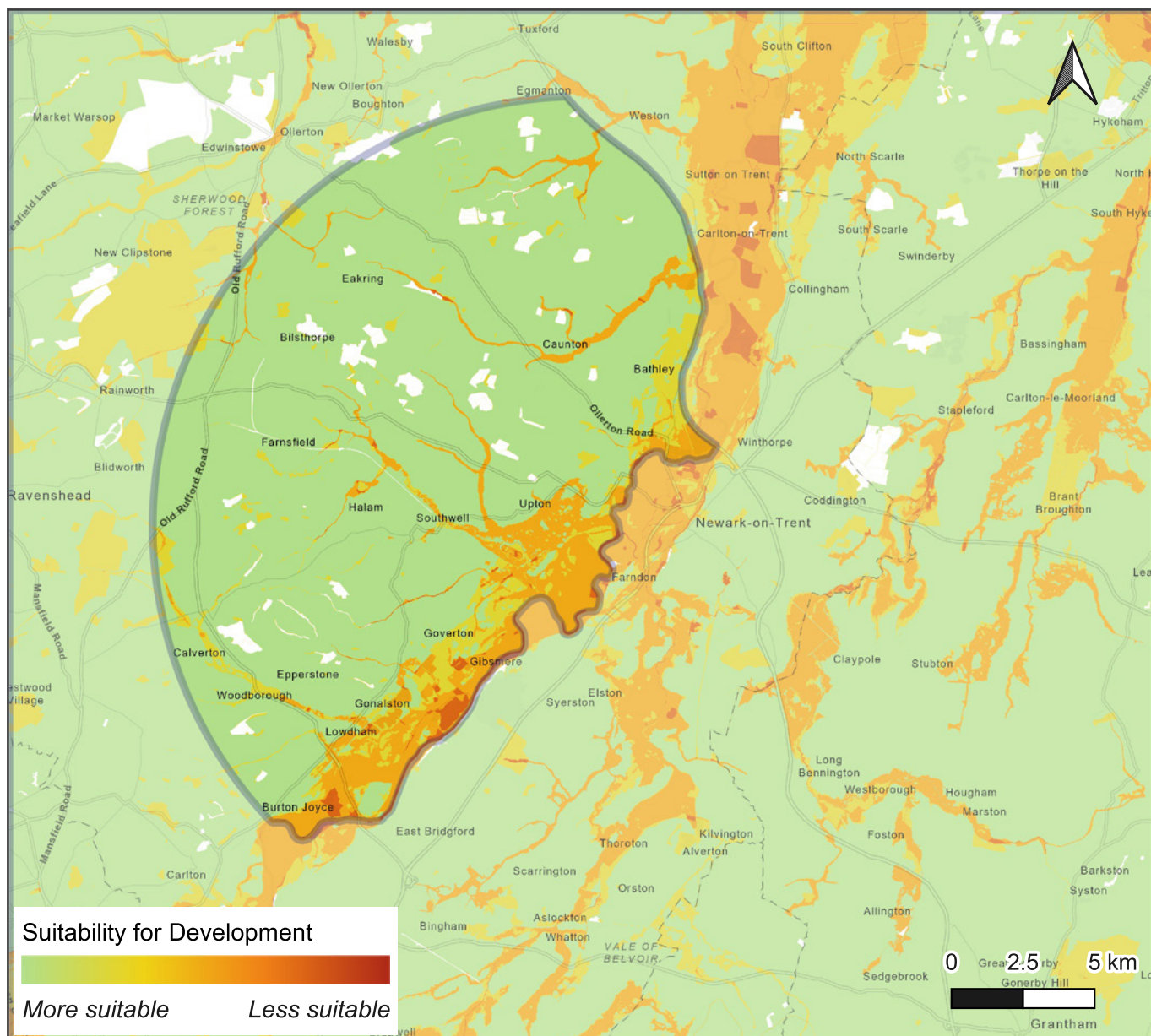


Figure 5: Hydrology, Ecology and Geology Considerations

31 There are no Ramsar or proposed Ramsar sites, Special Protection Areas (SPAs) or 'potential' SPAs, or 'possible' Special Areas of Conservation (SACs), in the area of search which would all have been unsuitable for development. Hydrology, ecology and geology factors have been included in the analysis as follows:

- **Areas not suitable for development** - Sites of Special Scientific Interest (SSSIs); Special Areas of Conservation (SACs); National Nature Reserves (NNRs); ancient woodland; and Local Nature Reserves (LNRs).
- **Areas identified as best avoided** - flood zones 2 and 3; local wildlife sites; irreplaceable habitats (as identified within the Priority Habitat Inventory) and Local Geological Sites.

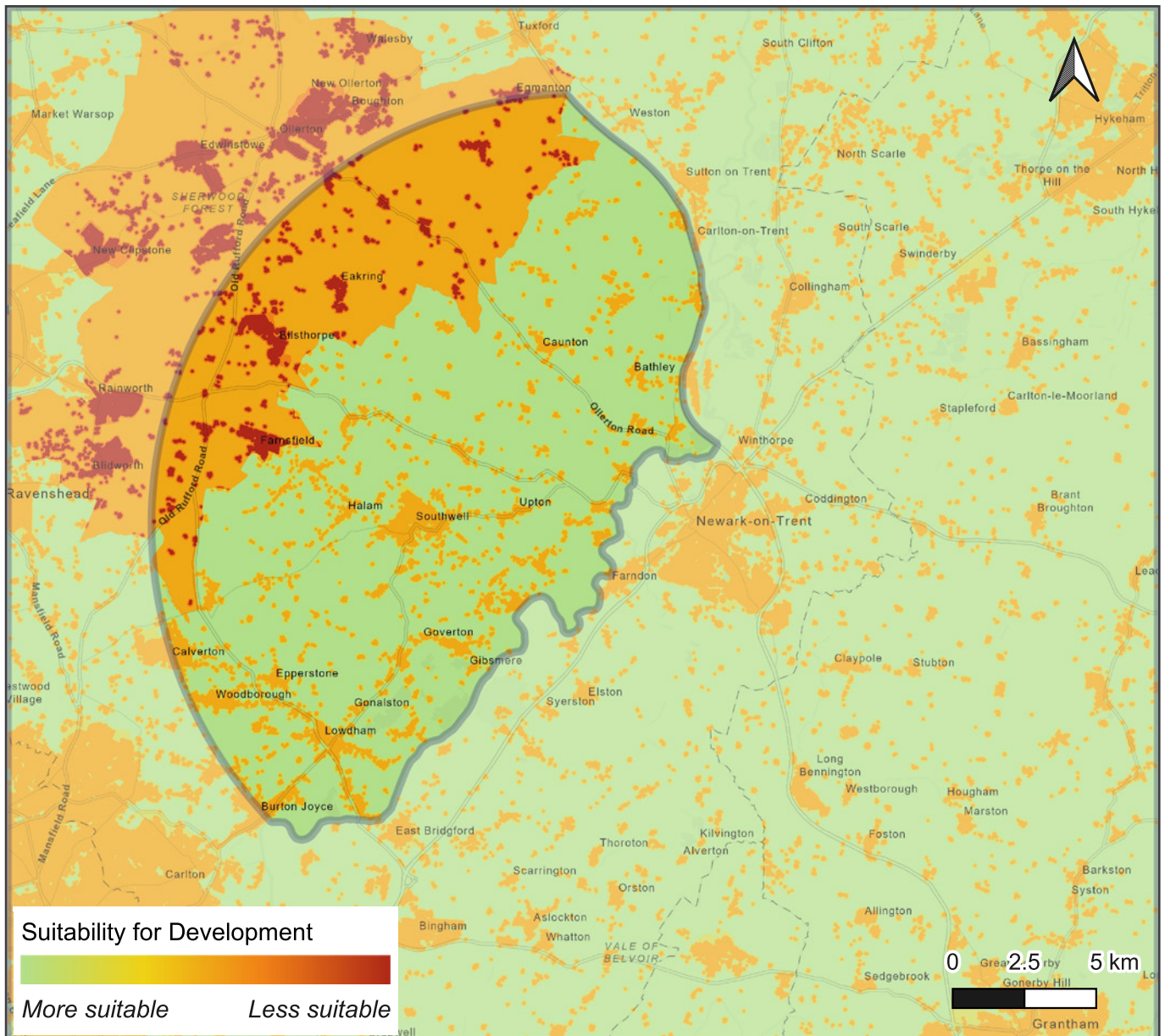


Figure 6: Landscape and Visual Considerations

- 32 There are no national landscape designations (areas unsuitable for development) or Heritage Coast within the area of search. The landscape and visual factors included in the analysis are as follows:
- **Areas identified as best avoided** - local landscape designations (potential Sherwood Forest Regional Park); and land within 50 m of residential buildings (to mitigate effects on residential visual amenity).
 - **Areas identified as not preferred** -land within 100 m of residential buildings or within 100 m of local plan housing allocations (in both cases to mitigate effects on residential visual amenity).

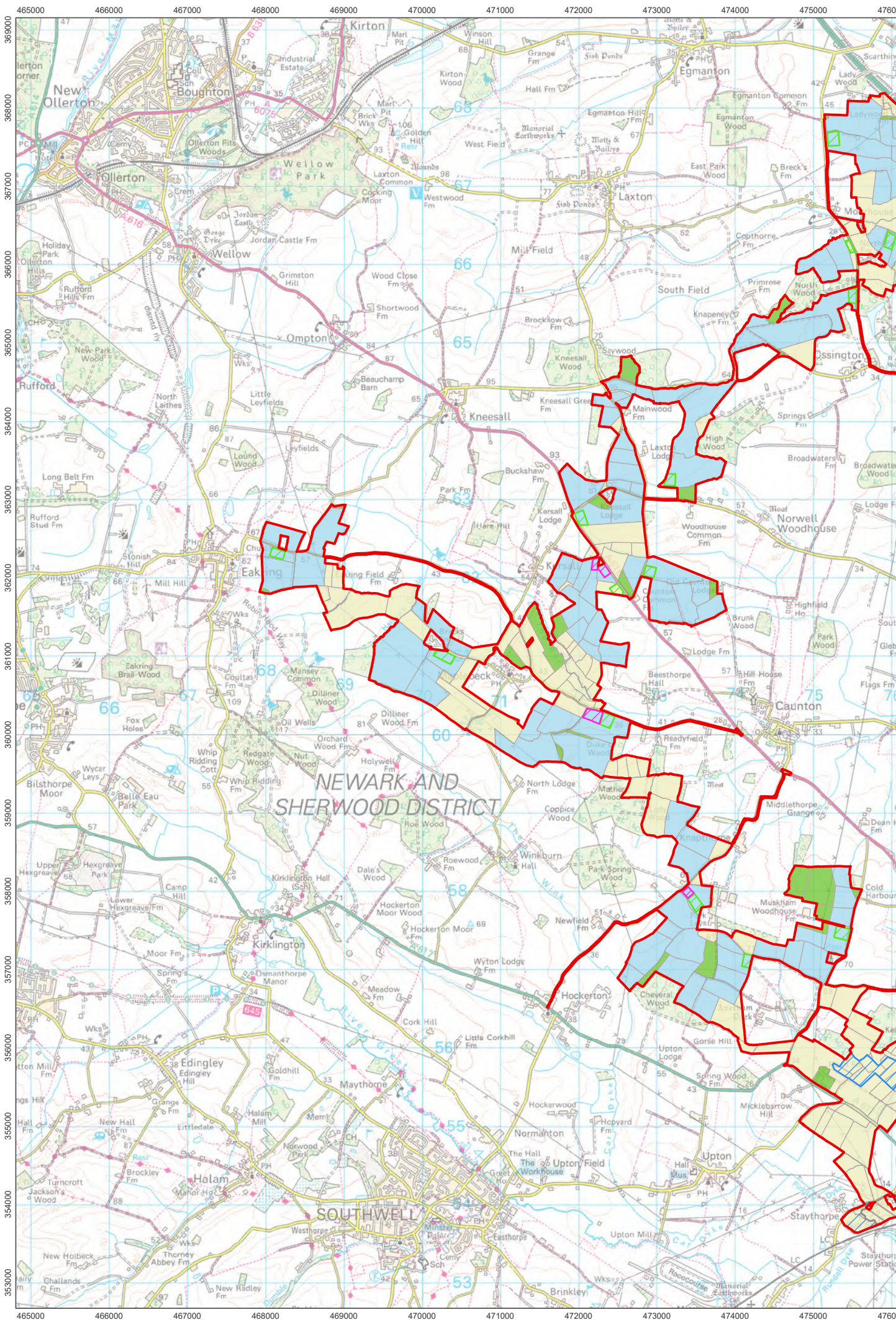
3.2 IDENTIFYING DEVELOPMENT AREAS

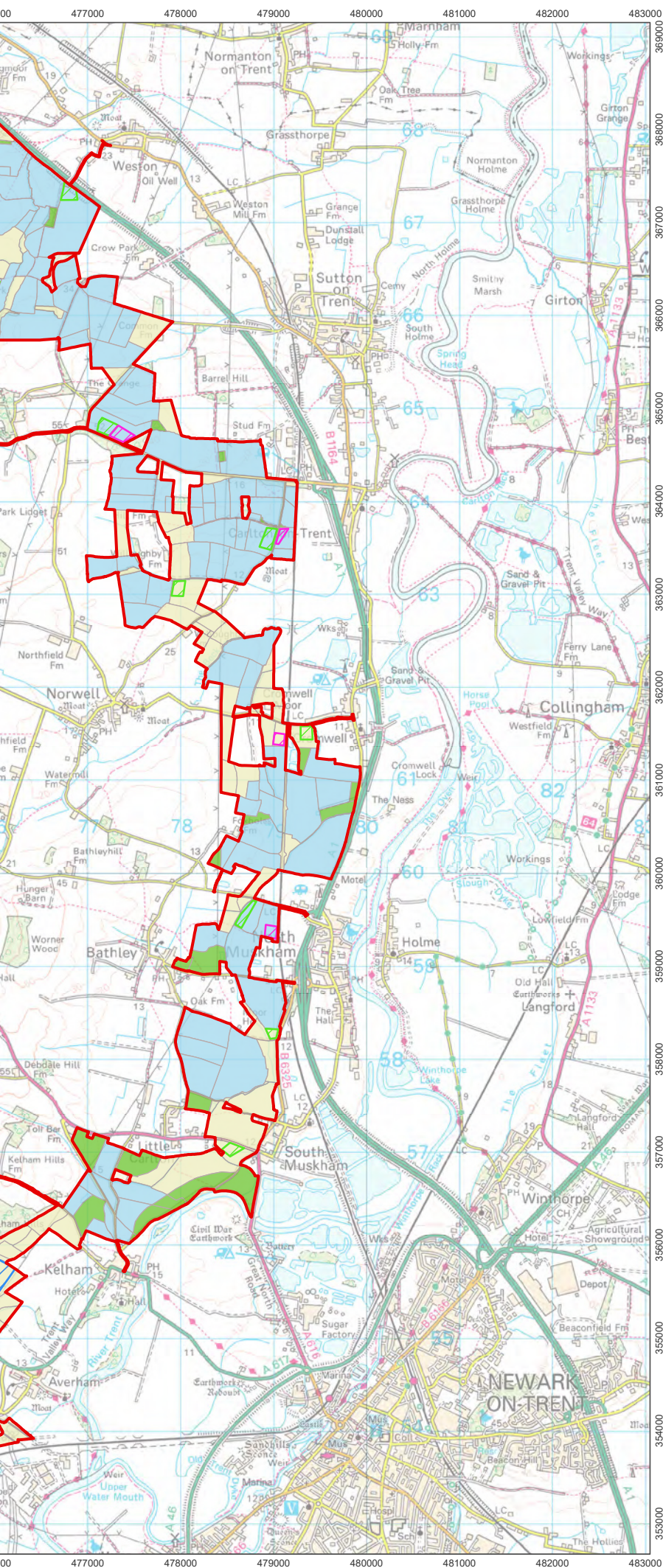
3.2.1 Land Assembly









- 33 The ownership of larger parcels of land within the parts of the search area with fewer constraints were identified. The land assembly involved a combination of assessment of landholdings introduced to the Applicant by land agents and land that the Applicant pursued by actively approaching landowners. This process worked outwards from the accepted grid connection point at Staythorpe substation, favouring lower constraint / more suitable areas and with a stronger preference placed on land parcels closer to the substation. This ensured efficiency in terms of the future electrical design and use of materials for the project.
- 34 As potentially available land was identified, high level technical and environmental reviews were undertaken to establish potential constraints to development with more suitable land parcels retained and obviously constrained land discarded. As this process progressed, further landowners were approached and the project team was also directly approached by other landowners wishing to be involved in the project.
- 35 Early on in the land assembly process it was decided that strong preference would be given to minimising the use of compulsory acquisition powers in order to secure land for the Development. Although this falls within the scope of NSIPs and the DCO process, the potential for adverse impacts on unwilling participants was recognised and the Applicant has made good progress on private treaty agreements to minimise this necessity. Further details relating to the land assembly are set out in Section 4.4 of Chapter 4 Alternatives [EN010162/APP/6.2.4].

3.2.2 Defining Draft Order Limits and Potential Development Areas

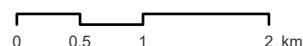
- 36 Once sufficient available land was identified to allow development of a project that would maximise utilisation of the grid connection available, a more detailed review was undertaken by environmental specialists to identify areas more and less suited for solar PV, cable routes (to link different solar PV areas and connect to the grid), access (for construction and maintenance), mitigation and enhancement.
- 37 This was complemented by a technical review where engineering specialists ensured that the areas identified for solar PV were viable, could be connected electrically and locations were proposed for other key infrastructure including the BESS, substations and compounds. This was an iterative process with environmental and technical teams working in conjunction to define the broad development parameters of the Development and ultimately the Scoping Order Limits required to accommodate it.





-  Order Limits
-  Staythorpe National Grid Substation
-  BESS 400kV Compound
-  Substation Areas
-  Construction Compound Areas
- Development Areas
 -  Cable Area
 -  Other Area
 -  Solar Area

1:60,000 Scale @ A3

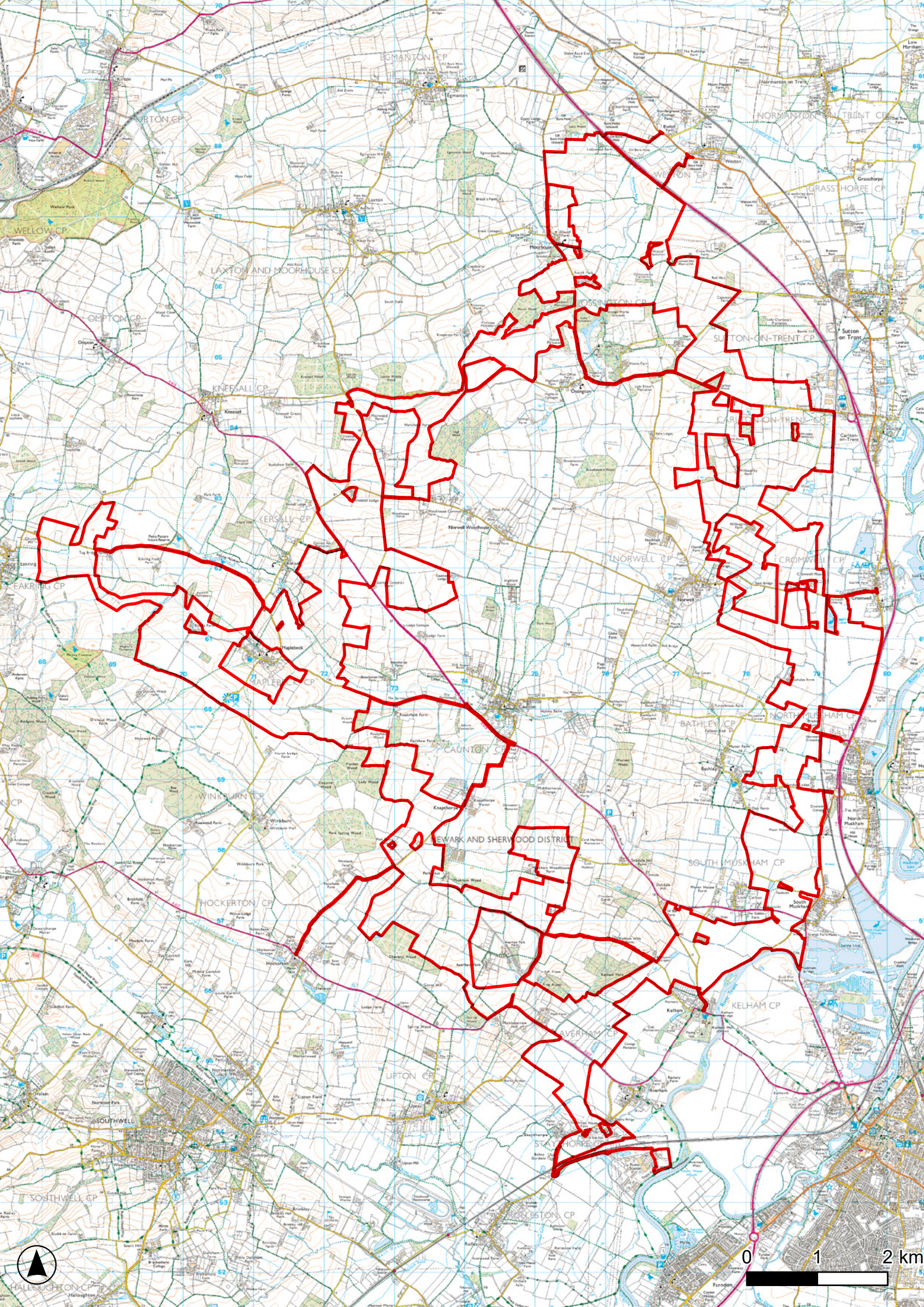


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Date: 07/11/2023

Indicative Developable Areas Figure 2.2 - Overview

Great North Road Solar Park Scoping Report



- 38 Within the Scoping Order Limits, broad development areas were defined as follows:
- **Solar Areas** - encompassing the solar PV array and associated infrastructure elements; including transformers, inverters, access tracks, fences, etc.
 - **Compounds** - comprising permanent compound areas within which the BESS and substations would be built and temporary compounds used during construction.
 - **Cable Areas** - available for underground cables and access.
 - **Other Areas** - available for environmental mitigation and enhancement (noting that this may also be included within any of the above areas) along with minor ancillary infrastructure such as access tracks.
- 39 These areas formed the basis of the EIA scoping process and are described in detail within the EIA Scoping Report and illustrated by EIA Scoping Report Figure 2.2 which is included on the following page.

Order Limits

 Order Limits

4 SITE CONTEXT







4.1 INTRODUCTION

- 40 This section provides an overview of the environmental context within and around the ES Order Limits.

4.1.1 Site Context and Order Limits

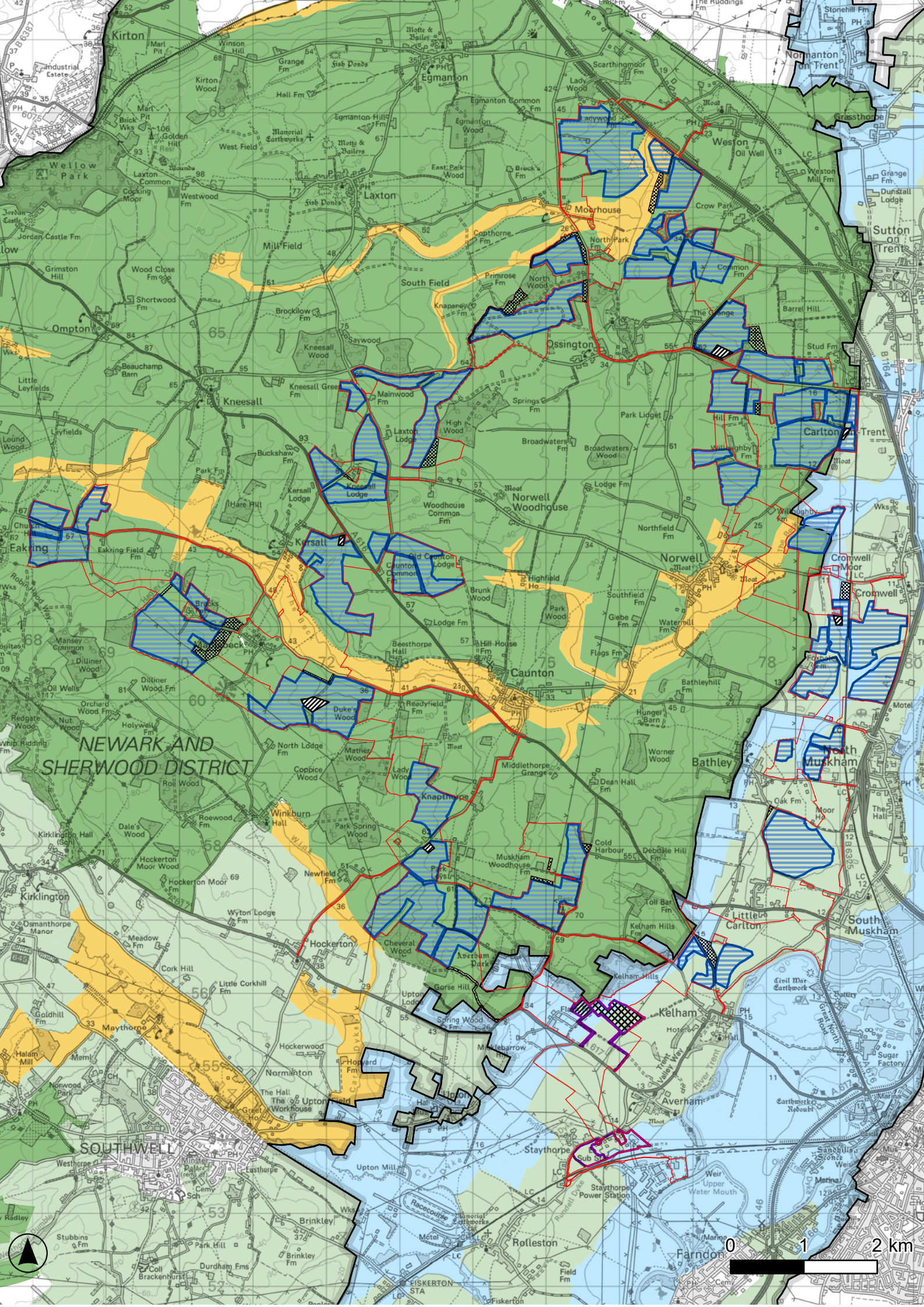
- 41 The ES Order Limits cover a ring of land parcels that broadly extends from the A1/ village of Egmanton in the north to the village of Staythorpe in the south, and from the Cromwell in the east to Eakring in the west.
- 42 The ES Order Limits cover approximately 1,765 ha, of which approximately 1,025 ha are solar PV fields.
- 43 The wider area within the ES Order Limits is generally composed of agricultural land, interspersed with occasional woodlands. Villages and hamlets are connected by rural roads and Public Rights of Way (PRoW), some of which are located within the ES Order Limits. Smaller fields and tree cover are more common close to the villages and along watercourses, with larger and more open fields set further away.
- 44 Topographically land within the ES Order Limits ranges from 10m Above Ordnance Datum (AOD) to 60 m AOD, across a gently undulating landscape and is generally lower lying in the east towards the River Trent.
- 45 Main transport routes in the local area include the A1 and East Coast Main Line railway which run adjacent to and through the eastern edge of the ES Order Limits, and the A616 and A617 which head northwest from Newark-upon-Trent which lies around 1 km to the southeast of the ES Order Limits.

Local Landscape Character

	Order Limits
	Proposed Solar Array Areas
	BESS and 400kV Substation Development Areas
	Substations (400kV & intermediate)
	BESS
	Proposed Woodland

Landscape Character

	Regional Character Areas
Newark & Sherwood Landscape Character Types	
	Meadowlands
	River Meadowlands
	Village Farmlands
	Village Farmlands with Ancient Woodlands





Undulating larger scale arable landscape with fields divided by hedges and trees



Red brick and pantile villages, barns, and infrastructure form part of the character



Smaller scale lower-lying pastoral landscape with trees along field boundaries within the Mid Nottinghamshire Farmlands RCA



More open, flatter landscape influenced by the A1 and railway line in the Trent Washlands RCA

4.2 LOCAL LANDSCAPE CHARACTER

- 46 At a local level Landscape Character Types (LCTs) within the PEIR Order Limits are defined within Newark and Sherwood's Landscape Character Assessment¹³. The majority of the Development would lie within the Village Farmlands with Ancient Woodland LCT within the Mid Nottinghamshire Farmland Regional Character Area (RCA), with areas to the east mostly within the Village Farmlands LCT within the Trent Washlands RCA. Small parts of the Development would be within the Meadowlands/ River Meadowlands LCTs.

13 Newark and Sherwood District Council (2013). Newark and Sherwood Landscape Character Assessment. Available at: <https://www.newark-sherwooddc.gov.uk/lcaspd/>



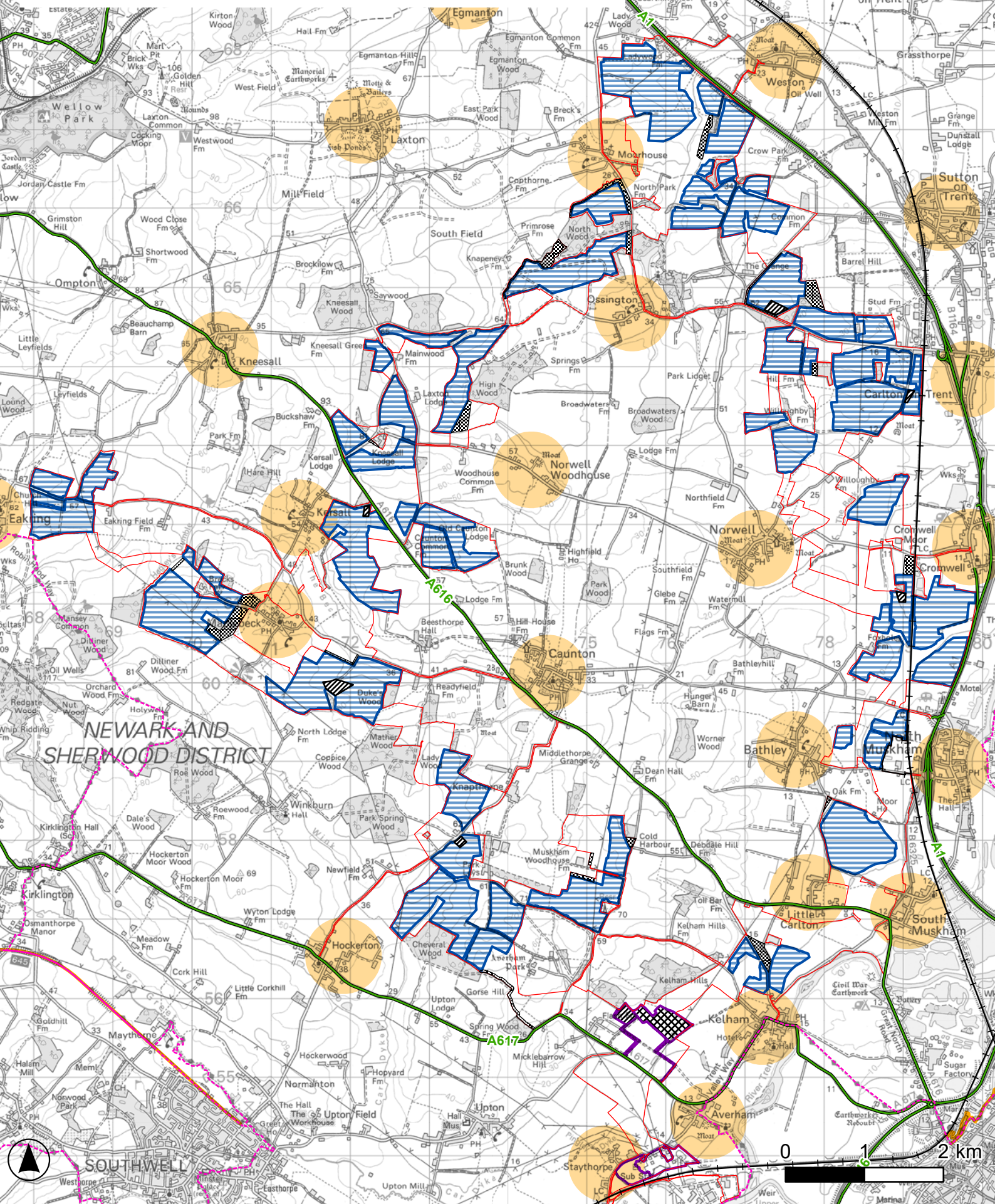
Roadside hedges often constrain views



Occasional open vistas

Visual Receptors

- Order Limits
- Proposed Solar Array Areas
- BESS and 400kV Substation Development Areas
- Substations (400kV & intermediate)
- BESS
- Proposed Woodland
- Nearby Villages
- Long Distance Routes
- Main Railway Lines
- A Roads
- National Cycle Routes



- 47 The Village Farmlands LCTs within the two adjacent Regional Character Areas have characteristics in common and form the larger scale, mostly rectilinear, primarily arable, gently undulating fields between the River Trent and the more wooded Sherwood area to the west. The Meadowlands LCT is associated with water courses and has a less rectilinear pattern with smaller pastoral fields and greater tree cover. The River Meadowlands are largely flat and have fewer hedgerows, but have trees along watercourses and transport corridors. Given these character differences, the Village Farmlands LCTs form the focus for the Development, with limited development within the more sensitive Meadowlands LCTs.

4.2.1 Village Farmlands Character

4.3 SENSITIVE VISUAL RECEPTORS

- 48 Sensitive visual receptors in the local area include residents of nearby villages, people living in rural properties outside of the villages, users of long distance footpaths and Public Rights of Way, and local road users.
- 49 Views out from streets and public places within villages are often contained by buildings and vegetation and the Development has been designed to minimise visibility from villages, avoiding fields which were more openly visible.
- 50 Footpaths have a mix of more contained and open views, with some paths running through woodlands and between hedges and others across open fields with wide vistas. Views from local roads are often constrained by roadside hedges and trees, although there are also more open vistas where roadside vegetation is absent.

5 DESIGN DEVELOPMENT: SCOPING TO PEIR

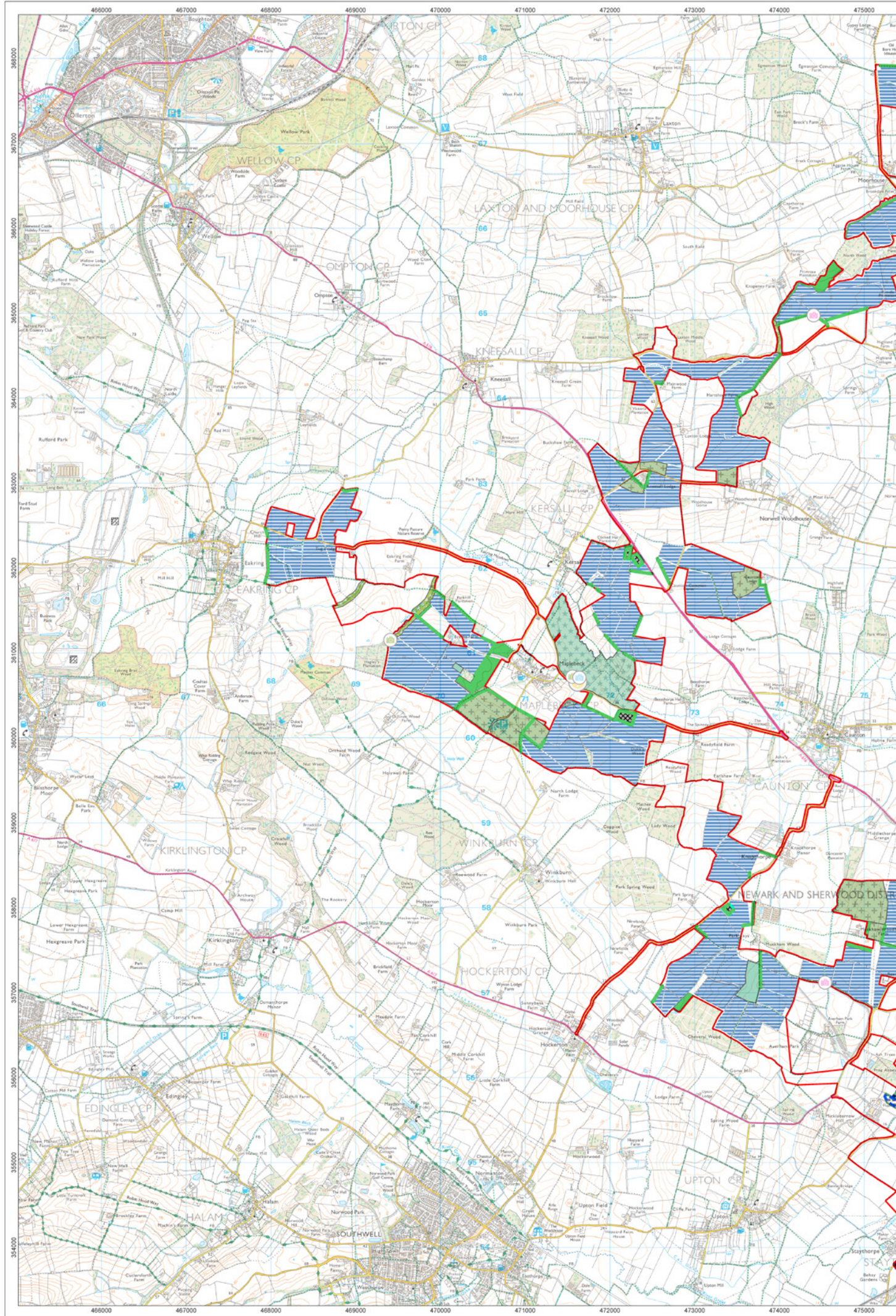
5.1 INTRODUCTION

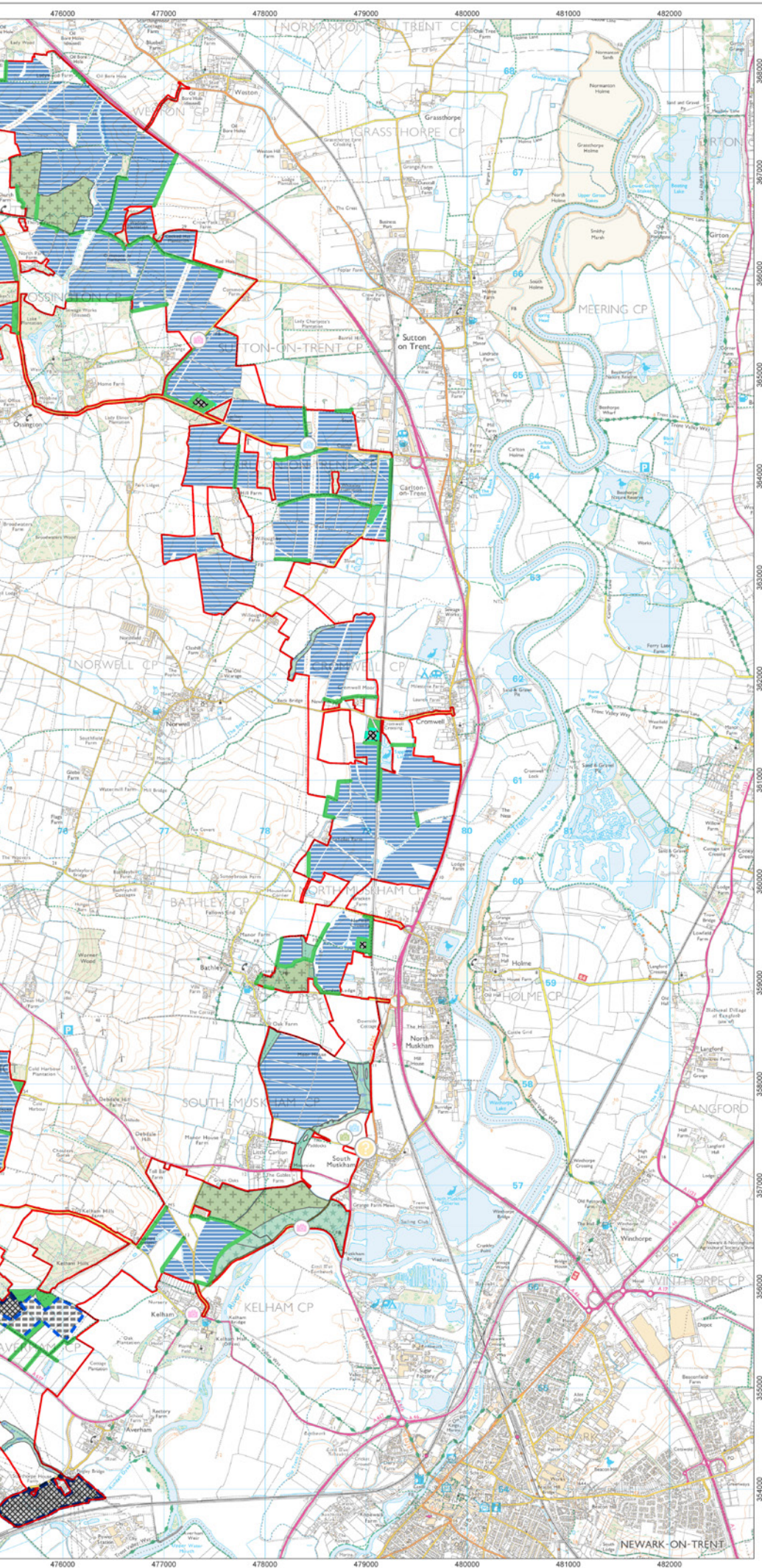
- 51 Following submission of the EIA Scoping request, a Preliminary Masterplan was developed based on the development areas set out for scoping. This included some initial refinements to solar areas arising due to technical and landowner factors and illustrated:
- Scoping Order Limits
 - Above ground energy infrastructure
 - Proposed landscape and ecological mitigation areas
 - Proposed public access enhancements, visitor facilities and interpretation
- 52 The Preliminary Masterplan, as illustrated on the following page, identified the broad scope of the Development and key project elements in a simple and accessible format to enable early stage communication with the local community and stakeholders.

5.1.1 Non-Statutory Consultation

- 53 An initial 6-week period of non-statutory community consultation was undertaken over January and February 2024 to introduce the project to the public, during which the preliminary masterplan was presented along with a range of other environmental and technical information relating to the Development. This included a series of public information events held in the local area and online, launch of the project website and initial engagement with a range of local organisations and public interest groups.
- 54 Feedback was collated through this period, as summarised in the Phase One Consultation Summary Report¹⁴, and a proactive approach to comments was taken. Wherever direct requests were made for design changes, these were considered by the project team and provisional amendments were identified where these were proportionate and appropriate. Following the initial consultation period an updated interim masterplan was produced to illustrate potential changes arising from feedback at this stage which was published on the project website.
- 55 Engagement with local communities and stakeholders has remained ongoing following the initial 6-week non-statutory consultation period through a range of different forums, including:
- Parish Councils - attending and presenting at local meetings
 - Local interest groups, including:
 - Local wildlife trusts
 - Sherwood Forest Trust
 - Trent River Trust
 - British Horse Society
 - YMCA
 - Local cycling, walking and other sports groups
 - Local businesses

14 Elements Green (2024). Community Newsletter and Phase One Consultation Summary Report. Available at https://static1.squarespace.com/static/63f72e89a711f627aa3bed70/t/66aa25a9441f413b3ef5894b/1722426797456/240731_Great+North+Road+Phase+One+Consultation+Summary+Report.pdf





- Order Limits
- Proposed Solar Panel Areas (1) - typically offset approximately 10m from field boundaries
- Proposed 400kV Substation Areas (2)
- Proposed BESS Area (2)
- Proposed Substation Areas (2)
- Landscape & Ecology**
 - Proposed Hedgerows and Broadleaf Woodland (5) (6)
 - Retained Agricultural Land - enhanced ecological management (7)
 - Proposed Permanent Grassland (8)
 - Proposed Green Corridor (9)
 - Proposed Riparian Corridor (9)
 - Proposed Wildlife Site (10)
- Visitor Interpretation**
 - Clean Energy Information (14)
 - Ecology/Landscape Information (14)
 - Heritage Information (14)
 - Solar Farm Visitor Hub (13)

1:27,500 Scale @ A1

0 0.25 0.5 1 1.5 2 km



Produced By:

Ref:

Checked By:

Date: 16/01/2024

Preliminary Masterplan

Great North Road Solar Park

5.1.2 Environmental Survey and Assessments

- 56 Environmental survey and assessment work has been ongoing throughout the project, increasing in intensity and focus following EIA scoping and taking on board feedback from statutory consultees. Environmental survey and baseline assessment outcomes have fed back into the design process, generally resulting in gradual reductions of the solar development areas as new constraints have been identified or areas required for specific environmental mitigations have been allocated.

5.1.3 Technical Design

- 57 Technical design work, particularly in relation to the overall electrical system, has been ongoing through this stage which has built upon the broad parameters which informed the site selection process and initial definition of the Scoping Order Limits. This ongoing technical design has allowed rationalisation of cable routes and infrastructure, including the locations and number of substations.

5.2 DESIGN REFINEMENT

- 58 Consultation, environmental and technical considerations have all fed into refinement of the Development design. The following pages in this section provide a summary of key changes which have been made to the Development between the EIA Scoping and PEIR stages of project, including both changes to the proposed layout and to the Order Limits.
- 59 Minor changes to proposed development areas and Order Limits are not described in detail but may have arisen due to one or more of the following factors:
- Offsets from field boundaries - solar areas illustrated on the Preliminary Masterplan included an offset of 5 m from all field boundaries, assuming the presence of hedgerow boundaries. These were rationalised for the PEIR stage in order to accommodate Root Protection Areas (RPAs) around hedgerows, trees and woodlands identified through ongoing arboricultural surveys, avoid other physical constraints and remove buffers around features such as open or post and wire fenced field boundaries which can easily be incorporated within solar areas.
 - Offsets from overhead lines and buried services - solar areas illustrated on the Preliminary Masterplan included varying offsets from all such features. These were incorporated within the 'solar array areas' for the PEIR stage as, while they remained a constraint for generation infrastructure (solar panels, inverters, substations, etc.), they may have been suitable for other ancillary infrastructure (access, cables, fencing, etc.).
 - Geophysics and trial trenching - solar areas illustrated on the Preliminary Masterplan excluded areas identified by early geophysics surveys as potentially containing features of archaeological interest. As above, these have now been incorporated within the solar array areas. Whilst they remained a constraint for generation infrastructure (solar panels, inverters, substations, etc.), they may have been suitable for other ancillary infrastructure (access, cables, fencing, etc.) subject to further archaeological investigations.
 - Landowner negotiations - the process of land assembly remained ongoing and landowner preferences were incorporated during the process of commercial agreements being finalised.

5.2.1 Changes to the Development Layout

5.2.1.1 Design Changes near Maplebeck

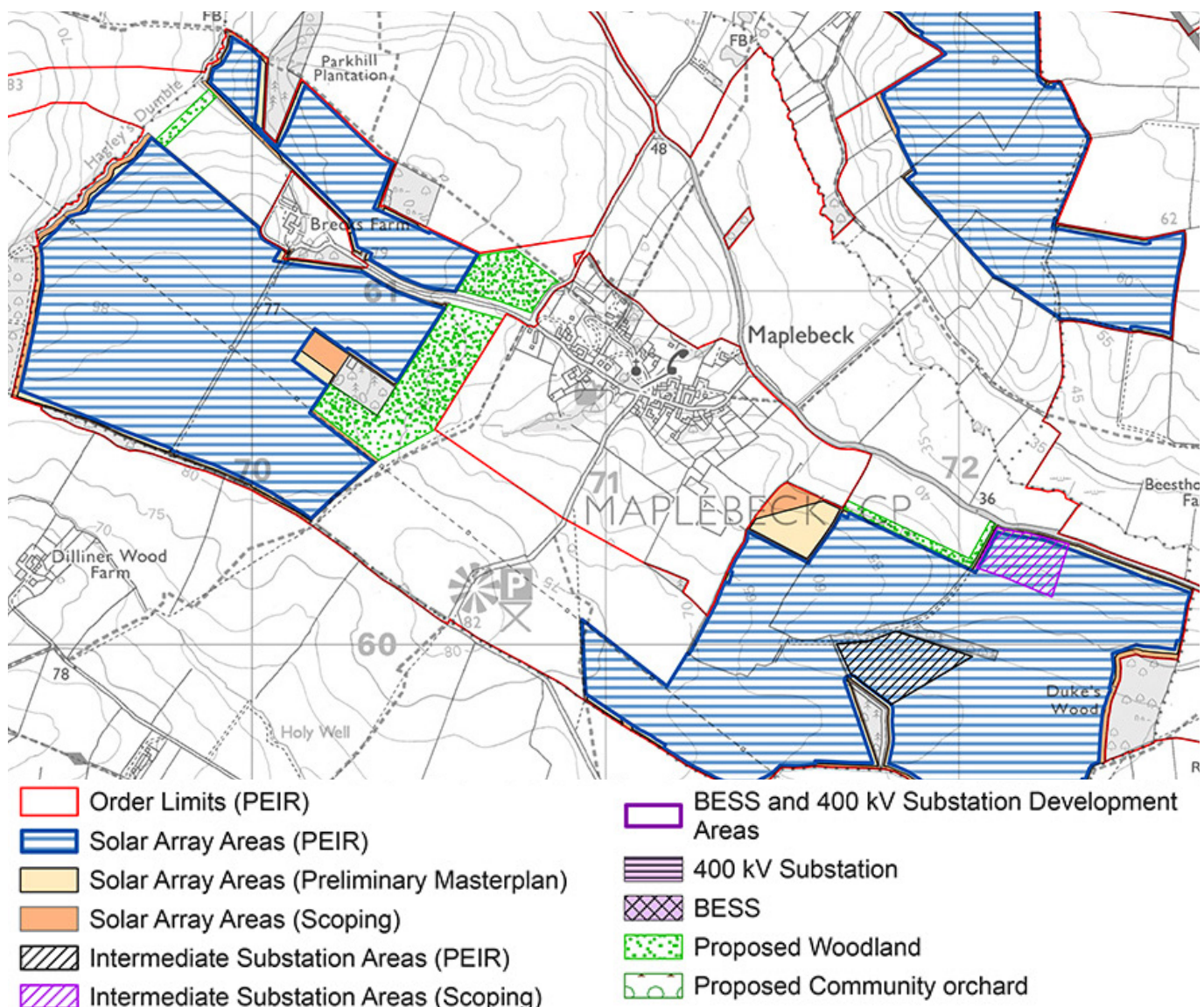
60 Between Scoping and the Preliminary Masterplan:

- Set back of closest panel area southeast of Maplebeck to avoid development on the more visually prominent slopes facing the village.
- Omission of solar panels from adjacent to woodland south of Brecks Farm to create ecological mitigation area.

61 Between Preliminary Masterplan and PEIR:

- The Maplebeck Road intermediate substation was removed southwest to reduce visibility from the local road and make use of screening by existing woodlands.
- New woodlands to the west of Maplebeck were incorporated to screen solar areas from the southwestern side of the village and for people using nearby footpaths. It was also anticipated that woodland in this area may assist in slowing water run-off and help alleviate existing flooding issues.

62 Further reduction in solar area southeast of Maplebeck.



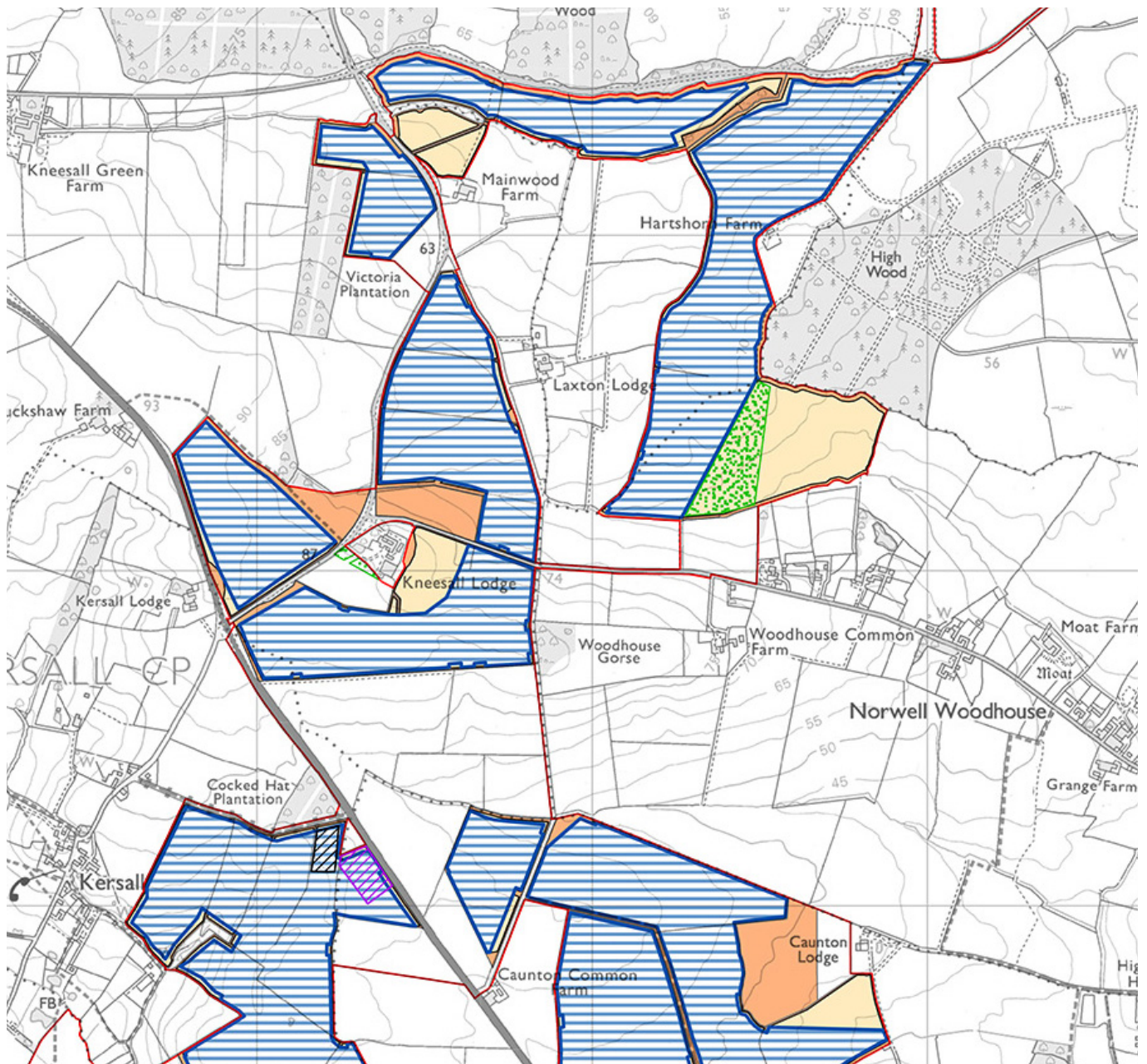
5.2.1.2 Design Changes near Norwell Woodhouse

63 Between Scoping and the Preliminary Masterplan:

- Set back of solar areas from residential properties, to the west and southwest of the properties at Cauntun Lodge and north of Kneesall Lodge.

64 Between Preliminary Masterplan and PEIR:

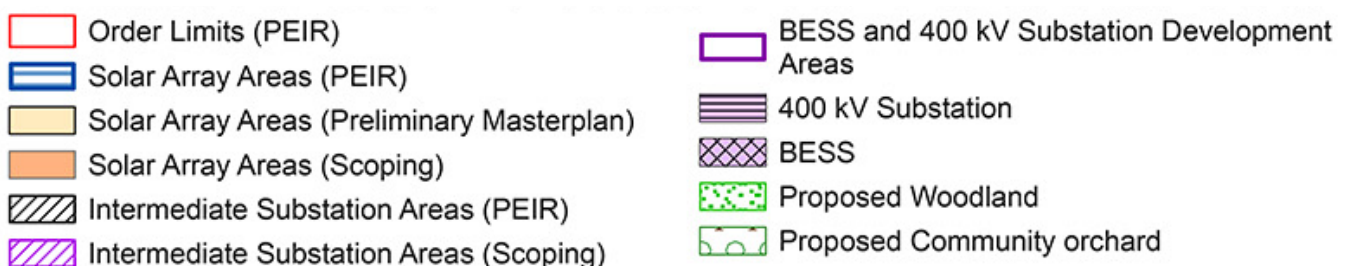
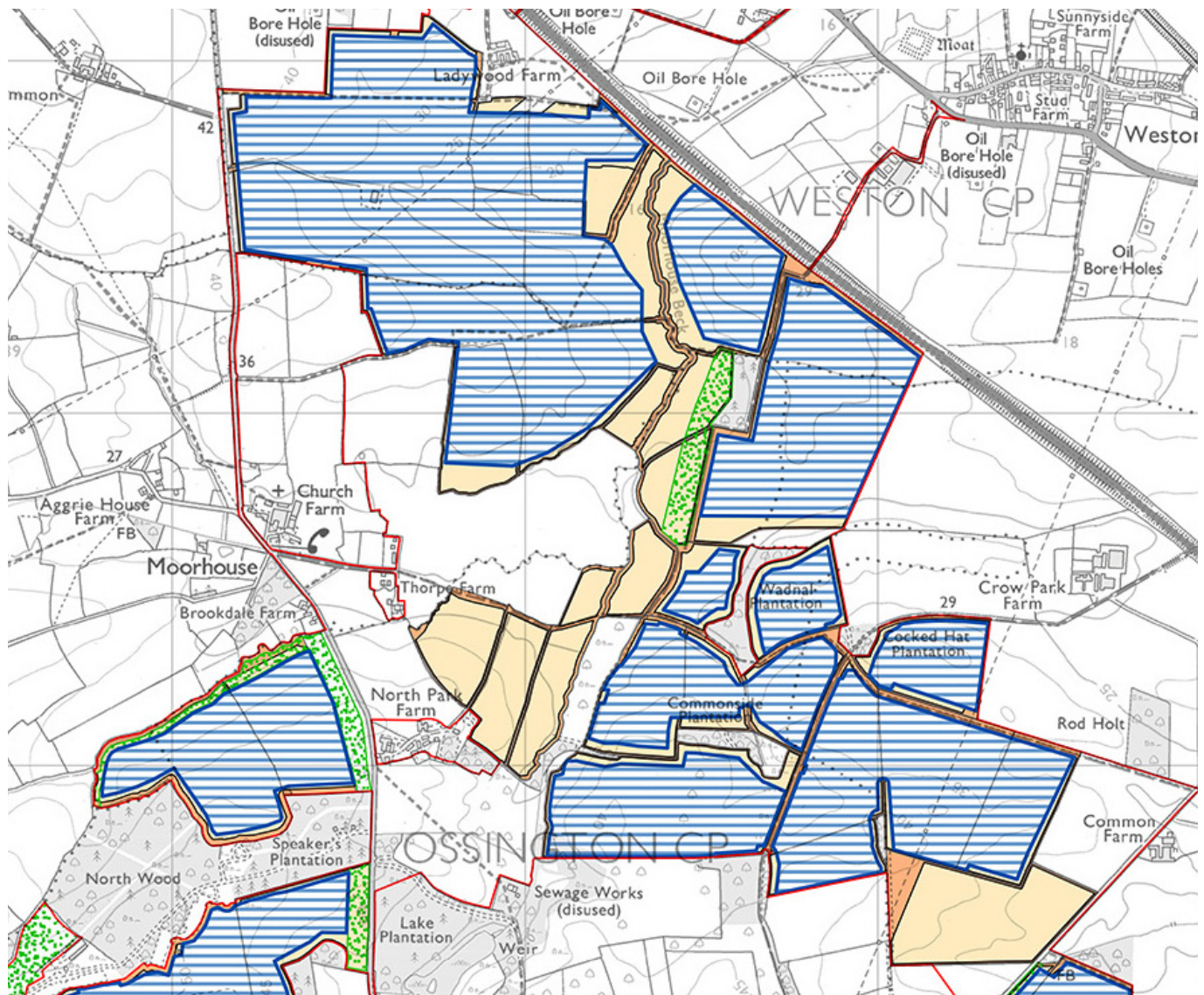
- Removal of one of the two potential areas for the Lime Lane intermediate substation to reduce visibility from the A616.
- Removal of solar panels south of High Wood from slopes facing towards Norwell Woodhouse and new woodland in the area to screen panels further west.
- Further set back of solar area to south of property at Cauntun Lodge and removal of panel areas north of Mainwood Farm and east and southeast of Kneesall Lodge in response to comments from householders during consultation in relation to visual amenity.



5.2.1.3 Design Changes near Moorhouse

65 Between Preliminary Masterplan and PEIR:

- Removal of solar areas alongside Moorhouse Beck due to the smaller scale pastoral character and higher flood risk (Flood Zone 3) in this area. This change also aids in optimising provision of ecological enhancement and reducing visibility of the Development from homes near Thorpe Farm.
- Reduction of solar areas and new woodlands proposed along Ossington Road south of Moorhouse (west of Lake Plantation) to screen panel areas, mitigating visual impact on local road users, and to enhance wooded character.
- Removal of solar from the field southwest of Common Farm, reflecting final land agreements.



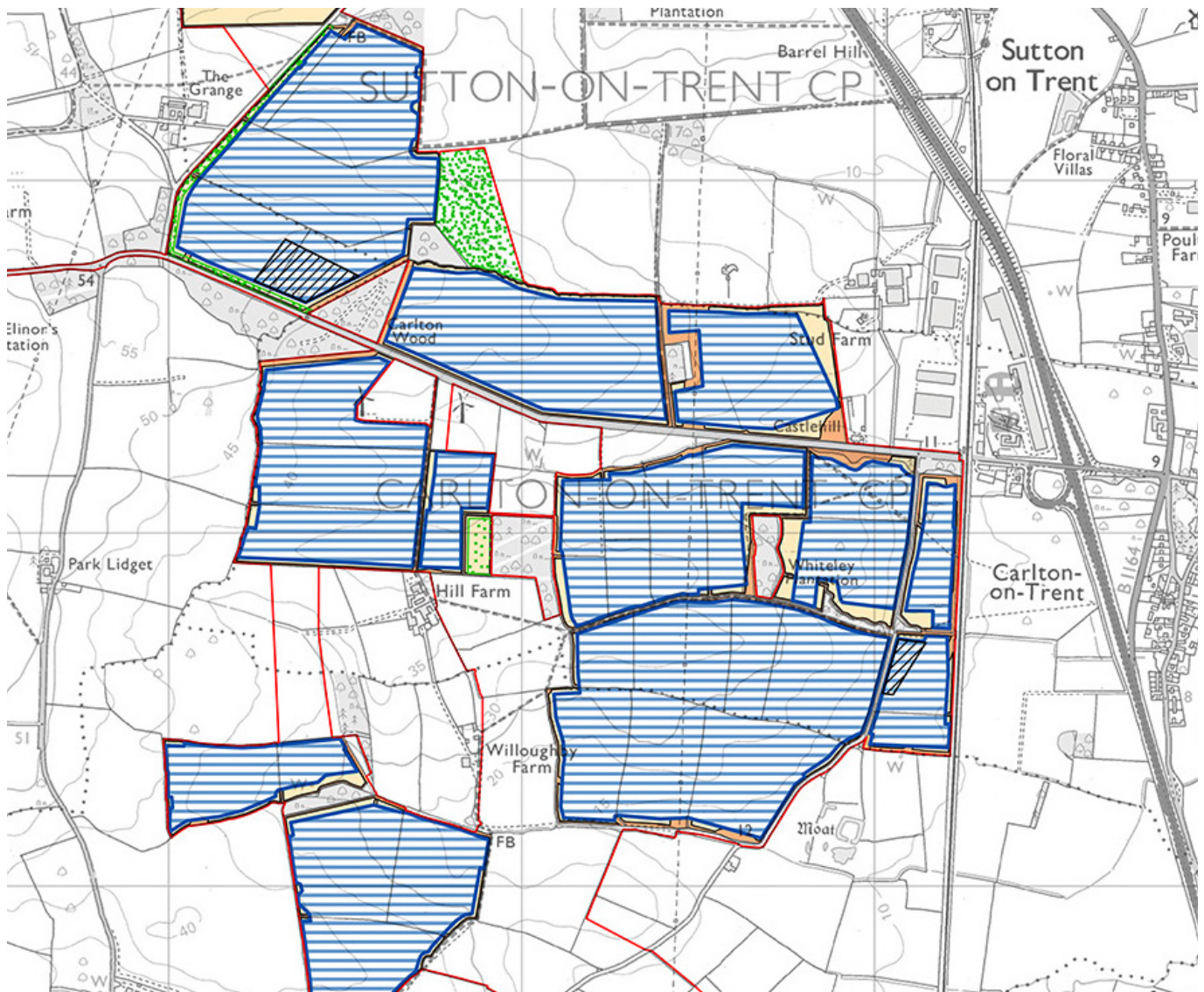
5.2.1.4 Design Changes near Carlton on Trent

66 Between Scoping and the Preliminary Masterplan:

- Set back of solar areas from residential properties at Castle Hill to mitigate effects on residential visual amenity.
- Introduction of a woodland belt around the Ossington Road intermediate substation to mitigate visual effects on road users and reinforcing the wooded character of the area.

67 Between Preliminary Masterplan and PEIR:

- Increased set back of solar areas from residential properties at Castle Hill and Stud Farm to mitigate effects on residential visual amenity.
- New woodlands proposed extending northeast of Carlton Wood and west from woodland east of Hill Farm to enhance wooded character in the area and provide ecological enhancement.



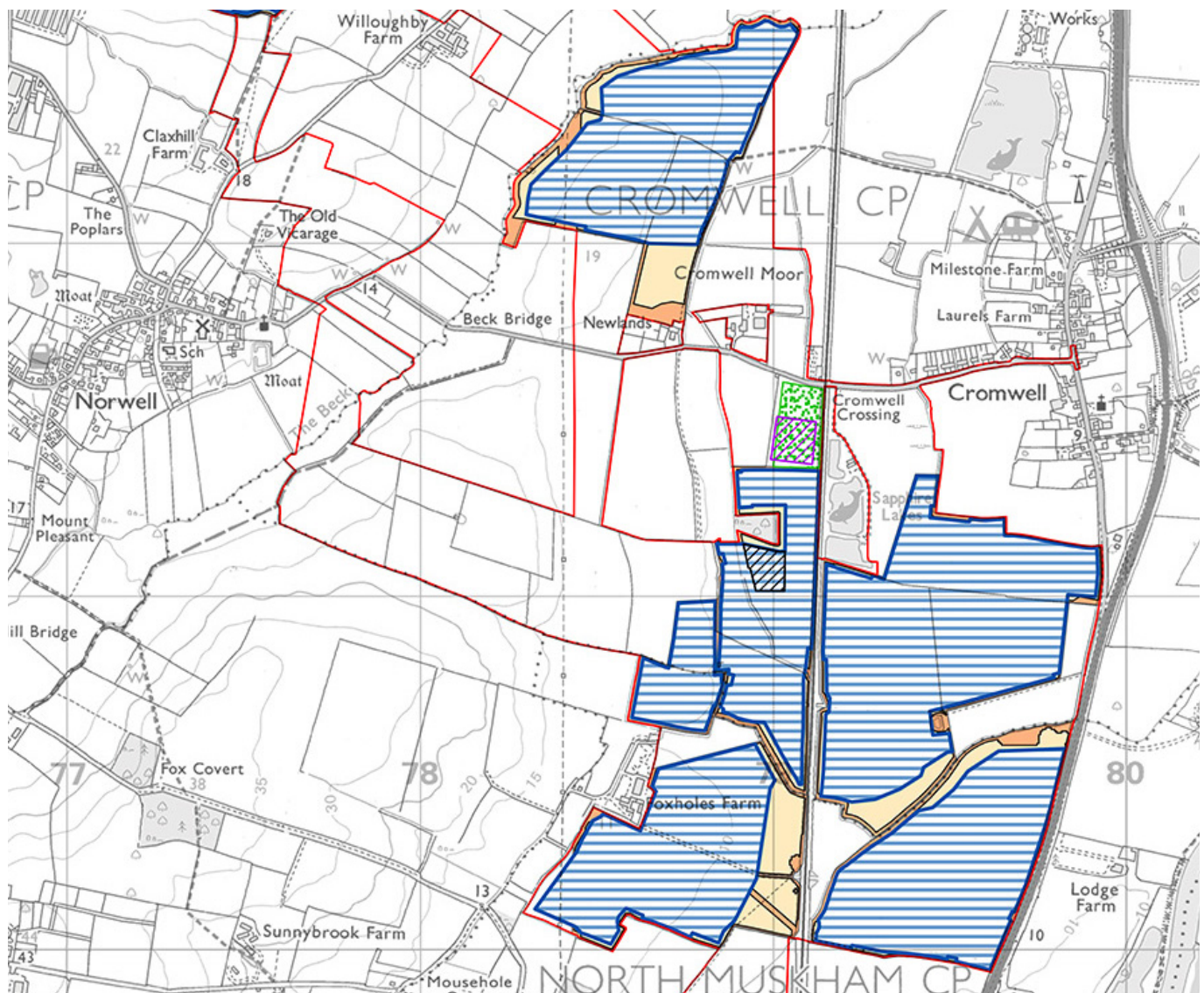
5.2.1.5 Design Changes near Cromwell

68 Between Scoping and Preliminary Masterplan:

- Set back of solar area from residential property at Newlands to mitigate effects on residential visual amenity.

69 Between Preliminary Masterplan and PEIR:

- Increased set back of solar areas from residential property at Newlands in response to comments from householders during consultation in relation to visual amenity.
- Reduction of the extent of solar areas within area of higher flood risk (Flood Zone 2) between Foxholes Farm and the A1, supported by detailed hydrological modelling.
- Location of Cromwell Crossing substation moved further south away from homes, and south of existing woodland to provide screening of views from Norwell Lane and mitigate potential noise impacts.



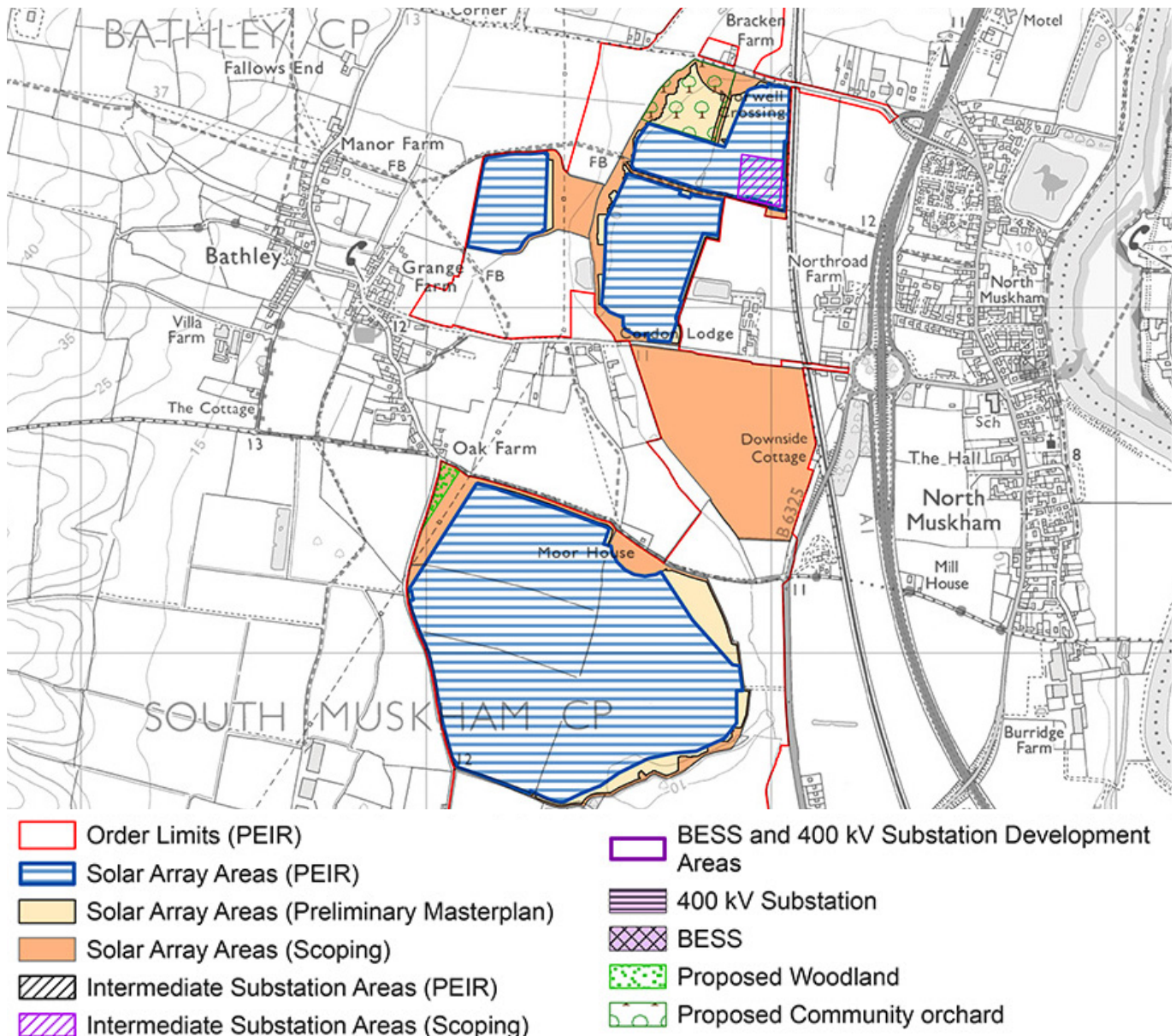
5.2.1.6 Design Changes near North Muskham and Bathley

70 Between Scoping and Preliminary Masterplan:

- Omission of areas close to residential properties at Bracken Farm, Oak Farm, Cordon Lodge, Downside Cottage and Moor House to mitigate effects on residential visual amenity, also reducing extent of solar areas within area of higher flood risk (Flood Zone 2).
- Omission of panels within areas of highest flood risk (Flood Zone 3).

71 Between Preliminary Masterplan and PEIR:

- Increased set back of solar areas from residential property at Bracken Farm in response to comments from householders during consultation in relation to visual amenity, and provision of a community orchard.
- Further reduction of the extent of solar areas within area of higher flood risk (Flood Zone 2) to the west of the B6325, supported by detailed hydrological modelling.
- Omission of Norwell Crossing substation as ongoing development of the electrical design indicated it would not be required.



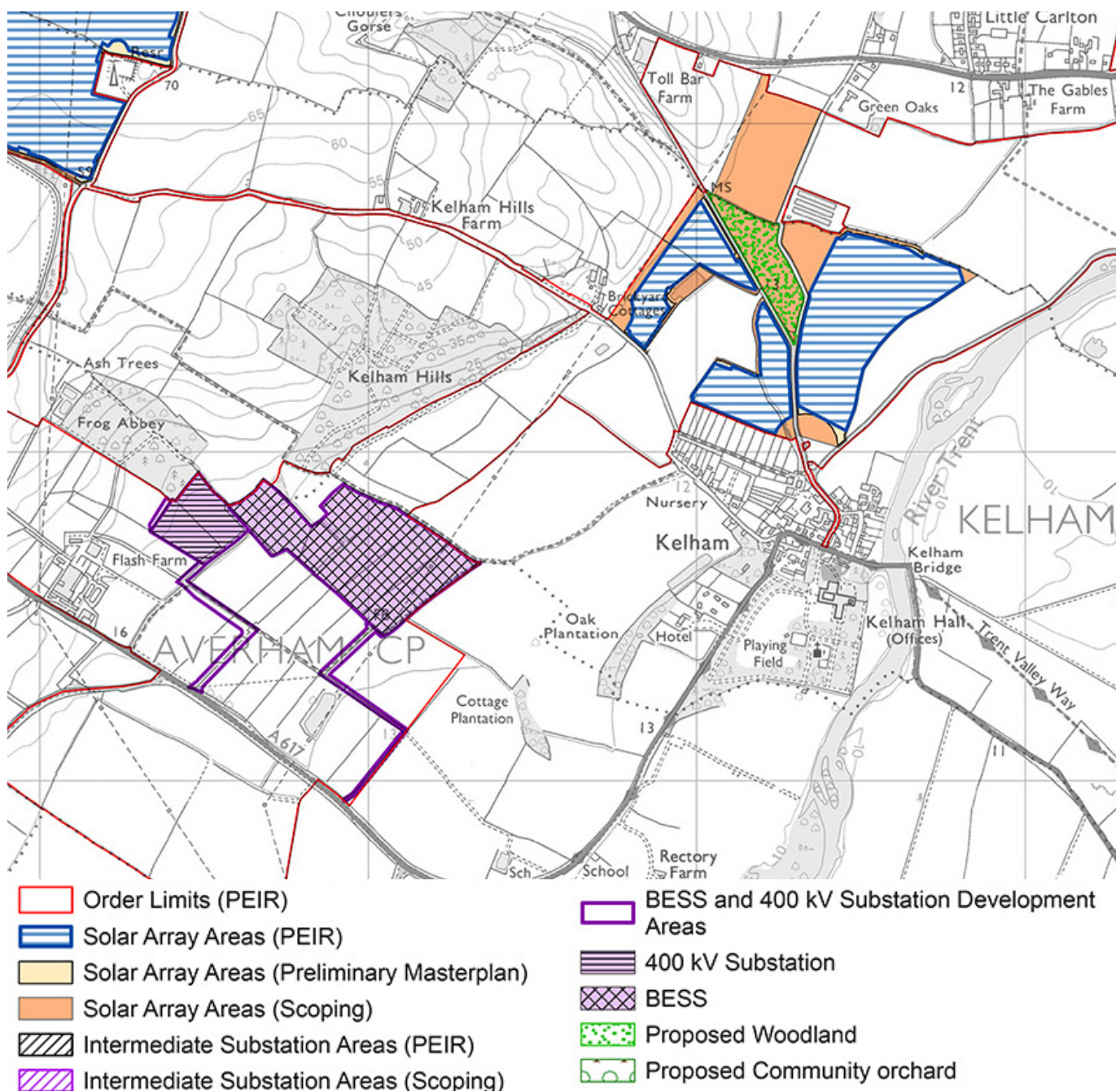
5.2.1.7 Design Changes near Kelham

72 Between Scoping and Preliminary Masterplan:

- Set back of solar areas from homes at Brickyard Cottages, Kelham Farm Bungalow at northern edge of Kelham and to mitigate effects on residential visual amenity.
- Omission of solar areas between Ollerton Road and Kelham Lane, avoiding an area of high flood risk (Flood Zone 3).

73 Between Preliminary Masterplan and PEIR:

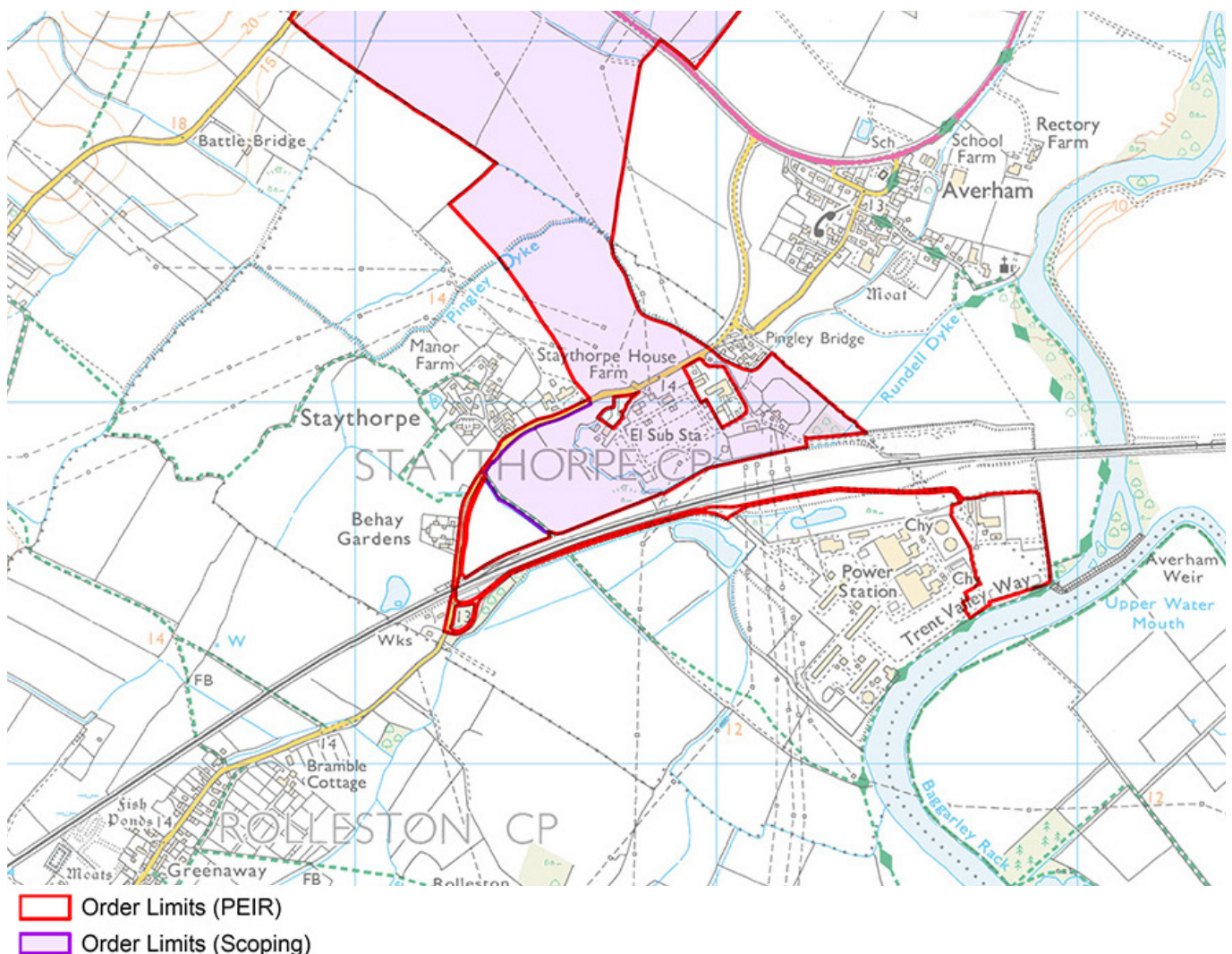
- Omission of field from BESS (immediately SE of 400 kV substation) as development of the electrical design indicated it would not be required, also avoiding area of high flood risk (Flood Zone 3) within the southern section of the omitted field.



5.2.2 Changes from Scoping Order Limits to PEIR Order Limits

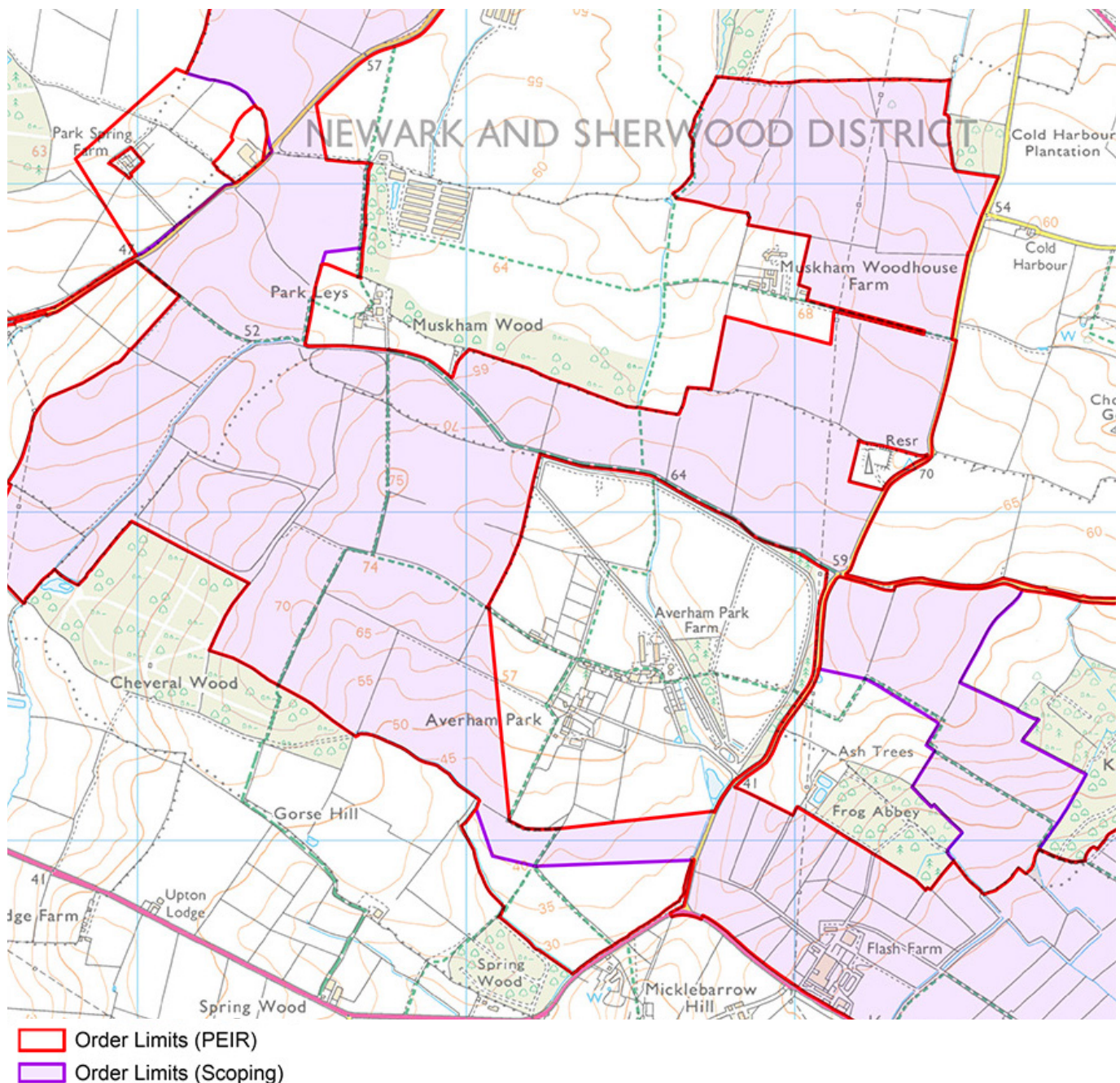
5.2.2.1 Order Limits Changes near Staythorpe

- Order Limits extended to the south, encompassing part of the Staythorpe Power Station site adjacent to the River Trent, to allow the option of transporting equipment and construction materials via the river and reduce construction traffic on the local road network.
- Order Limits extended to encompass the field immediately southwest of the consented Staythorpe BESS development, providing additional flexibility to construct the Development around the consented BESS and existing Staythorpe Substation where the Development will connect to the electricity grid.



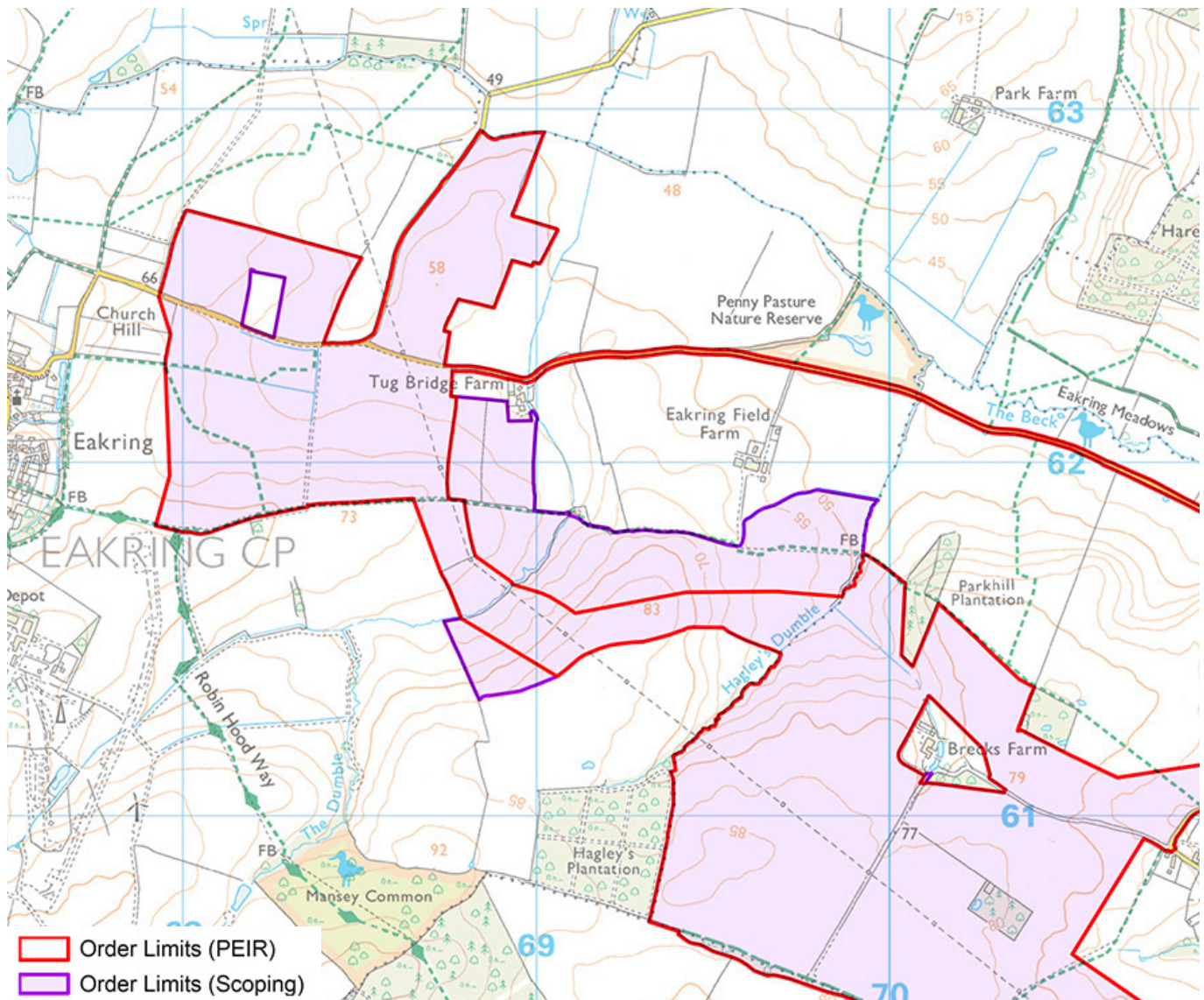
5.2.2.2 Order Limits Changes between Kelham and Hockerton

- Removal of cable corridor between woodlands to north of Flash Farm from the Order Limits to avoid potential pinch point at crossroads northeast of Averham Park Farm. To compensate for the loss of this routing option, the Order Limits have been extended between Averham Park and Micklebarrow Hill to allow greater flexibility for design of the cable route and construction of the Development within this area.
- Order Limits extended around Park Spring Farm to provide greater flexibility for cable route design and construction of the Development in this area, alleviating the potential pinch point at road crossing to the east of the Bedmax factory.



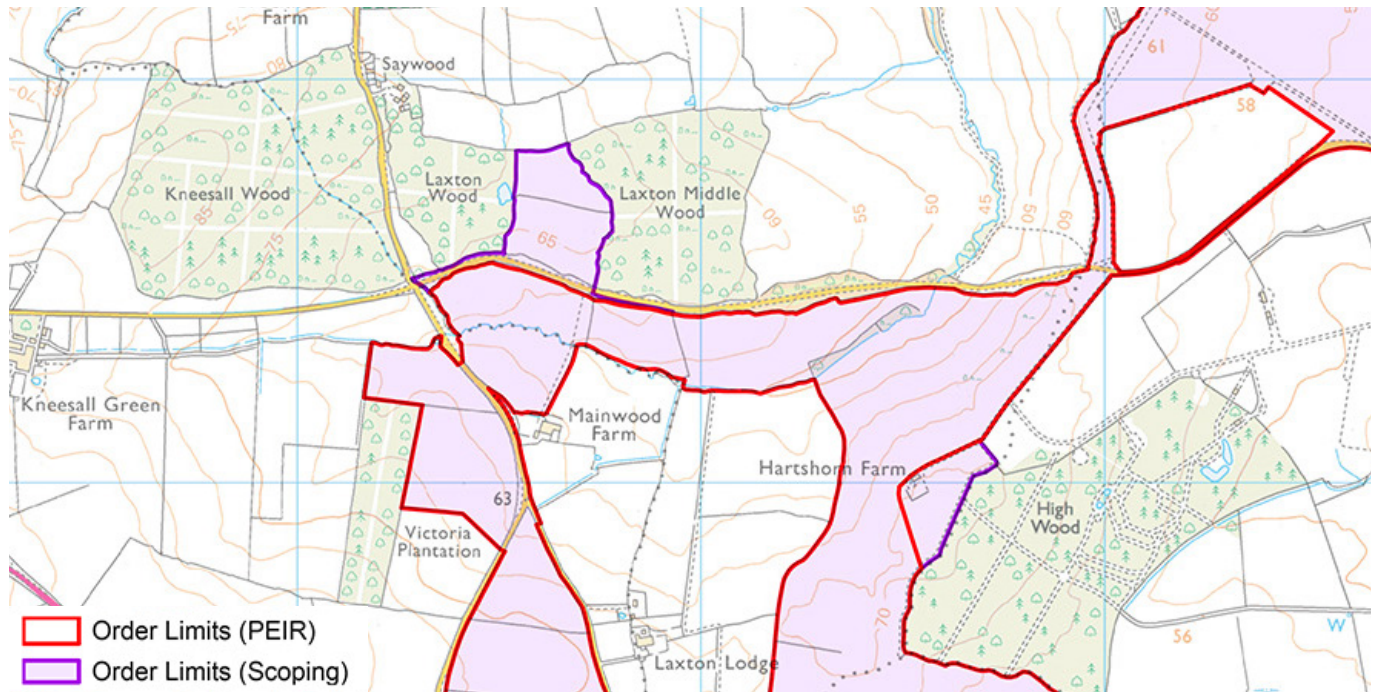
5.2.2.3 Order Limits Changes near Eakring

- Landowner agreement secured for small, previously omitted area of land north of the road between Eakring and Maplebeck to be added to the Order Limits, allowing rationalisation of solar panels in this area.
- Development of the electrical design allowed the cable corridor and Order Limits to be reduced in this area.



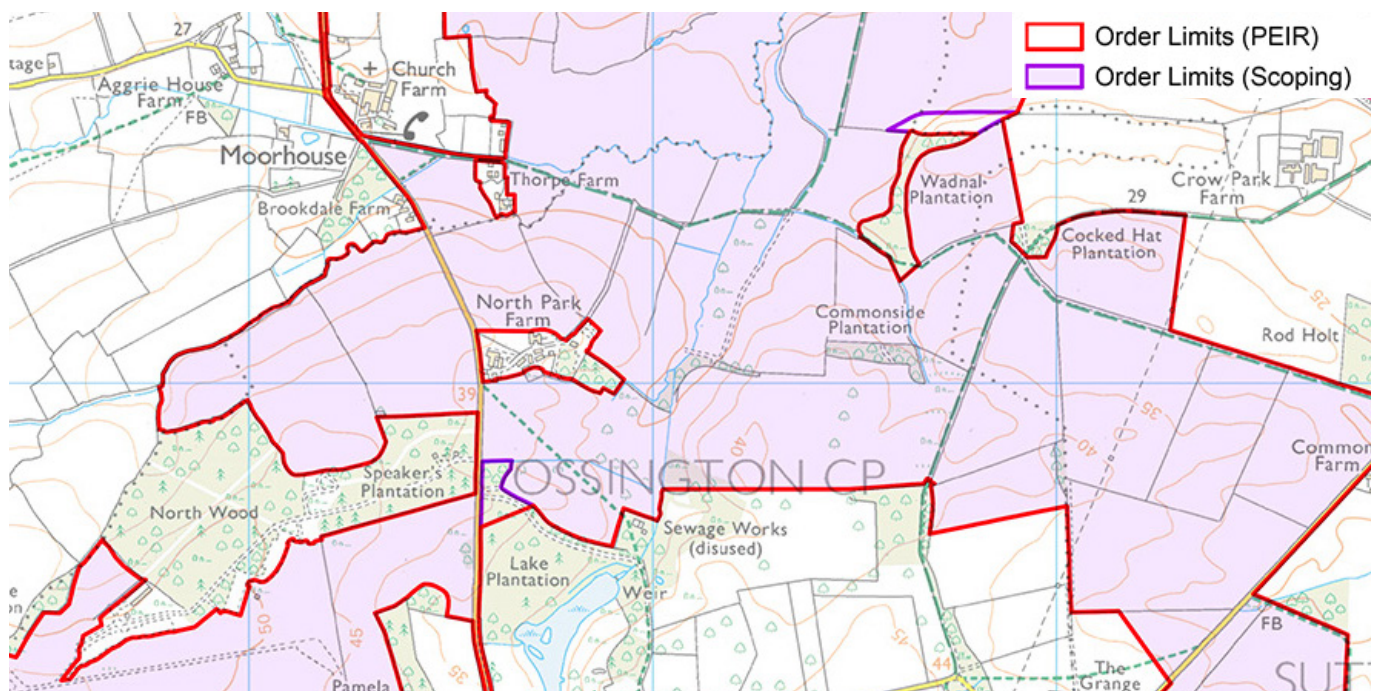
5.2.2.4 Order Limits Changes near Kneesall

- Removal of the area between Laxton Wood and Laxton Middle Wood due to proximity to areas of ancient woodland and to reduce potential visibility of solar areas in views from the north of this area.
- Omission of the area around Hartshorn Farm by landowner request.



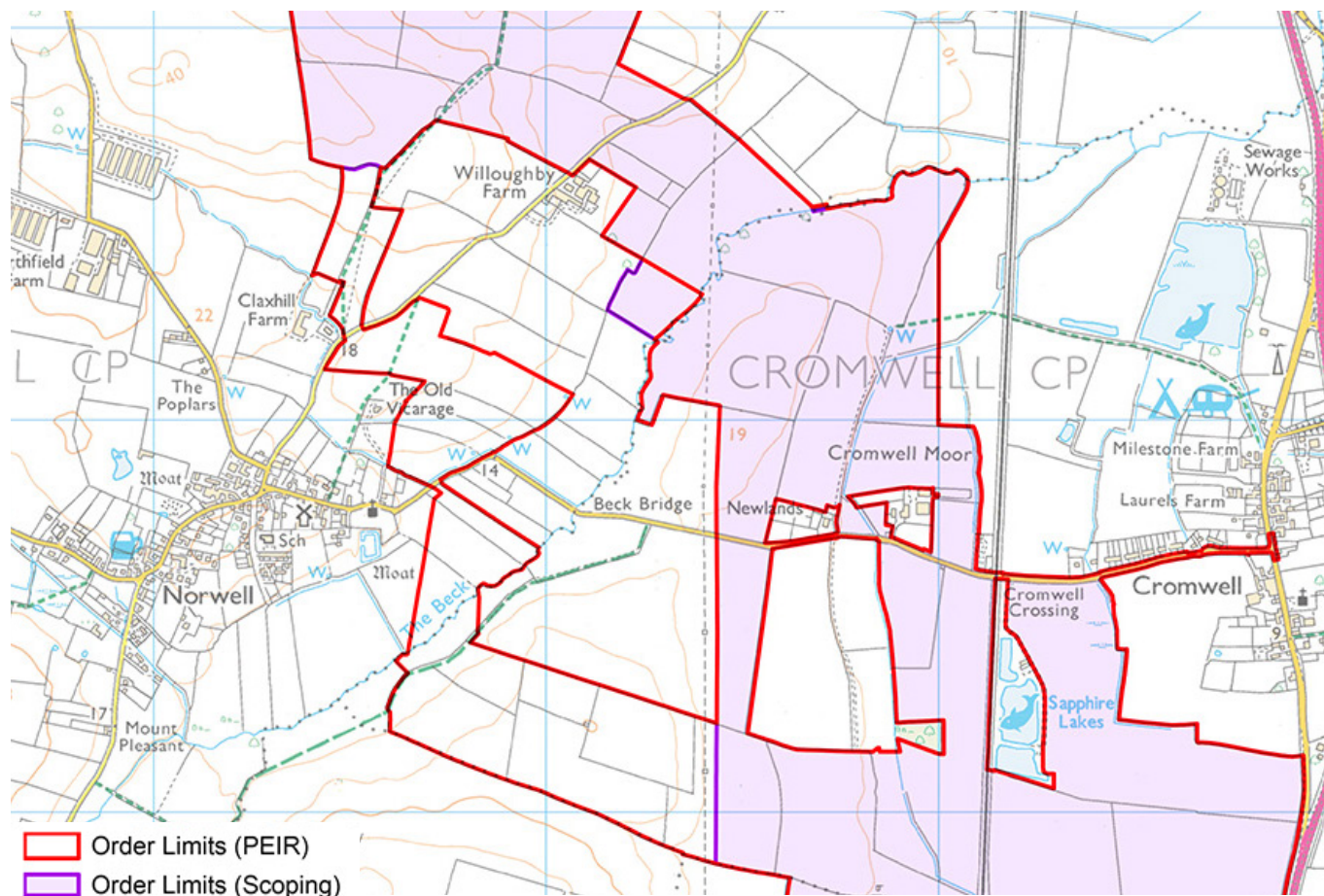
5.2.2.5 Order Limits Changes near Moorhouse

- Small extensions to the Order Limits between Speakers Plantation and Lake Plantation, and north of Wadnal Plantation to provide greater flexibility for cable route design and construction of the Development in these areas.



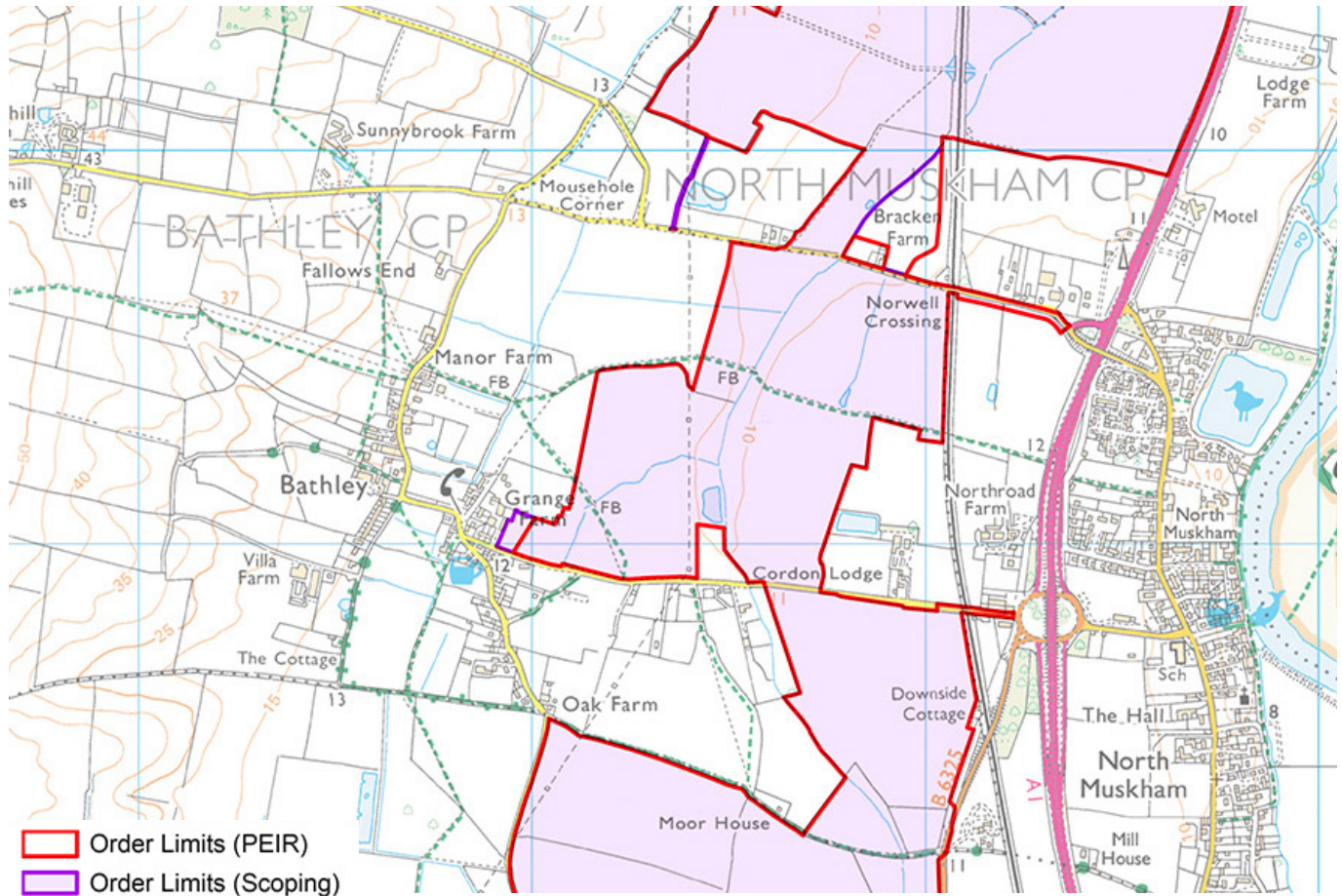
5.2.2.6 Order Limits Changes near Norwell

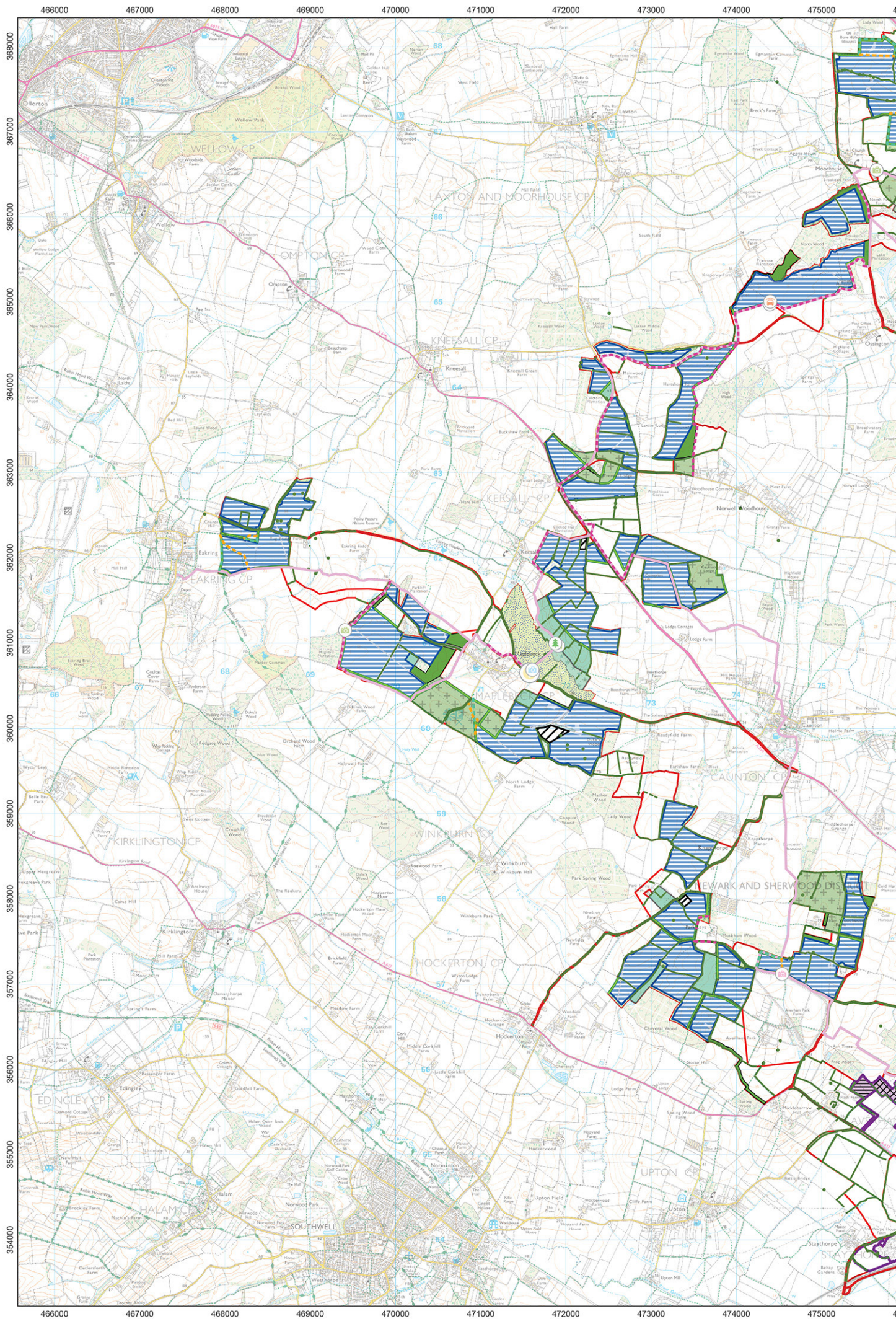
- New cable corridor added to the Order Limits east of Norwell to provide greater flexibility for cable route design and construction of the Development in this area and avoid a potential requirement for compulsory purchase.
- Removal of a field southeast of Willoughby Farm from the Order Limits by landowner request.

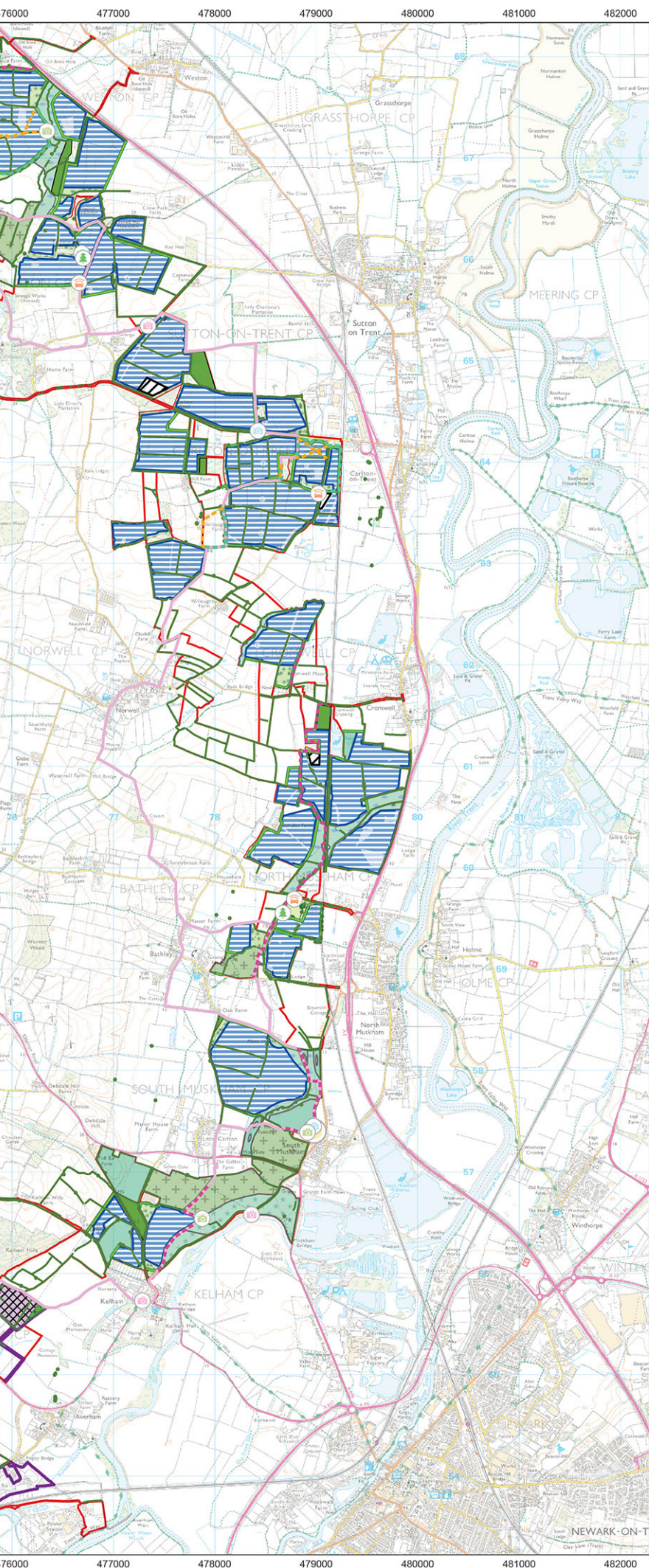


5.2.2.7 Order Limits Changes near North Muskham

- Order Limits extended to the east of Bracken Farm to provide greater flexibility for cable route design and construction of the Development in this area. Access route west of Bracken Farm removed as no longer required.
- Removal of field adjacent to Bathley from Order Limits in response to feedback from the local community.







- Order Limits
- Proposed Solar Array Areas
- Substation Areas
- BESS and 400kV Substation Development Areas
- 400kV Substation
- BESS
- Landscape & Ecology**
 - Existing Hedgerows
 - Proposed Hedgerows
 - Proposed Woodland
 - Proposed Hedge and Tree Belt
 - Retained Agricultural Land - enhanced ecological management
 - Proposed Permanent Grassland
 - Proposed Green Corridor
 - Proposed Riparian Corridor
 - Proposed Wildlife Site
 - Proposed Community Orchard
 - Proposed Grassland (PV areas) - species diverse
 - Target area for ecological enhancement
- Access, Recreation & Interpretation**
 - Proposed GNR Circular Long Distance Route
 - Proposed New Permissive Route
 - Proposed Public Right of Way Diversion
 - Proposed Public Right of Way Deletion
- Visitor Facilities & Interpretation**
 - Visitor Hub
 - Clean Energy Information
 - Ecology/Landscape Information
 - Heritage Information
 - Picnic Area
 - Potential Parking Area (small, c. 4-6 vehicles)

1:55,000 Scale @ A3
0 0.5 1 2 km



Ref: Date: 14/11/2024

PEIR Stage Masterplan - Overview

Great North Road Solar and Biodiversity Park

6 THE PEIR STAGE DESIGN

6.1 THE DEVELOPMENT

- 74 The PEIR stage design is illustrated on Figure 7 on the preceding page. The Development broadly comprised: electrical infrastructure, including above ground solar arrays, substations and BESS; buried cables to connect the electrical components; and, areas utilised for environmental mitigation and enhancement.

6.2 ELECTRICAL AND ANCILLARY INFRASTRUCTURE

6.2.1 Solar PV Modules

- 75 These convert the sun's energy to electricity. These comprise dark coloured panels installed on a metal framework, south facing and tilted at a fixed angle to orient the panels so they convert the maximum amount of solar energy. The panels would be raised up from the ground to allow vegetation management and prevent plants underneath (usually grassland/meadow plants) from growing over the panels.

6.2.2 Central Inverters and Transformer Stations

- 76 These elements collect electricity generated by the surrounding solar PV modules and convert it ready for transmission to the intermediate substations. Transformers and inverters may be separate or combined units and are typically enclosed within metal or composite containers, painted grey or dark green, with dimensions similar to shipping containers. They would usually be sited centrally amongst the PV modules and away from the edges of solar areas.

6.2.3 Fencing and Security

- 77 The main type of fencing used around solar areas across the Development would be deer fencing, comprising wooden posts and wide gauge galvanised wire mesh, approximately 1.8 - 2.5 m in height. Such fences are relatively commonplace in rural areas to protect new planting from grazing by deer.
- 78 Smaller areas of higher security fencing would be required around high voltage electrical equipment, namely the substations and BESS, to ensure public safety. This would comprise steel palisade or welded mesh fencing up to 4 m in height; similar fencing may also be required around high value auxiliary buildings. The BESS area may also require an acoustic barrier to mitigate noise impacts. These typically comprise close board timber fences but there are a wide range of materials and designs which may be utilised.
- 79 The use of security cameras would be required throughout the Development. In solar areas, these would typically be installed on poles a similar height as the perimeter fencing and oriented to look along the fence lines, within the solar areas. In the substations, BESS and other compound areas, security cameras may be mounted on taller poles or affixed to buildings as required.



Solar panels and perimeter fencing



Central inverters and transformer stations located amongst solar panels



Perimeter fencing and security camera around solar area.

Field of Solar Panels by Des Blenkinsopp, CC BY-SA 2.0 <<https://creativecommons.org/licenses/by-sa/2.0>>, via Wikimedia Commons

6.2.4 Substations

- 80 Intermediate substations would collect electricity from various solar areas, increasing the voltage to 132 kV for the efficient transfer of electricity to the main 400 kV substation, which would collect electricity from the intermediate substations before increasing the voltage again for onward transmission to the grid connection point at the National Grid Staythorpe Substation.
- 81 Substations would comprise a range of outdoor and indoor switching gear, transformers, gantries, associated electrical equipment, control rooms and ancillary buildings (including welfare facilities). Outdoor electrical equipment would typically be painted grey or uncoated, indoor electrical equipment may be housed in metal or composite enclosures or within permanent buildings which would be designed to reflect local character, as would any ancillary buildings. The primary difference in appearance between the intermediate substations and the main 400 kV substation would be in their physical footprint and the scale of the electrical equipment.

6.2.5 BESS

- 82 The BESS area would comprise an array of battery modules. The specification of these can vary but typically they comprise rectangular containers, similar in dimensions to shipping containers. Control equipment may be integrated into individual battery modules or may be external to them. Additional ancillary equipment is likely to include power control systems, comprising inverters and transformers, and a control room with staff welfare facilities.

6.2.6 Cables

- 83 The electricity generation, transmission and storage infrastructure across the Development would be connected by underground cables. No new overhead power lines are proposed as part of the Development.

6.3 ENVIRONMENTAL MITIGATION AND ENHANCEMENT

- 84 Environmental mitigation and enhancement takes many forms and is described in detail within the relevant topic chapters of the ES. This section describes the mitigation and enhancement elements that would have a notable presence in the landscape and would be evident to people living in, visiting and travelling around the local area.

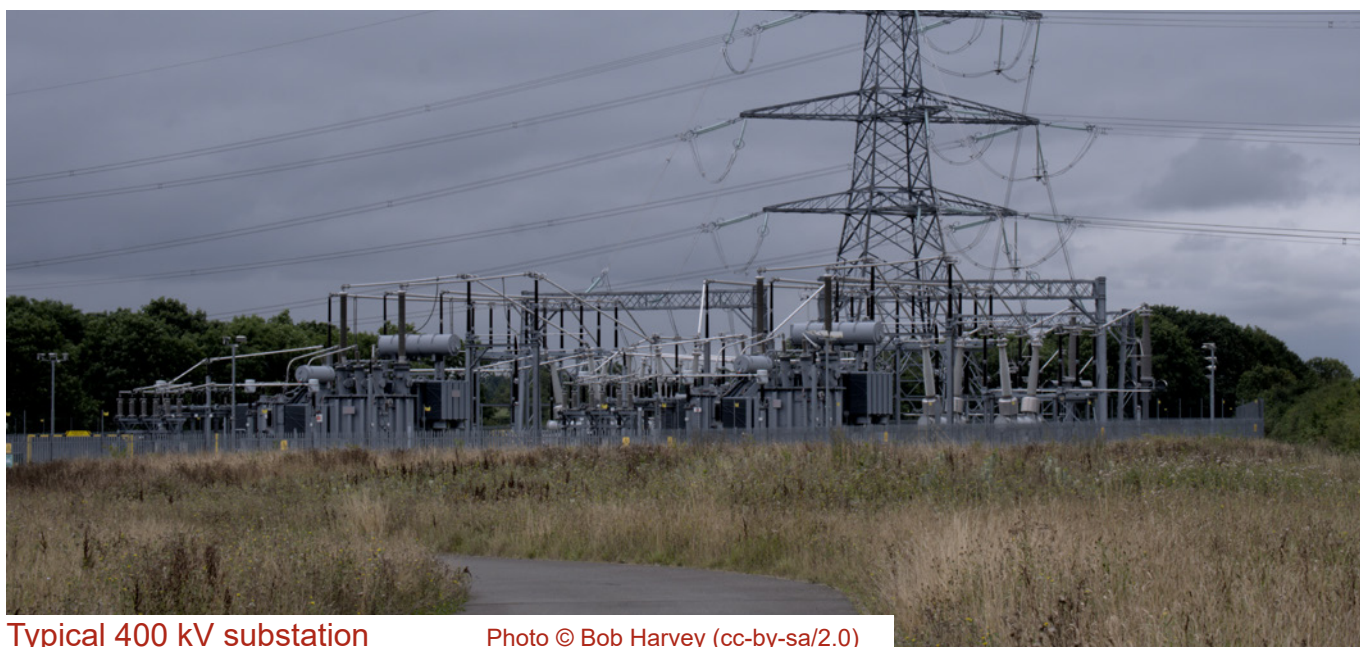
6.3.1 Hedgerow Management and Planting

- 85 Existing hedgerows within the Order Limits would typically be 'gapped up' with new planting infilling existing gaps within hedgerows to aid the screening of solar areas and improve the condition of the existing landscape features. Where hedges run along the edge of solar areas these would generally be allowed to grow up to a height of c. 3 m.
- 86 Extensive areas of new hedgerow planting, primarily around solar areas, would also be provided to further screen these and other parts of the Development. In general, new hedgerow planting would reinforce the existing character of the local area although the new hedges and changes in management of existing hedgerows would result in changes to the outlook from some roads and PRow. Double hedgerows are typically



Typical 132 kV substation

Photo © Alan Wood Engineering



Typical 400 kV substation

Photo © Bob Harvey (cc-by-sa/2.0)



Outgrown hedgerow (left) and trimmed hedgerow (right) at Moorhouse

proposed along PRow and new permissive routes where they pass between solar PV areas, as illustrated below, or where routes run alongside existing hedgerows with solar areas introduced on the same side. This is already typical of some paths in the area, such as to the east of Moorhouse and north of Caunton, but elsewhere would result in a sense of enclosure and a new experience for users of some routes.

- 87 Most local roads in and around the ES Order Limits are lined by hedgerows on both sides at present so changes would usually be limited to a slight increase in the degree of existing enclosure as a result of taller hedgerows and gaps being infilled - benefits of which include improving landscape condition, further screening of the Development and promoting biodiversity.

6.3.2 Woodland and Tree Planting

- 88 Proposed hedgerows will incorporate trees where overshadowing of solar panels is not a consideration, typically the northern edge of solar areas or in hedgerows away from solar panels; gapping up of existing hedgerows will also include the introduction of trees where appropriate. New woodlands would also be planted, ranging from small areas strategically placed to screen particular parts of the development to extensions of existing woodlands and more substantial new woodland areas. Overall, the Development would see the planting of tens of thousands of new trees, reinforcing the existing wooded character of the local area and providing a range of habitats and ecological benefits.

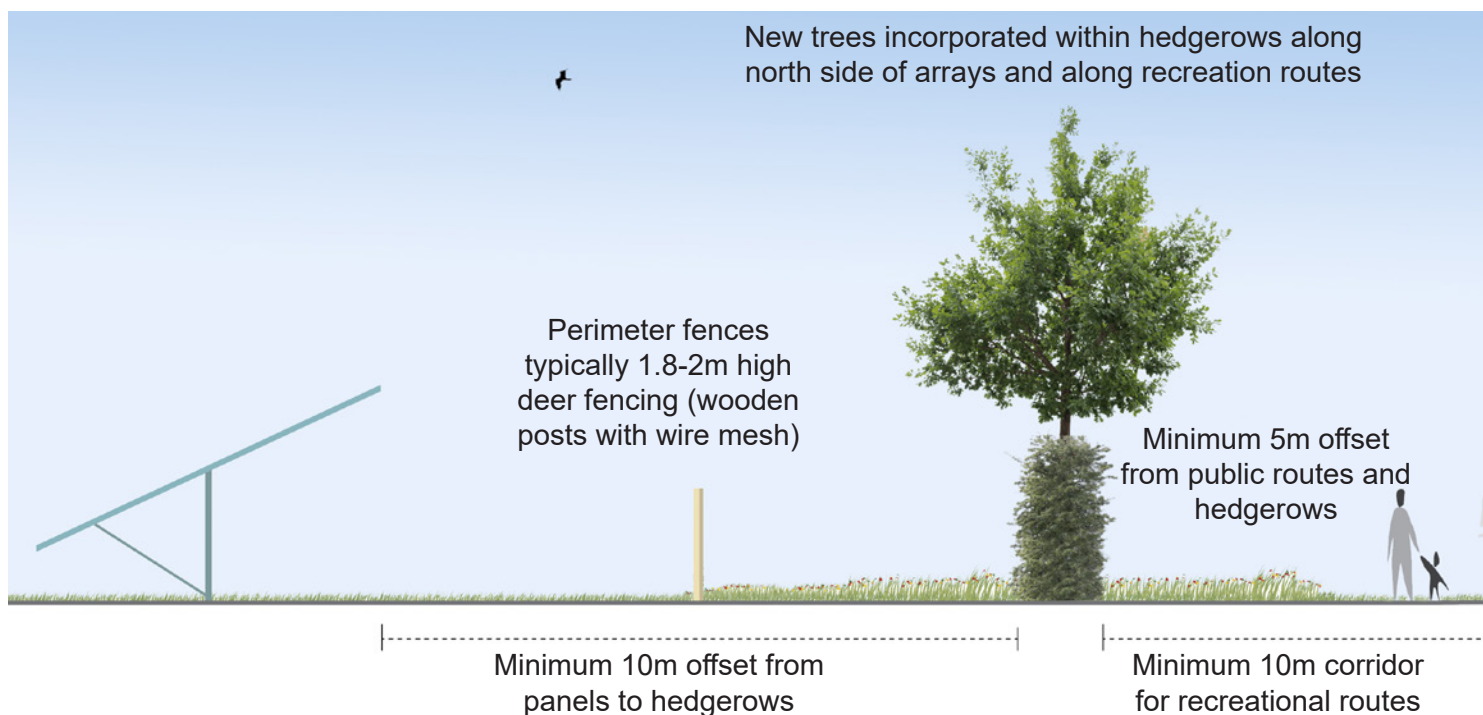
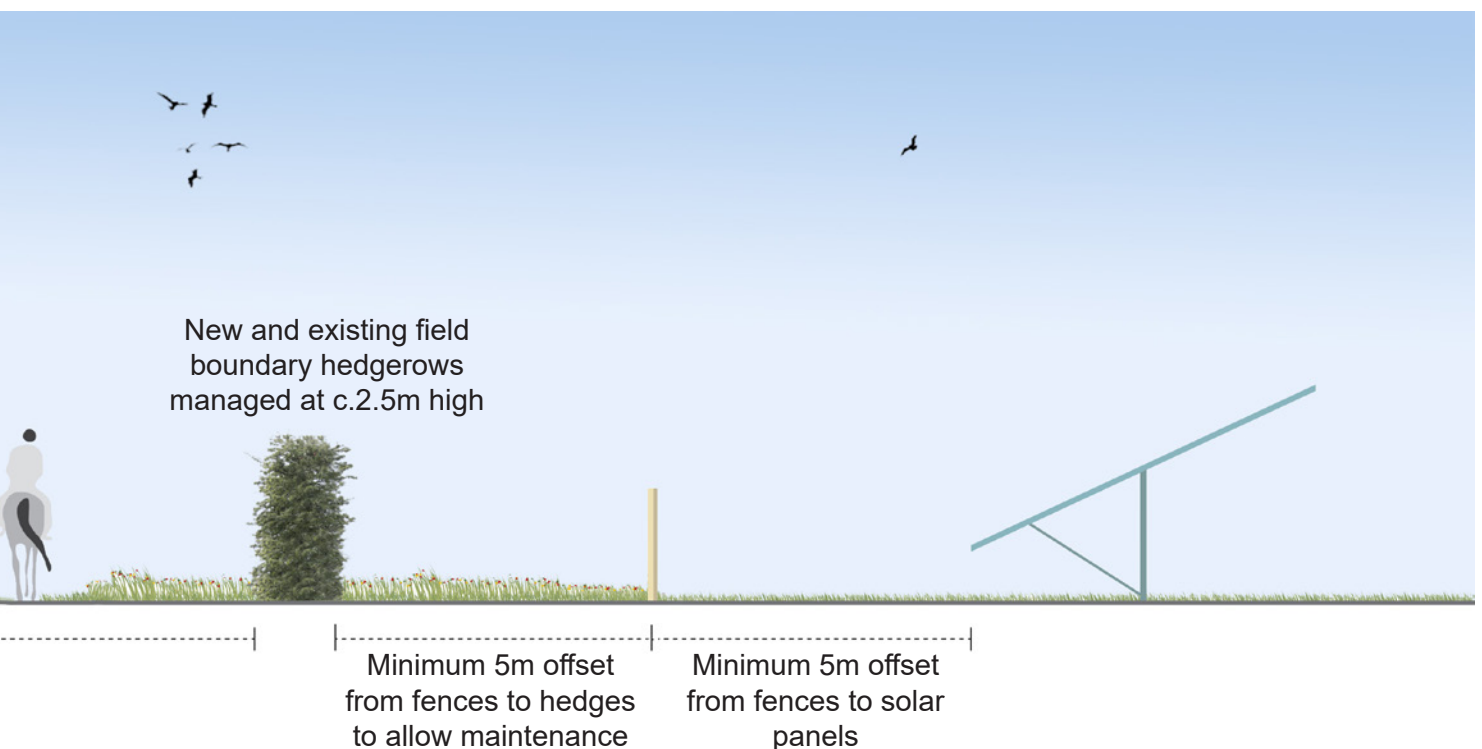


Figure 7: Typical section through double hedged path

6.3.3 Permanent Grassland and Farmland Management

- 89 A number of areas across the Development have been identified for the introduction of permanent grassland and others for implementation of particular management practices within retained agricultural land in order to provide ecological enhancements and mitigation. Although this will have a limited influence on the character or appearance of the area, a slight increase in permanent landcover may be noted where intensive arable farming currently prevails.



7 THE DESIGN RESPONSE

The design of the Great North Road Solar and Biodiversity Park has been an iterative process responding to technical engineering challenges, environmental surveys, and consultation feedback. Good design requires a holistic approach with input from all disciplines to provide in an integrated solution. The decision making process involved input from multiple teams and stakeholders.

- 90 As set out in section 1.3 Government guidance¹⁴ defines 'good design' and explains how the design of a project responds to the overarching design principles for national infrastructure¹⁵ as set out by the National Infrastructure Commission (NIC). These are defined as:
- **Climate** – mitigate greenhouse gas emissions and adapt to climate change;
 - **People** – reflect what society wants and share benefits widely;
 - **Places** – provide a sense of identity and improve our environment; and
 - **Value** – achieve multiple benefits and solve problems well.
- 91 This chapter focuses on the design response relating to the landscape and environmental design, and the technical infrastructure components which have been wholly or partly driven in response to the requirements of 'good design' and the existing location context.
- 92 It is not intended that this chapter provides a design rationale for all elements of the Development, such as those that are constrained by safety requirements, manufacturing capabilities or industry standards and/or were not influenced by the requirements of 'good design' and the existing location context.
- 93 The design parameters for the individual and specific elements of the components which make up the Development are outlined in, and controlled by, the Concept Design Parameters and Principles [EN010162/APP/7.14]. **Table 1** provides examples of how the project responds to the overarching design principles.

¹⁴ Department for Levelling Up, Housing and Communities (2024). Planning Act 2008: Pre-application stage for Nationally Significant Infrastructure Projects. Available at <https://www.gov.uk/guidance/planning-act-2008-pre-application-stage-for-nationally-significant-infrastructure-projects>.

¹⁵ National Infrastructure Commission (No Date). Design Principles for National Infrastructure. Available at: <https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/#tab-summary>.

Table 1: Design response to overarching design principles

Topic	Design Principle Code	NPS for Renewable Energy Infrastructure (EN-3) project specific de-sign principle	Example of the Applicant applying the design principle
Climate	CL1	Make an important contribution to achieving net zero greenhouse gas emissions by 2050 or sooner.	The Development has an energisation target date of 2028 and as such it will make significant contribution towards achieving Net Zero as well as the national low carbon energy generation targets by 2030.
Climate	CL2	Seek to minimise whole life emissions of the project.	The applicant has sought options to accommodate UK milled steel where this is practicable and feasible and aligns with the planned energisation of 2028.
Climate	CL3	Ensure the project can adapt flexibly to climate change.	The solar PV panels and intermediate substations are largely outside Flood Zone 2 and Flood Zone 3 following the most recent flood modelling for climate change, meaning the Development design has taken the risk around climate flexibility for solar farms seriously.
People	PE1	Communicate openly with local communities and stakeholders.	The Applicant has engaged freely and openly with communities and stakeholders meaningfully and extensively. This is set out in the Consultation Report.
People	PE2	Minimise the need to use compulsory purchase powers.	The Applicant has sought to ensure that the assembly of land utilised as many voluntary agreements as possible.
People	PE3	Seek local knowledge and views to inform and improve the project.	Met with 18 of the 19 parish councils to shape the design and actively seek views from local people and stakeholders. These meetings led to design changes at Eakring and Moorhouse among many other examples.
People	PE4	Deliver wider societal benefit by funding Community Benefit.	<p>The Development will deliver wider societal benefit as it will provide additional recreational footpaths and bridleways, thus improving public access to open green space. This will be secured through the Recreational Routes Management Plan.</p> <p>The Development also creates a significant amount of biodiversity net gain through the mitigation and enhancement areas. This will be secured through the Landscape and Ecological Management Plan.</p> <p>The Development will also create jobs locally and in the wider economy. Further details are set out in the Outline Skills, Supply Chain and Employment Plan.</p>
People	PE5	Be a good neighbour to local residents and businesses.	The principles have ensured that support is given first to local businesses such as local print companies, caterers, accommodation providers. The Development will also be a good neighbour through the implementation of control mechanisms set out in the various management plans secured by the DCO Requirements.
Places	PL1	Design at a human scale and embed nature-based solutions.	Nature-based solutions are strongly evident in the LEMP, from natural water management systems, to planting species which are suitable to their local environment.

Topic	Design Principle Code	NPS for Renewable Energy Infrastructure (EN-3) project specific de-sign principle	Example of the Applicant applying the design principle
Places	PL2	Seek opportunities to enhance access and recreation to improve health and well-being.	21 new permissive footpaths, and 6 new permissive bridleways, creating 32.6 km of new permissive routes (as described in Table 18.7). A circular recreational route would be created around the Order Limits, covering 50.6 km, including 12.5 km of new permissive path, as detailed in Chapter 18: Recreation and in the Outline Recreational Routes Management Plan.
Places	PL3	Deliver biodiversity net gain that exceeds mandatory requirements.	Development to deliver a substantial biodiversity net gain as set out in the Outline Landscape and Ecological Management Plan.
Places	PL4	Facilitate understanding and appreciation of local cultural heritage throughout the life of the project.	Walkboards would serve as a useful tool to remind the public of their past heritage on permissive routes. Topics could include Ridge and Furrow historic farming, power generation history, as well as other heritage topics which have emerged through the archaeological investigations.
Places	PL5	Design with local landscape character in mind, providing a legacy of landscape enhancement.	Design has been carefully orientated to better assimilate the Development into the landscape as set out throughout this Document. The proposed planting also offers natural screening.
Value	VA1	Seek opportunities to grow planting materials within the site and nearby, for example, seed mixes and hedgerow plants.	Proposals include the planting of over 60,000 trees and creation of over 550 ha outside the solar panel areas to dedicate to biodiversity. Additionally, over 40 km of hedgerow planting is proposed.
Value	VA2	Measure performance of all aspects of the project against its objectives and use lessons learned to improve.	Through internal processes the Applicant has measured performance and sought continuous improvement throughout the lifetime of the design, whether through additional design sessions or through meetings with the relevant technical teams to seek improvements.
Value	VA3	Encourage engagement and provide learning opportunities.	As well as engaging extensively on the Development through community and stakeholder consultations, the Applicant has committed to skills and training opportunities, as set out in the Outline Skills, Supply Chain and Employment Plan.

8 DESIGN EVOLUTION

8.1 PEIR TO ENVIRONMENTAL STATEMENT

- 94 This section sets out the consolidation of all works areas based on public and technical consultation responses, and design optimisation. Archaeological trial trenching results, as well as updated Environment Agency Flood Data have been the main environmental determinants for the changes.
- 95 At this design stage the final works areas are defined as follows:
- Work no. 1: Solar PV;
 - Work no. 2: Cables;
 - Work no. 3: Mitigation/enhancement;
 - Work no. 4: Intermediate substations;
 - Work no. 5a: BESS;
 - Work no. 5b: 400 kV compound;
 - Work no. 6: National Grid Staythorpe Substation and connection point;
 - Work no. 7: Consented Staythorpe BESS and Connection; and
 - Work no. 8: Access Works
- 96 Improvements in panel efficiency over the years since the initial design was conceived in 2021 is another factor that has enabled the Applicant to consolidate the design and reduce land take for solar areas (Work no. 1).
- 97 In many cases removing the former Work no. 2b as defined in PEIR and refining the cable routing to a 60 m-wide corridor typically enabled the reduction of the ES Order Limits either side of this.
- 98 The design submitted alongside the application is also accompanied by a Masterplan (see Figure 5.2 [EN010162/APP/6.4.5.2] including more advanced landscape and ecological mitigation and enhancement based on consultation responses. In addition, a TAA4.1 Public Rights of Way Strategy [EN010162/APP/6.4.4.1] has been set out consolidating the key design principles applied to retaining and improving access across the ES Order Limits of the Development.
- 99 Figure 8 to 11 shows the extent of the solar PV area changes from the PEIR Design to the ES design stage. Figure 5.2 Masterplan [EN010162/APP/6.3.5.2] shows the Development's design including the main components together with the mitigation and enhancement measures. The design features:
- 64,500 proposed trees (31 ha of proposed woodland);
 - 50 km of proposed hedgerow;
 - 999 ha of Solar PV (diverse) grassland;
 - 407 ha of diverse grassland
 - 22 ha of Ecotone;
 - 32.6 km of new permissive routes, comprising 27 new permissive routes, including 21 permissive paths and 6 bridleways; and
 - Biodiversity Net Gain.

8.2 NORTHEAST QUADRANT (FIGURE 8)

- 100 Two new datasets relating to the impact of climate change on flooding from the Environment Agency became available post-PIER (Trent and Tributaries 100-year plus Climate Change event, and the Flood Map for Planning Present Day Extents), which show a 1 in 100 chance flood extent for rivers. Using this and existing flooding data, all proposals for solar PV were removed from flood zones which reduced the section of solar around Moorhouse Beck (9-SR25, 9-OR29, 9-OR30) and in a field near Castlehill, Carlton on Trent (9-SR19), and eliminated the field near Cromwell (9-SR10) in the south, and eliminated the field near Cromwell (9-SR10) in the south. This resulted in the removal of a large cable area 9-OR12.
- 101 Around Moorhouse, north facing solar PV fields were removed (9-SR26). North facing fields have a low solar yield and render the land more technically difficult to construct.
- 102 A 60 m cable corridor has been defined avoiding physical constraints such as pylons for overhead lines, resulting in a large portion of land around Ossington and Cromwell being removed.

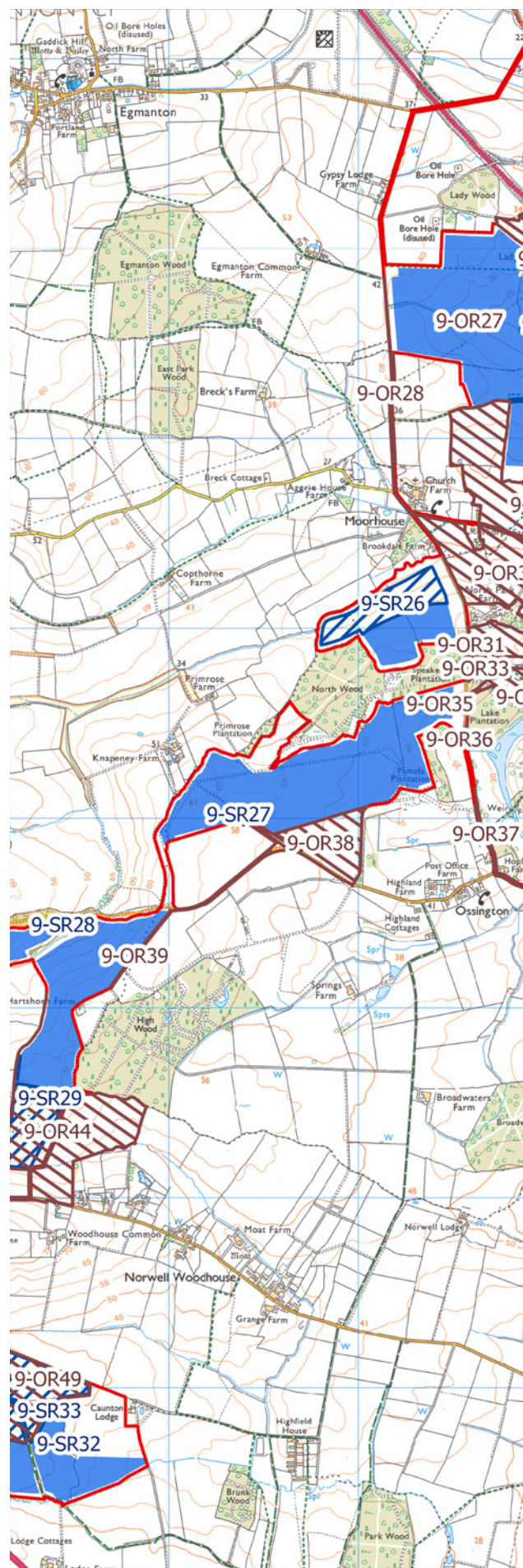


Figure 8: PEIR to Environmental Statements

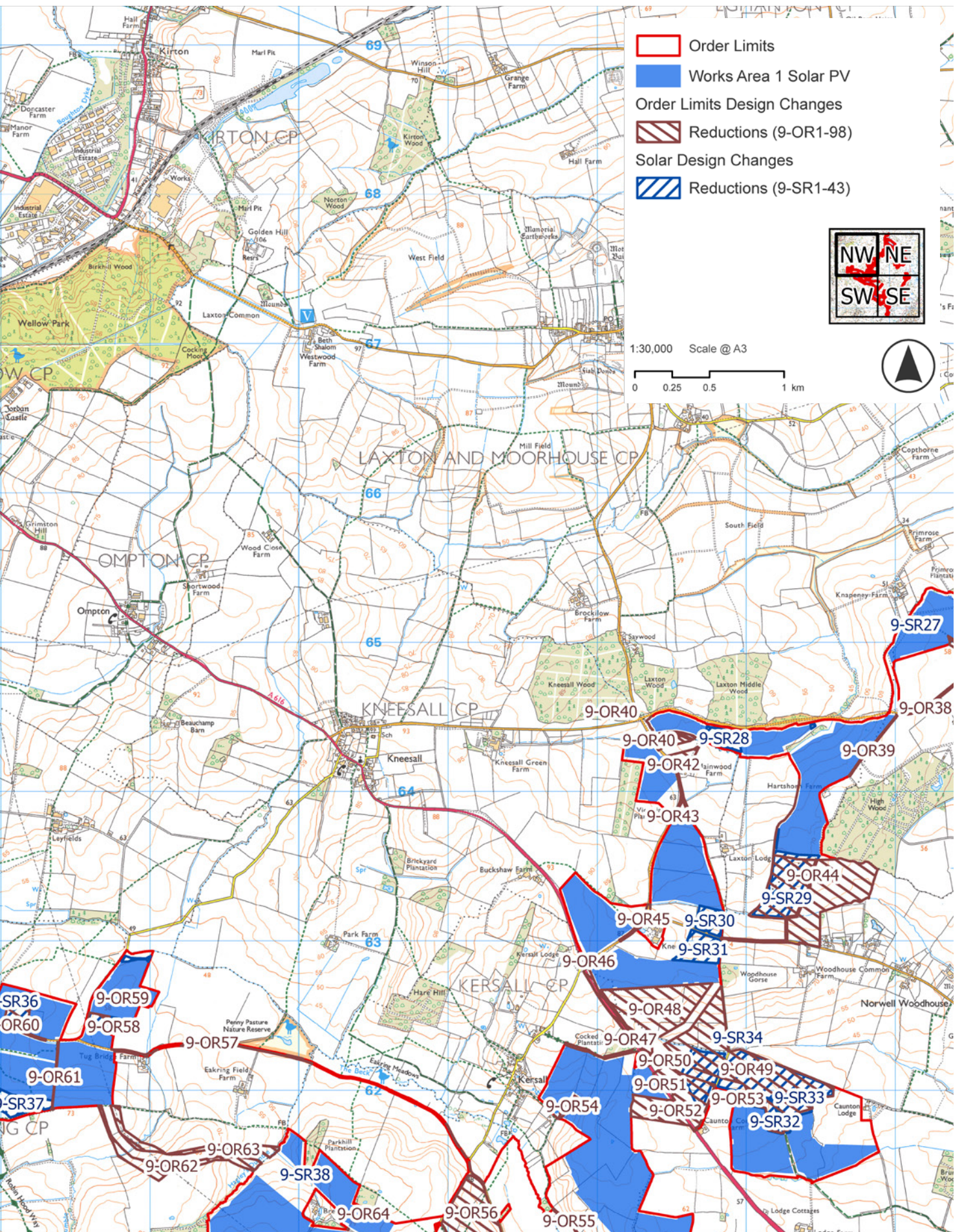


8.3 NORTHWEST QUADRANT (FIGURE 9)

- 103 Removal of solar around Caunton Lodge (9-SR32, 9SR33) due to its high potential for underground archaeology. Further solar PV reductions can be seen north of Norwell Woodhouse (9-SR29 and 9-OR44) to ensure consistency with the design principles and avoid steeper slopes on land that is not preferable, which was now achievable due to the increases in panel efficiency. Solar areas east of Kersall (9-SR30 and 9SR31) were removed to improve residential visual amenity.
- 104 A 60 m cable corridor has been defined avoiding physical constraints such as pylons for overhead lines.



Figure 9: PEIR to Environmental Statements



at design changes: Northwest Quadrant

8.4 SOUTHEAST QUADRANT (FIGURE 10)

- 105 The southeastern area of the project from Kelham up to Cromwell was modified and the latest iteration excludes solar PV, cable and substation options. This is as a result of a number of technical constraints, primarily associated with flood risk and underground archaeology. These areas include from 9-SR1 to 9-SR13.
- 106 Two new datasets relating to the impact of climate change on flooding from the Environment Agency became available post-PIER (Trent and Tributaries 100-year plus Climate Change event, and the Flood Map for Planning Present Day Extents) which show a 1 in 100 chance flood extent for rivers. Using this and existing flooding data, all solar was removed from flood zones 2 and 3.
- 107 After removing all solar PV from flood zones 2 and 3 and extensive high potential for underground archaeology being present in the same area, only a handful of carved out fields remained. These fields were removed as the small pockets of development area remaining within them after the removal of flood risk and archaeology areas rendered them economically unviable. Additionally, the railway crossing for the cable would have added cost, time and complexity to avoid potential impacts on existing Network Rail infrastructure. The cost of cabling to these pockets of solar outweighed the gain and this allowed for a logical block of solar area to be removed, thus requiring no further design disaggregation than was already the case.
- 108 The end result was the entire section of land to the south and west of Cromwell, and east of the East Coast Main Line being removed.
- 109 Whilst infrastructure in this area has been removed, parcels of land containing mitigation enhancement and permissive routes are retained. Some mitigation areas have been removed to allow land to remain in agriculture as less mitigation land is required following the loss in area of solar PV.

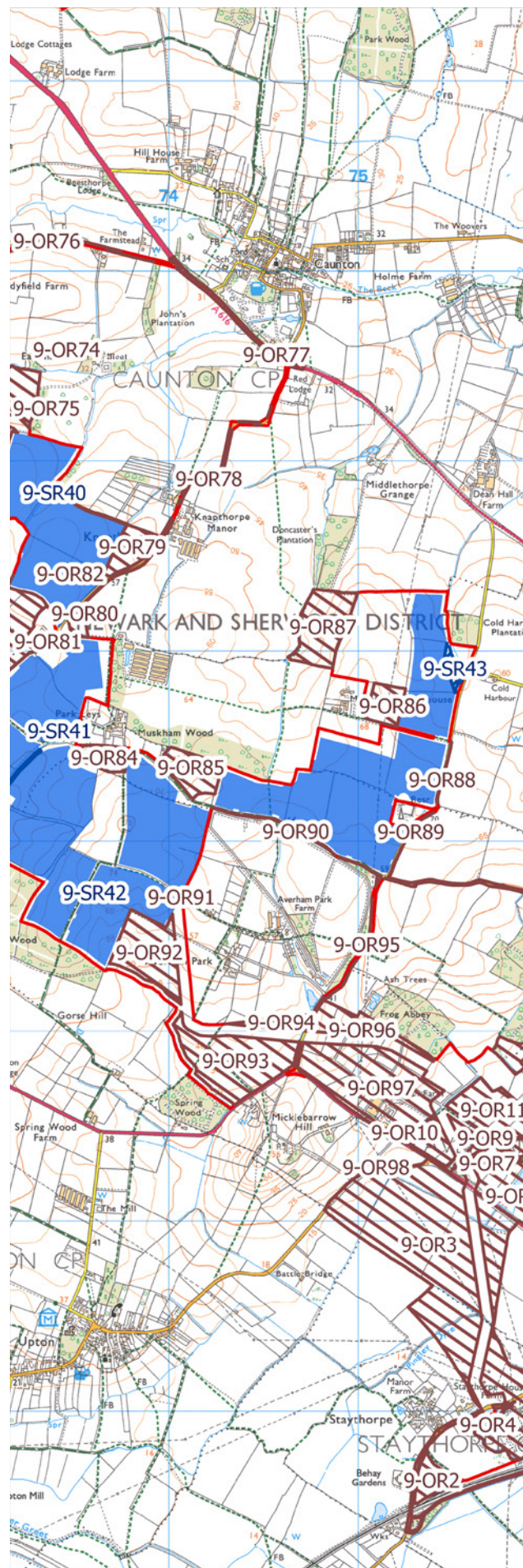
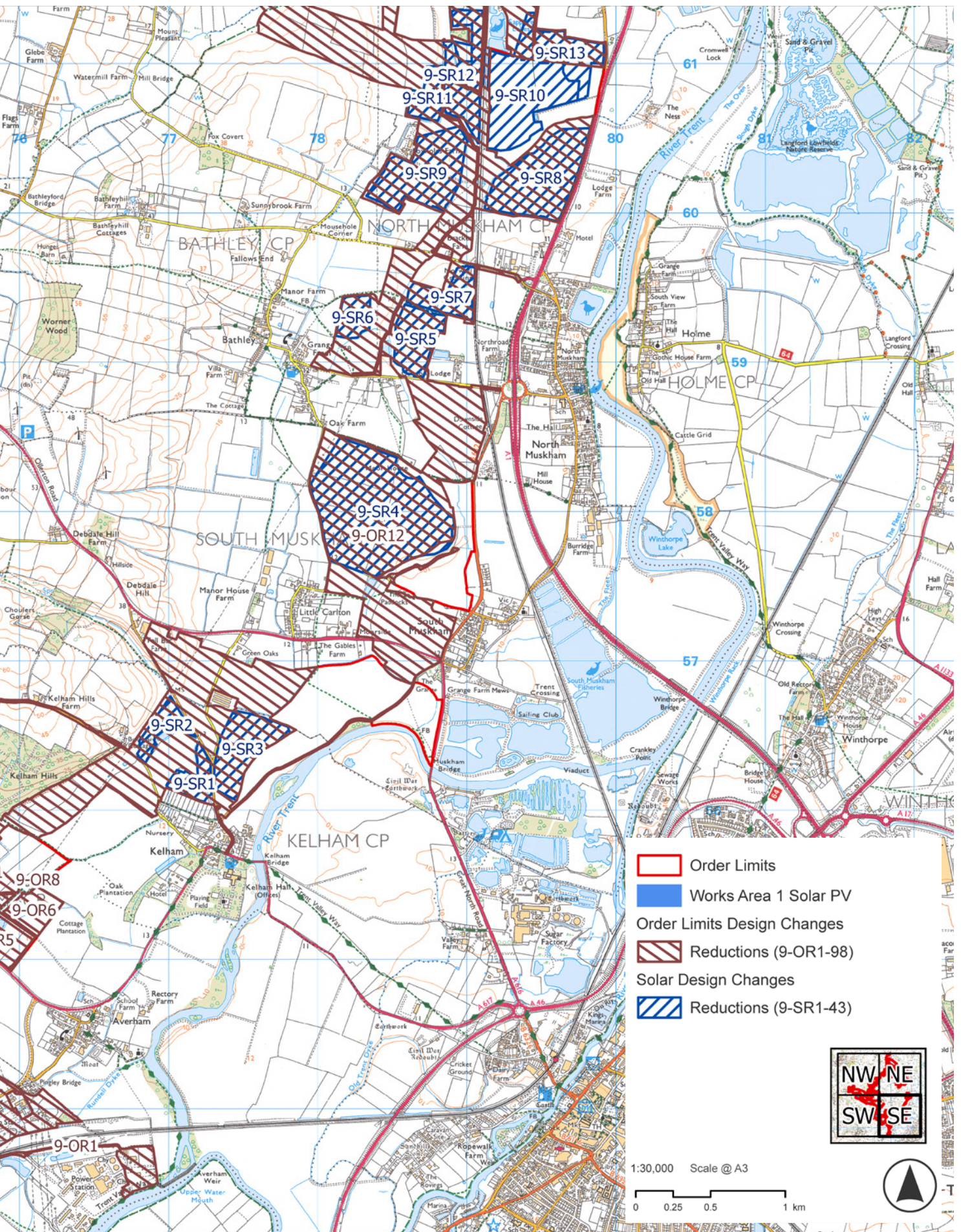


Figure 10: PEIR to Environmental Statement



ent design changes: Southeast Quadrant

8.5 SOUTHWEST QUADRANT (FIGURE 11)

- 110 No changes to the solar areas were made in this section.
- 111 A 60 m cable corridor was defined avoiding physical constraints such as overhead lines, combined with the reduction in cable route optionality through 9-OR80, 9-OR81, and 9-OR82. Other former cable areas removed include 9-OR72-9-OR75).

8.6 POST-CONSENT DELIVERY

- 112 The detailed design for the Development would be delivered post-consent, pursuant to the discharge of DCO Requirements.

8.7 SUMMARY

- 113 As noted in consultation comments (see Section 4.1.2), the Development differs from the layouts of some other large solar proposals in the UK in that it is not one area of contiguous fields, but a number of islands of land connected by fields which will be used for underground cabling and biodiversity enhancement. To minimise cost and maximise operational efficiency, the Development would be located as close as possible to the Staythorpe substation and aggregated into a single area, and this would therefore be a preference. However, other, principally environmental, factors influence design as explained above. The culmination of consideration of these factors leads to the proposed layout.
- 114 By applying the approach set out in Section 4.3 to identify potentially developable land, and then the evolution process set out in Section 4.4 to optimise the layout of components of the solar park within this, a wider area overall area has been included (as indicated, for example, by the furthest distance between two points within the Order Limits, which is c. 15.5 km). This has allowed the selection of land that leads to lower overall environmental impact than would be the case if all solar areas were aggregated together.



Figure 11: PEIR to Environmental Statement

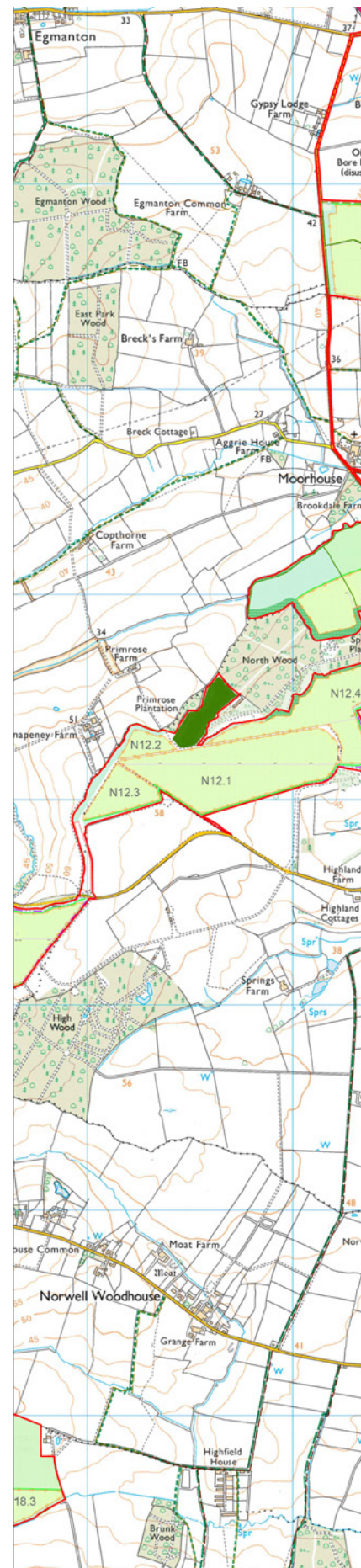


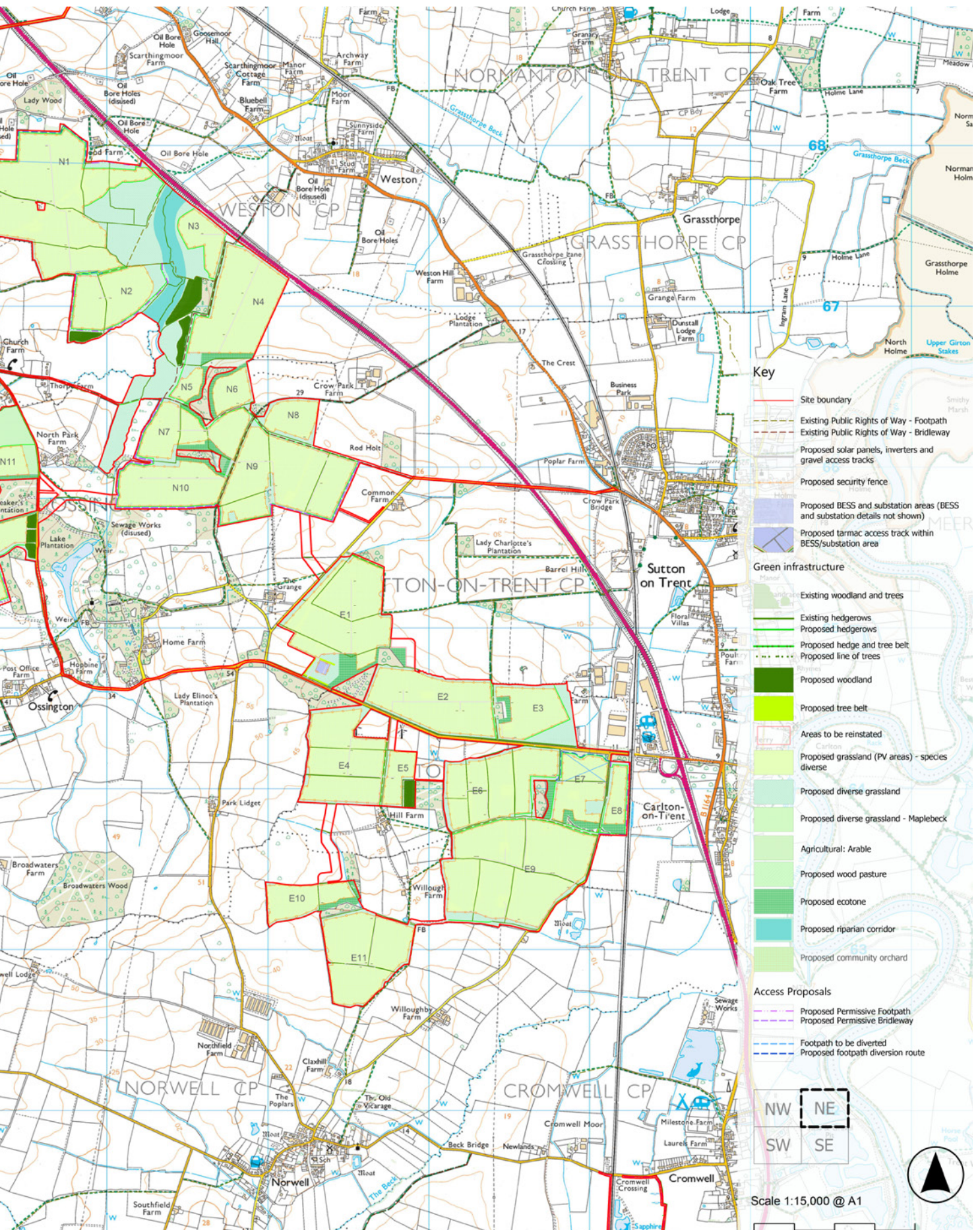
8.8 LANDSCAPE AND ENVIRONMENTAL DESIGN

115 The landscape and environmental design aims and objectives are provided within the Landscape and Ecological Management Plan (LEMP). The LEMP describes the measures required to implement, manage, monitor and remediate habitats during the lifetime of the Development. The aim of these actions is to ensure that, as far as practicable, habitats are created and enhanced in accordance with the conclusions of the ES and the aspirations of BNG. In addressing this aim, a range of overarching objectives are summarised in **Table 2**:

Table 2: Design response to overarching design principles

Objective	Rationale
Mitigate and compensate for the loss of habitats, including those on which wildlife depend.	Reduce the effects of habitat loss.
Enhance retained habitats to a better condition, extent and connectivity, including their ability to support wildlife.	Provide an overall net gain in biodiversity.
Create new habitats in keeping with the local environment.	Provide an overall net gain in biodiversity.
Increase the resilience of habitats to the effects of climate change.	Provide long-term stability and opportunities for wildlife.
Screen elements of the Development from key receptors.	Reduce the visual impact of the Development.
Soften the 'hard edges' of the Development.	Reduce the visual impact of the Development.
Improve the amenity value of the land.	Increase opportunities for access and education.
Reduce flood risk.	Reduce the effects of flooding on local residents.
Improve water quality.	Improve the quality of water in the catchment to benefit people and the environment.





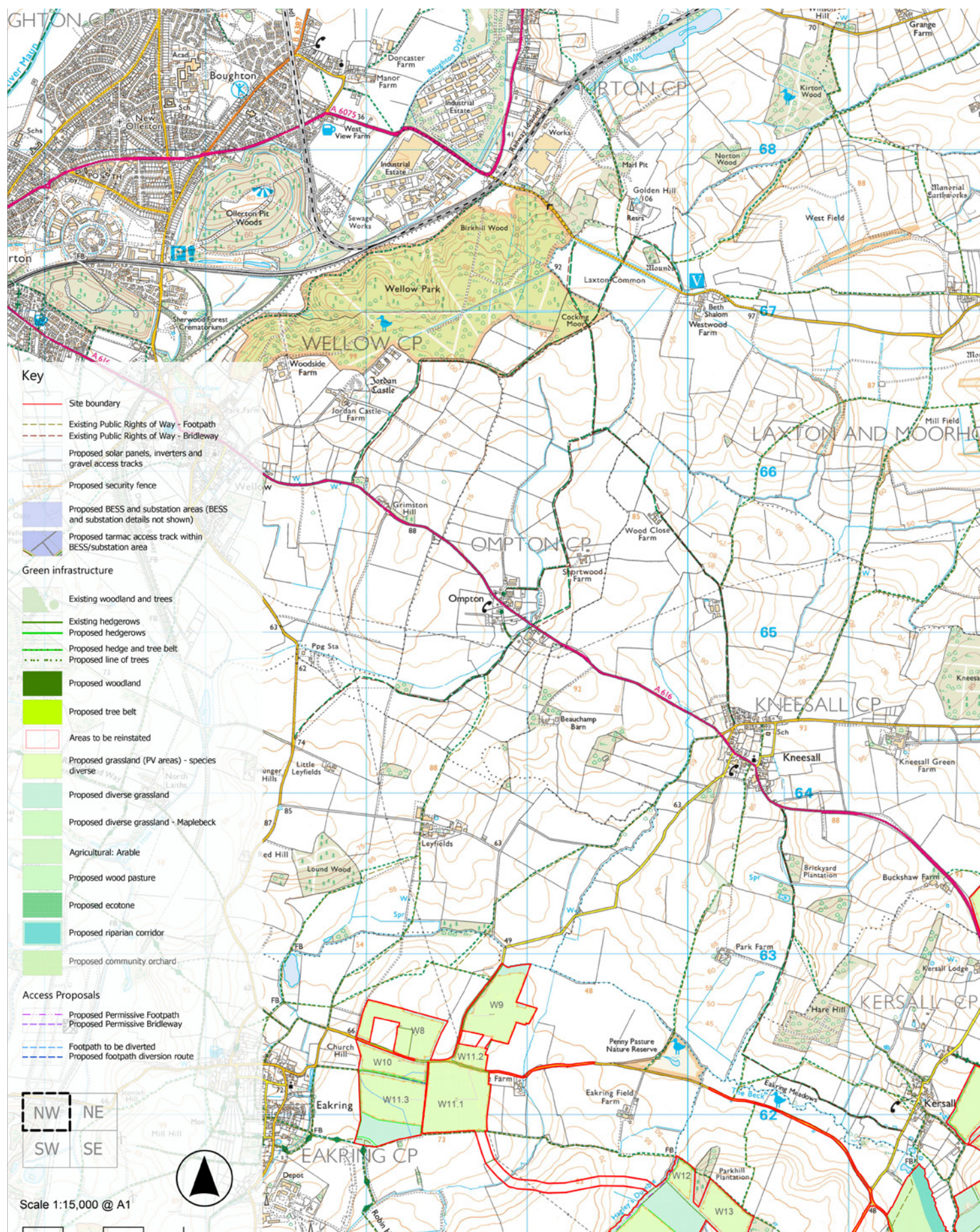


Figure 13: Masterplan (Northwest)



8.8.1 LANDSCAPE

116 The below list defines the key landscape design concepts which have guided the preparation of the landscape proposals:

- Protection of retained habitats, where possible, which are of ecological and nature conservation interest, and the enhancement and creation of ecologically valuable habitats and features;
- Suitable buffers around the root protection areas of each tree and hedgerow that are to be retained;
- Strategic landscape interventions to reinforce and enhance Green Infrastructure, such as new structural landscape planting including native hedgerow, treelines/belts and woodland;
- Retention and enhancement of the existing components of landscape character, including field pattern;
- Creation of suitable habitats to promote the wildlife the site already supports;
- Strengthen existing landscape features such as hedgerows, to reduce visual effects and reinforce these landscape elements which make an important contribution to landscape character;
- Creation of Community Orchards to engage and promote community involvement;
- Provide mitigation of the visual impact of the Development when viewed by sensitive visual receptors.

8.8.2 ECOLOGY

117 A review of England's wildlife sites and ecological networks established the principles by which their resilience and coherence could be improved:

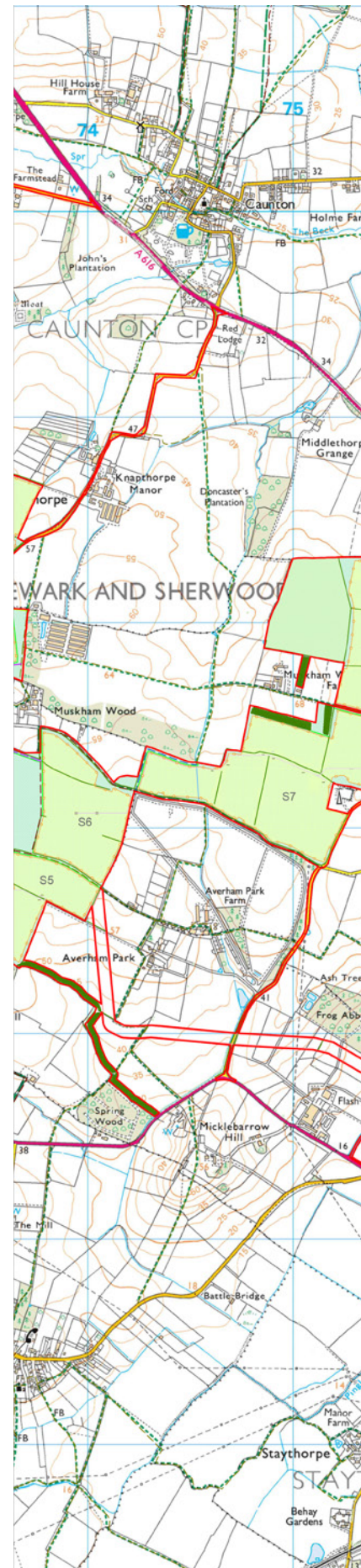
- More – increase the diversity of habitats;
- Bigger – increase the extent of habitats;
- Better – improve the value or condition of habitats, including reducing the pressures on wildlife by improving the wider environment, such as through buffering wildlife sites; and
- Joined-up – improve connectivity between habitats.

118 The review focused on a national scale network of sites, but the principles are applicable to habitat management at the landscape scale of the Development and have influenced the design of the Masterplan and the scope of the LEMP.

- 119 The Nottinghamshire Biodiversity Opportunity Mapping Project has also influenced the design of the Masterplan and LEMP and the forthcoming Local Nature Recovery Strategy (LNRS) will be considered in future design iterations, whilst recognising that many aspects of the Development design will be fixed by the time of its publication.
- 120 The LEMP also provides measures that will reduce risks to natural capital through nature recovery, including several of those identified in the recently published State of Natural Capital Report 2024, such as the creation of species-rich farmland, woodland creation and improving water quality.
- 121 National Policy Statement for energy (EN-01)¹⁶ includes provisions for developments to deliver biodiversity and wider environmental gains (e.g., access to greenspace), beyond those embodied in BNG. This LEMP also addresses the obligation to produce a biodiversity management strategy for the Development.
- 122 National Policy Statement for renewable energy infrastructure (EN-3)¹⁷ identifies the potential of solar farms to increase the biodiversity value of a site beyond BNG, as demonstrated by the LEMP.
- 123 In 2020, the government committed to protecting 30% of the UK's land by 2030 ('30by30'). Through the LEMP and BNG, the Development will contribute to this by protecting a large area from loss or damage to important biodiversity values through long-term ownership and long-term management agreements, as well as contributing to local policies such as the emerging LNRS.
- 124 Many of the habitats and species affected by the Development have specific guidance and action plans relating to their conservation management and are considered in the management prescriptions.

¹⁶ Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for energy (EN-1). Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1>.

¹⁷ Department for Energy Security and Net Zero (2024). National Policy Statement for renewable energy infrastructure (EN-3). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3>.



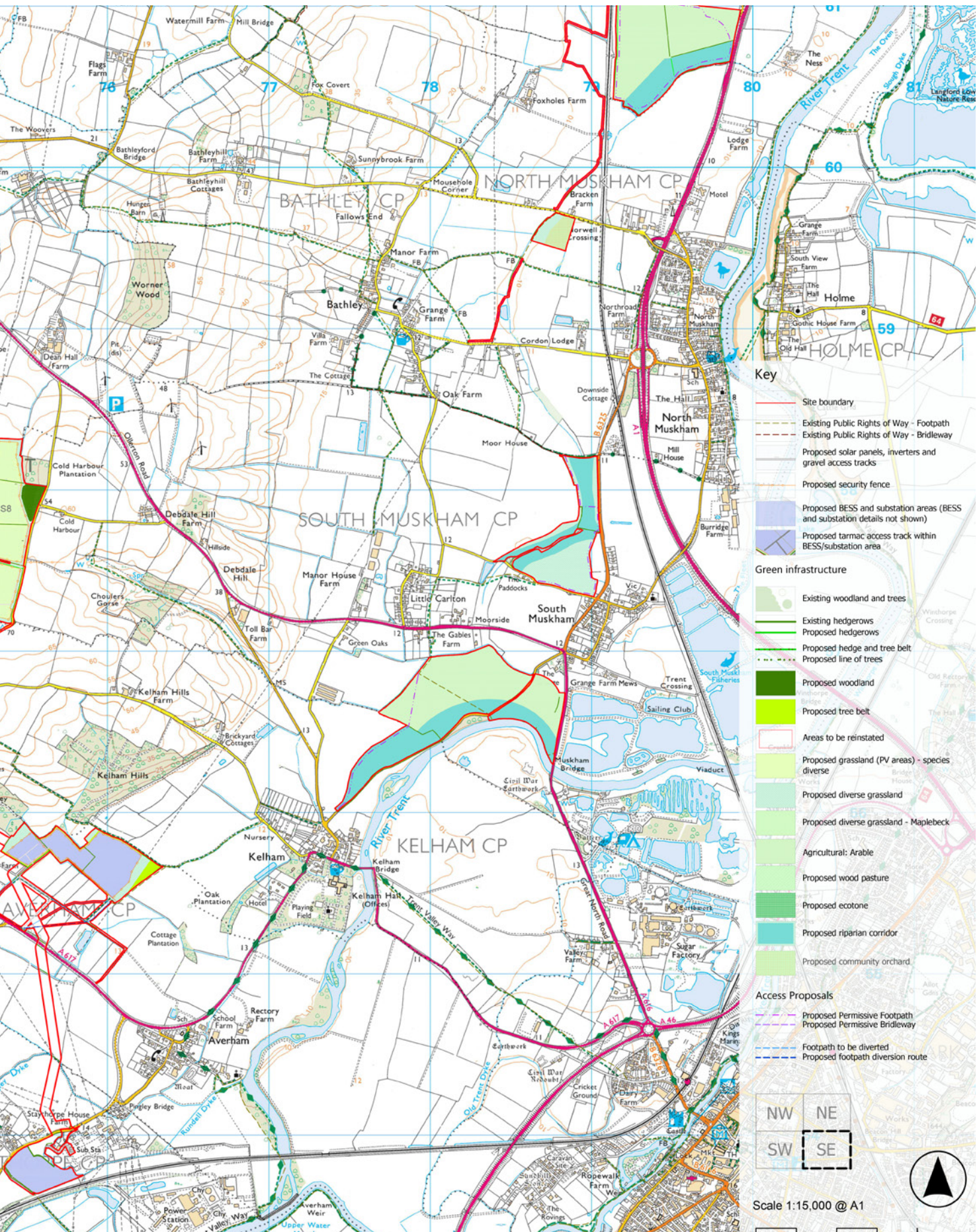


Figure 14: Masterplan (Southeast)

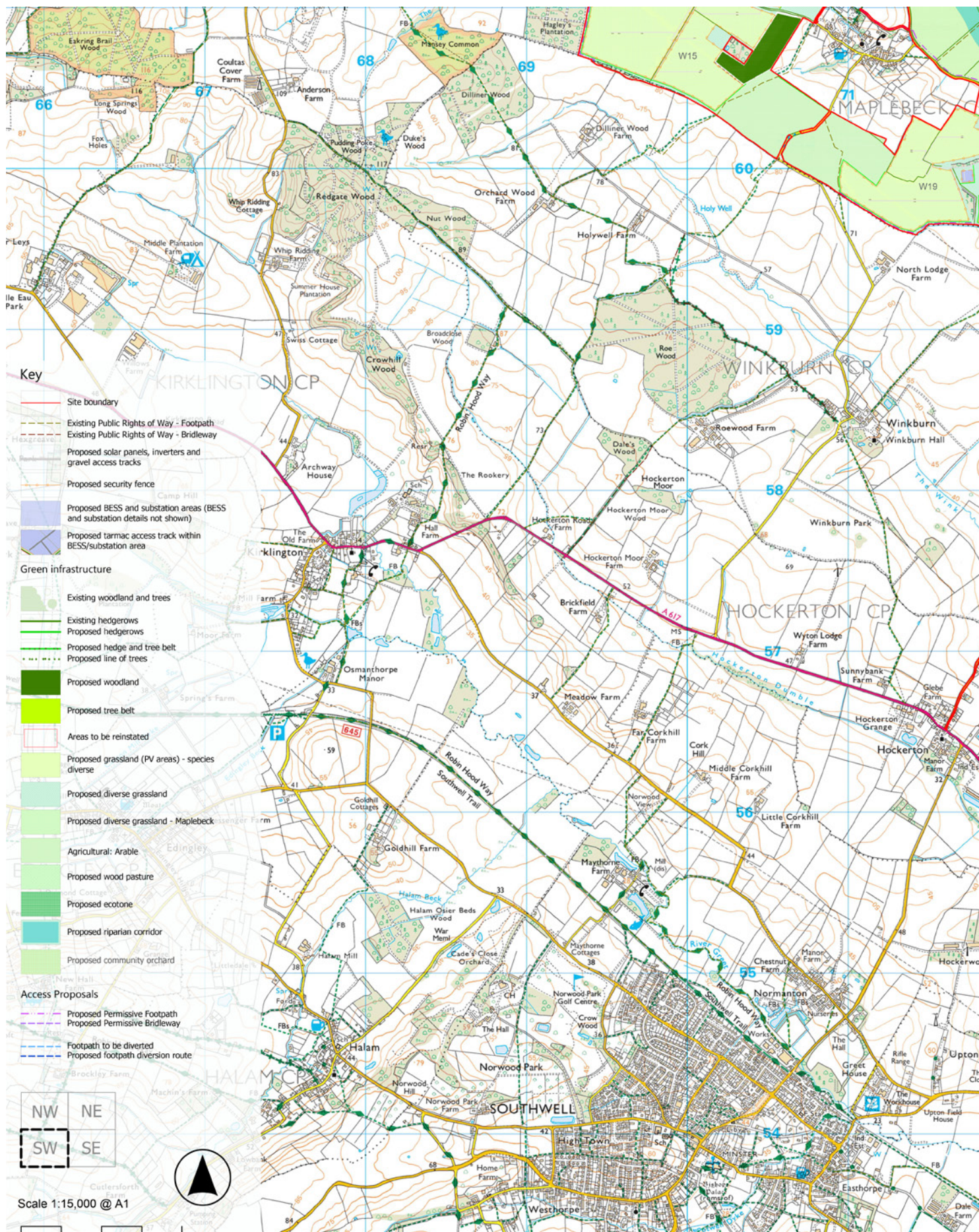


Figure 15: Masterplan (Southwest)

8.9 LANDSCAPE MASTERPLANS

- 125 The Landscape Masterplans for the Development are shown on Figures 12 to 15. The Masterplans provide an overview of the detail proposals presented within the LEMP.

Table 3: LEMP Habitats

LEMP Feature	Extent
<i>Proposed Terrestrial Habitats</i>	
Existing woodland and trees	11.69 ha
Proposed woodland	31.09 ha
Existing hedgerow	-
Proposed hedgerow	48.94 km
Proposed hedge and tree belt	
Proposed line of trees	3.06 km
Proposed tree belt	2.72 ha
Proposed grassland (PV areas) – species diverse	998.69 ha
Proposed community orchard	2.37 ha
Proposed wood pasture	8.51 ha
Proposed ecotone	23.13 ha
Proposed diverse grassland	351.05 ha
Proposed diverse grassland – Maplebeck	54.29 ha
Wildlife boxes and artificial refugia	
<i>Agriculture</i>	
Arable (Retained agricultural land – enhanced ecological management)	144.19 ha
<i>Freshwater</i>	
Riparian corridor (with scattered trees)	69.85 ha
Pond	2 new ponds 4 four existing ponds enhanced
Scrape	16 no.

8.9.1 MONITORING

- 126 Monitoring is essential to the successful establishment of the LEMP habitats. The timing, frequency and methods of monitoring will provide the necessary information to monitor compliance with objectives and influence management.
- 127 Monitoring reports will be provided to the Local Planning Authority (LPA). Any lessons learnt from this monitoring can then be reflected in a review of the management plan (to be agreed with the LPA), which should normally be made every five years. The management and remediation prescriptions in the LEMP may be subject to change over the lifetime of the Development to ensure that, as far as possible, the habitat types achieve the same or better condition than proposed.

9 CONCLUSION

- 128 The design of the Proposed Development has been developed in accordance with a clear design framework, based on the criteria for good design set out in EN-1. This has included the adoption of project level design principles to guide decision making and embed good design outcomes to the Proposed Development.
- 129 Project Principles have evolved throughout the design process, being informed and refined by stakeholder engagement, consultation feedback, technical studies and assessments. They have been used to steer and influence the design of the Development to avoid and reduce adverse impacts wherever possible, make the most of opportunities for enhancement and balance the need for flexibility and certainty within the DCO Application.
- 130 In addition to the generation of secure, low cost, decarbonised, clean, renewable energy, the Proposed Development would deliver a number of environmental, social and economic benefits. These include significant areas of new habitats that respect and enhance features within the landscape, including over 31.09ha of new native woodland comprising 64,500 trees, over 50km of new hedgerows and over 1400 hectares of species rich grassland delivering a Biodiversity Net Gain and improvements in ecological connectivity.
- 131 The Proposed Development would also provide benefits to the local community via an enhanced green infrastructure network including a better-connected footpath and bridleway network and access to open space and recreational spaces. These would include the provision of permissive paths and a new community orchard. If DCO consent is given, the design of the Proposed Development will be secured and implemented post-consent, in accordance with the Environmental Statement [EN010162/APP/6.2].

