

# One Earth Solar Farm

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## Executive summary

One Earth Solar Farm is a proposed solar farm with associated battery storage located at the border of Nottinghamshire and Lincolnshire. The project would connect into the National Grid at High Marnham.

This Design Approach Document (DAD) details how good design has been embedded in One Earth Solar Farm to date and how it will continue to be embedded post consent throughout detailed design.

Planning policy consistently highlights the breadth of issues that should be considered under the scope of good design, in particular the approach to sustainability alongside its relationship to the physical characteristics of a site and overall landscape character.

Given the broad scope of good design, the project appointed a design lead from the outset to guide the design process. The role of the design lead has been to inform and test project decisions and embed good design at each stage of the design process.

The Order Limits extend across 1,409 hectares (ha.) of land, mostly comprising agricultural fields to the east and west of the River Trent. The Order Limits fall within two county boundaries; 1,203ha. within Nottinghamshire and 206ha. within Lincolnshire. At the district scale the Order Limits extend across Newark and Sherwood (402ha.), West Lindsey (206ha.) and Bassetlaw (802ha.) administrative areas (the district measurments total 1,410 to allow for rounding to whole numbers).

Embedding good design in the Proposed Development requires the adoption of a design focussed vision and design principles, which are then translated into the secured aspects of the Proposed Development. The project vision is as follows:

‘One Earth Solar Farm will deliver 740MW (ac) of renewable energy to the national grid whilst being sensitive to its surroundings. The project will engage in meaningful conversation

with communities and will be sited to take account of the local environment and people’s visual amenity. The project will take opportunities to embed sustainability and resilience, enhancing biodiversity and furthering recreational access across the site.’

Project specific design principles were adopted at the outset of the project under the headings of **climate, people, places and value**. These four headings highlight the breadth of considerations that should be included under the banner of good design. The design principles have been held as the benchmark against which all project design decisions have been measured. Meaningful engagement with stakeholders and local communities has been foundational to the integration of the design principles in the final masterplan.

The design of the Proposed Development has been an iterative process responding to technical engineering challenges, environmental surveys, consultation and engagement feedback. Good design requires a holistic approach with input from all disciplines to result in an integrated solution.

At each stage of design development, the project has sought to embed the guidance presented in the National Infrastructure Commissions guidance to: **appreciate the wider context, engage meaningfully**, and **continually measure and improve**.

The project has sought opportunities to provide beneficial outcomes including:

- A series of permissive paths that will be open for the operational phase of the Proposed Development to be used by equestrians, cyclists and pedestrians.
- Making efficient use of land by optimising energy generation in line with the grid connection agreement to provide clean energy to the national grid.
- Delivering Biodiversity Net Gain and contributing towards

local conservation priorities. This includes providing new and enhanced contribution to the local green infrastructure network including extensive hedgerow networks, coastal and floodplain grazing marsh, field margins and ditches.

Sustainability is a key aspect of good design and has been a priority in the development of One Earth. At a high level, this is embedded in the project specific design principles.

Good design has been secured through several means within the DCO, including the Works Plan [EN010159/APP/2.3], Height Parameter Plan (Within Site Layout Plans [EN010159/APP/2.5]) and Outline Design Parameters [EN010159/APP/5.9]. Alongside other aspects of the DCO, these documents ensure that the maximum extent of the Proposed Development is assessed in the ES, as well as provide secured limits within which future design development can be progressed.

The controls placed on the Proposed Development to ensure that good design is embedded are secured by the DCO. An overview of these controls, and where they are secured, is provided in the Commitments Register [EN010159/APP/7.15].

Future design development will be overseen by a technical design team. Emerging design decisions will be communicated to the local community via a community liaison officer.



# Introduction

One Earth Solar Farm is a proposed solar farm with associated battery storage located at the border of Nottinghamshire and Lincolnshire. The project would connect into the National Grid at High Marnham.

This Design Approach Document (DAD) details how good design has been embedded in One Earth Solar Farm to date and how it will continue to be embedded post consent throughout detailed design.

The Planning Inspectorate's advice titled 'Nationally Significant Infrastructure Projects: Advice on Good Design' (October 2024) provides issues that applicants should consider before submitting a DCO application for examination. This DAD addresses these issues, either directly or by signposting to wider commitments secured within the DCO. Table 1 provides direction to where each of the points for consideration in Appendix A of the Advice Note have been considered.



Land within the Order Limits. Orientated west over the River Trent

Table 1: Signposting to key design considerations		
Issue	Considerations	Response
Design	Is a DAD provided?	Yes
Approach	Does the DAD address the brief, the design process, the design principles, and beneficial outcomes?	Provided under respective headings in this DAD
Document	If a DAD is not provided, where are the design process and design principles set out?	N/A
Analysis,	How has the development site been analysed to inform a good design approach?	Addressed in 'Assemble' section
Research	What are the main conclusions from this analysis that inform the design at this stage and as it develops?	See 'Summary of Constraints and Opportunities' within 'Assemble' section
Response	What are the main significant adverse effects of the proposed development and how are they addressed to enable good design?	Embedded mitigation at each stage of design provided in 'Research' section
Vision	What is the vision for the completed development and its surroundings? Where is it set out?	Addressed in 'Assemble' section: Process, vision and design principles
	Set out the narrative, how the vision will achieve sustainability, create a new place and hold the design together.	Addressed in 'Assemble' section: Process, vision and design principles
Skills	What professional disciplines and skill sets are being and will be working on the design of the project?	Addressed in 'Assemble' section: Good design in the Design Team
	Is there a design champion designated for this project, and if so, who is it and what are their skills?	Addressed in 'Assemble' section: Good design in the Design Team
Developing the design	Describe the approach to good design and explain how the design has (and will continue) to evolve.	Addressed in 'Research' section
	How is any required flexibility being addressed?	See ES, Chapter 5: Description of the Proposed Development [EN010159/APP/6.5
	What design choices have (and will be) made?	Addressed in 'Coordinate' section
	What are the emerging design principles and how have the principles directly informed decision making?	Addressed in 'Coordinate' section
	Is there a hierarchical approach to elements of the proposal (for example in designing major and less important bridges in a highways scheme)?	N/A
	Have digital techniques, including algorithms and AI been used in design development? If so, explain the tools and data used.	Such digital techniques have not been used.
	Is there a coherent narrative of how the approach to design has evolved?	Addressed in 'Research' section
	Where are design outcomes set out?	Addressed in 'Research' section: Delivery of Positive Outcomes
	Will additional value beyond the site boundary be incorporated?	Addressed in the 'Value' Design Principles discussed within 'Research' section
Independent design review	Has the design development been the subject of an independent design review?	Yes, addressed in 'Research' section: Design review
	If so, what were the main comments and how has the design responded to them?	Addressed in 'Research' section: Design review
	Is it the intention to include design reviews post-consent? If so, how are these secured?	No post-consent design reviews proposed
Delivery	How will the final design be delivered? Will there be a design management plan, a design guide or a design code? If not, why are they not required?	Addressed in 'Secure' section
	Is there a design consultation plan to engage the community following consent of the DCO?	A community liaison officer would be in place
	Is there an agreed process for post-consent decisions with local planning authorities and others, where required?	Addressed in 'Secure' section
Place	How is placemaking being addressed?	'Place' is one of the overarching design principles. Addressed in 'Assemble' and 'Research'.
	How will this be a distinctive place and how will the community benefit from it?	Understanding distinctive features is detailed within 'Assemble'. Positive outcomes is addressed in 'Coordinate'
	Describe what the quality of place outcome will be, how this relates to the vision and how it will be secured?	Addressed in 'Coordinate' section.
People	What consultation has taken place with statutory and local authorities, communities and people with an interest in the land?	Set out in Consultation Report [EN010159/APP/5.1]
	How will their views be incorporated in the design evolution and where will this be set out?	Set out in Consultation Report [EN010159/APP/5.1]
Integrated design approach	Explain how an integrated, holistic approach to the project's design will be achieved.	Addressed in 'Research': Design evolution
	Where is it shown in the documentation? Is there a masterplan?	See Works Plan EN010159/APP/2.3 and Illustrative Masterplan EN010159/APP/2.7
	How will this be secured?	Addressed in 'Secure' section
NPSs	How have the requirements for good design in the relevant NPS (or NPSs) been met?	This DAD provides the summary of the project's approach to meeting the requirements for good design.
Design Principles	Set out the good design principles being applied to the project.	Provided in 'Assemble' section
	Are the design principles structured or grouped logically?	Provided in 'Assemble' section (structured in accordance with NIC guidance).
	How will they be developed prior to consent?	Development and response to design principles provided within 'Research' section.
	How will they be illustrated and secured?	As explained in 'Secure'
National Infrastructure Commission (NIC) 'principles'	Is there a response to the NIC's four principles of good design?	Addressed in 'Assemble' section. (NIC's four principles have been translated into the project specific design principles).
	If not, what design principles have been adopted?	N/A
	What process has been used to develop and embed project level design principles?	Addressed in 'Assemble' section.



# Good Design

Good design is a simple concept but has far reaching implications. It goes beyond pure aesthetics, rather spanning all project design and engineering decisions including sustainability, functionality and place. As such it is not limited to a single deliverable or assessment, but rather permeates every design decision from site selection and the extent of the Order Limits to the specification and height of individual elements.

It is therefore the role of this DAD to not only describe the design rationale for the final masterplan, but also the process and key decisions taken, as well as the proposed approach to detailed design and how this will be controlled within the parameters assessed.

The requirement for good design is set out in policy. The following section highlights the key policy documents that have been considered (rather than providing a comprehensive policy review). This DAD provides design narrative in response to the policy requirements. A full response detailing how the Proposed Development has addressed the policy requirements is provided in the Planning Statement [EN010159/APP/5.5].

The policy reviewed consistently highlight the breadth of issues that should be considered under the scope of good design, in particular the approach to sustainability alongside its relationship to the physical characteristics of a site and overall landscape character.

## Policy

The project’s approach to good design has been informed by the following policy and guidance:

Overarching National Policy Statement for Energy (EN-1), November 2023, in particular paragraphs 4.7.1 - 4.7.2 which state:

“4.7.1 The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important.

4.7.2 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.”

National Policy Statement for Renewable Energy Infrastructure (EN-3), November 2023, in particular the ‘Impacts’ section from paragraph 2.10.73 - 2.10.126 and paragraphs 2.10.60 - 2.10.61 which state:

“2.10.60 ...applicants will consider several factors when considering the design and layout of sites, including proximity to available grid capacity to accommodate the scale of generation, orientation, topography, previous land–use, and ability to mitigate environmental impacts and flood risk.

2.10.61 For a solar farm to generate electricity efficiently the panel array spacing should seek to maximise the potential power output of the site. The type, spacing and aspect of panel arrays will depend on the physical characteristics of the site such as site elevation.”

National Planning Policy Framework, December 2024, in particular paragraph 131 which states:

The creation of high quality, beautiful and sustainable buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.

Central Lincolnshire Local Plan, April 2023, in particular policy S53: Design and Amenity which states:

“All development... must achieve high quality sustainable design that contributes positively to local character, landscape and townscape, and supports diversity, equality and access for all.

Good design will be at the centre of every development proposal and this will be required to be demonstrated through evidence supporting planning applications to a degree proportionate to the proposal... All development proposals will be assessed against, and will be expected to meet the following relevant design and amenity criteria” including:

1. Context;
2. Identity;
3. Built Form;
4. Movement;
5. Nature;
6. Public Spaces;
7. Uses;
8. Homes and Buildings;
9. Resources; and
10. Lifespan.

# Good Design

Newark and Sherwood Amended Core Strategy, March 2019, in particular Core Strategy 9 which states:

“The District Council will expect new development proposals to demonstrate a high standard of sustainable design that both protects and enhances the natural environment and contributes to and sustains the rich local distinctiveness of the District. Therefore all new development should:

- Achieve a high standard of sustainable design and layout that is capable of being accessible to all and of an appropriate form and scale to its context complementing the existing built and landscape environments;
- Through its design, pro-actively manage surface water including, where feasible, the use of Sustainable Drainage Systems;
- Minimise the production of waste and maximise its re-use and recycling;
- Demonstrate an effective and efficient use of land that, where appropriate, promotes the re-use of previously developed land and that optimises site potential at a level suitable to local character;
- Contribute to a compatible mix of uses, particularly in the town and village centres;
- Provide for development that proves to be resilient in the long-term. Taking into account the potential impacts of climate change and the varying needs of the community; and
- Take account of the need to reduce the opportunities for crime and the fear of crime, disorder and anti-social behaviour, and promote safe living environments...”

Bassetlaw Local Plan, May 2024, in particular Policy ST33: Design Quality which states:

“All development must be of a high quality design that:

a) has a clear function, character and identity based upon a robust understanding of local context, constraints and distinctiveness, while reflecting the principles of relevant national and local design guidance, including..., the Bassetlaw Design Quality SPD and the Bassetlaw Design Code;

b) uses land efficiently...

j) incorporates and/or links to a well-defined green/blue infrastructure network of well managed and maintained public and open spaces;

k) secures a high quality public realm that is attractive and aesthetically

pleasing, that clearly distinguishes between public and private spaces;

l) enhances the value of the District’s Nature Recovery Network such as through the use of street trees;

m)incorporates high quality landscape design and maximises opportunities for greening, particularly where a development site adjoins the countryside;

n) is sustainable in design and construction, and utilises modern construction methods and durable materials, where practicable;

o) minimises energy consumption by maximising opportunities for passive solar energy and integrating renewable and low carbon technologies where practicable in accordance with Policy ST49;

p) mitigates flood risk and water run-off utilising the drainage hierarchy in accordance with Policy ST50, and integrates water management appropriate to place...”

## Guidance and Advice

Alongside planning policy, the approach to good design has also been informed by the following guidance and advice:

- National Infrastructure Strategy (HM Treasury. November 2020);
- Nationally Significant Infrastructure Projects: Advice on Good Design (Planning Inspectorate. 23 October 2024);
- Design Principles for National Infrastructure (National Infrastructure Commission Design Group);
- Project Level Design Principles (National Infrastructure Commission Design Group. May 2024); and
- National Design Guide. Planning practice guidance for beautiful, enduring and successful places (MHCLG. January 2021).

The Planning Inspectorate’s Advice on Good Design (October 2024) explains that the following elements should be considered during the pre-application process:

1. Assemble
  - Comprising preliminary information including the project brief, timeline, team, baseline information, vision and design principles.
2. Research
  - Comprising description of the iterative process undertaken to analyse constraints and opportunities and presentation of a narrative of how the design has evolved to mitigate adverse effects and deliver positive outcomes through environmental assessment and consultation.
3. Coordinate
  - Comprising refinement of details and parameters by incorporating consultation responses and findings from environmental assessment. ‘Coordinate’ also requires explanation of the process by which future post-consent decision making will be made.
4. Secure
  - Set out how the project’s good design is secured and will be delivered including ongoing design advice and community engagement.

This DAD has been structured in accordance with these four elements, with Coordinate and Secure being combined into a single section.

# Assemble

- project brief
- timeline
- team
- baseline information
- vision
- design principles

## Project Brief

### The Proposed Development

One Earth Solar Farm (the Proposed Development) is a proposed solar farm with associated battery storage and infrastructure.

The Proposed Development will connect to the National Grid at High Marnham, having secured a grid connection agreement to supply 740MW, enough to power more than 200,000 homes with clean power each year.

A full description of the Proposed Development is provided in Environmental Statement Chapter 5 [EN010159/APP/6.5]. The Statement of Need [EN010159/APP/7.1] details the case for why the Proposed Development is required.

### Location

The Planning Statement [EN010159/APP/5.5] sets out the consideration of alternative locations. The following provides a summary of why the land within the Order Limits has been selected:

- the distance from protected ecological assets compared to areas to the west and south which are closer to the Spalford Warren SSSIs and areas of higher landscape sensitivity;
- seeking to minimise undue cumulative impacts with other NSIP-scale solar farms which were at various stages of the DCO process during the site selection process (Cottam, West Burton and Gate Burton all now consented and Fosse Green which is still at the pre-submission stage);
- seeking to minimise additional land take that would otherwise be required to create a cable connection route;

- the existence of large open areas of undeveloped land, which is predominantly made up of gently undulating topography and generally sparse settlement patterns. The area also has high levels of solar irradiation;
- the wider landscape context includes High Marnham substation and National Grid Cottam substation further to the north and therefore its baseline character is influenced by power generation;
- the existing infrastructure and capacity to connect to the National Grid transmission system at High Marnham;
- the land is not located within or close to internationally and nationally designated biodiversity sites;
- the land is not located within or close to National Parks, National Landscapes or other designated areas of landscape value;
- the land is not located within the Green Belt;
- Agricultural Land Classification (ALC) areas do not significantly vary across different locations in wider proximity to the Proposed Development, mainly comprising of ALC grade 2, 3a and 3b land; and
- there are relatively few residential properties in immediate proximity to the Order limits and the impact on those that can be effectively mitigated through offsets and sensitive landscaping.

The project brief can be summarised as:

Design and deliver a sensitively sited and sustainable solar farm and BESS that will deliver 740MW of clean power to High Marnham substation.

# Timeline

The following timeline presents the key milestones that have been undertaken to date and the anticipated future programme.

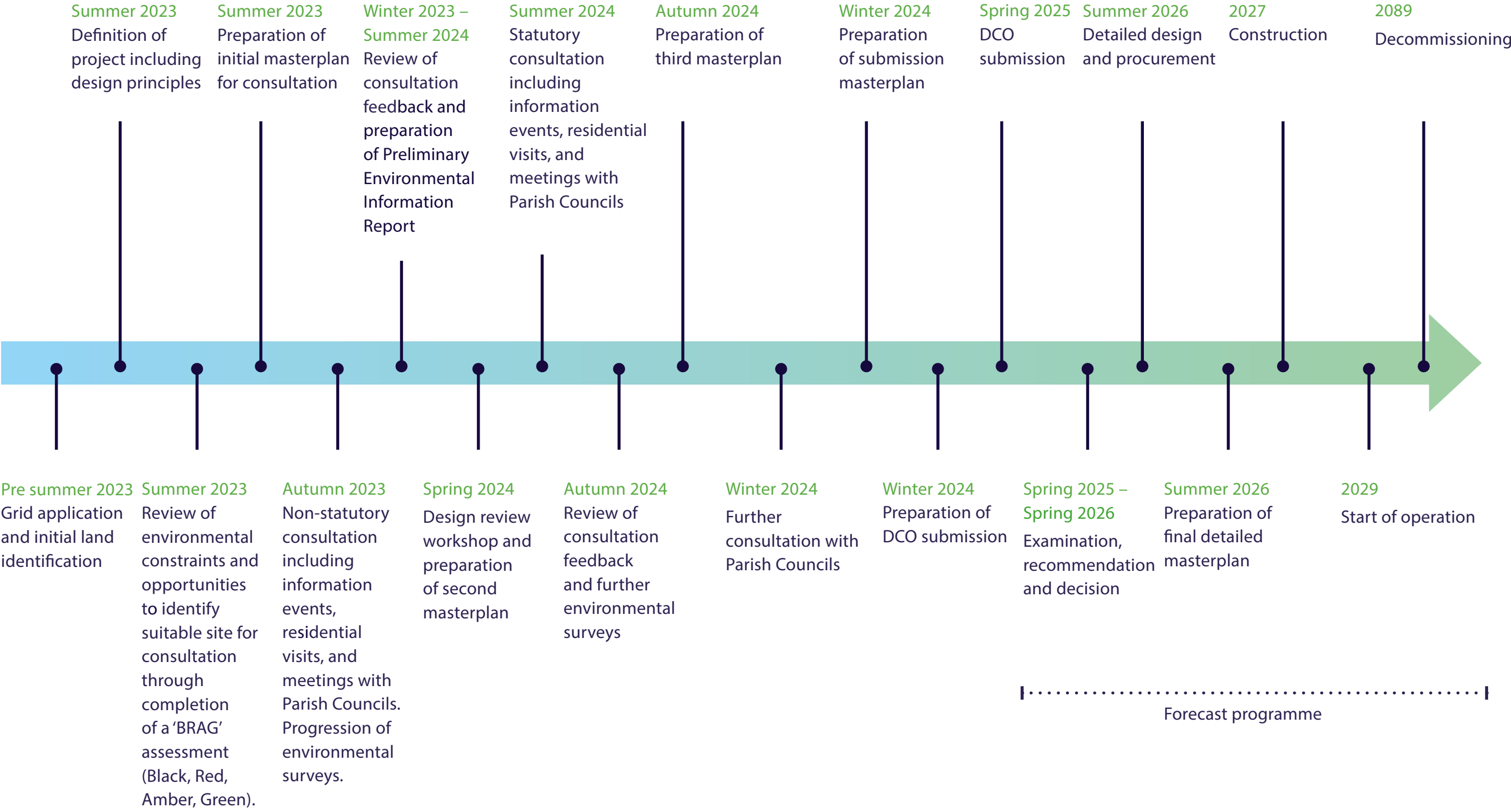


Figure 1: Timeline

# Good design in the project team

Given the broad scope of good design the project appointed a design lead from the outset to guide the design process. The role of the design lead has been to test project decisions and embed good design at each stage of the design process. Figure 2 shows the structure of the design team and their respective skillset.



Figure 2: Design team structure



# Baseline information

The Order Limits extend across 1,409 hectares (ha.) of land, mostly comprising agricultural fields to the east and west of the River Trent.

The Order Limits fall within two county boundaries; 1,203ha. within Nottinghamshire and 206ha. within Lincolnshire. At the district scale the Order Limits extend across Newark and Sherwood (402ha.), West Lindsey (206ha.) and Bassetlaw (802ha.) (the district measurments total 1,410 to allow for rounding to whole numbers).

The Order Limits are within the Trent Valley. The River Trent bisects the Order Limits from north to south. Approximately 6.5km to the north lies the decommissioned coal-fired Cottam Power Station. In August 2023, demolition occurred of the main building, bunker bay, turbine hall and the coal conveyer. West Burton Power Station is located further north. The concentration of power stations and associated infrastructure led to the valley being known as 'Megawatt Valley'.

The following section provides an overview of the baseline information associated with the land within the Order Limits.

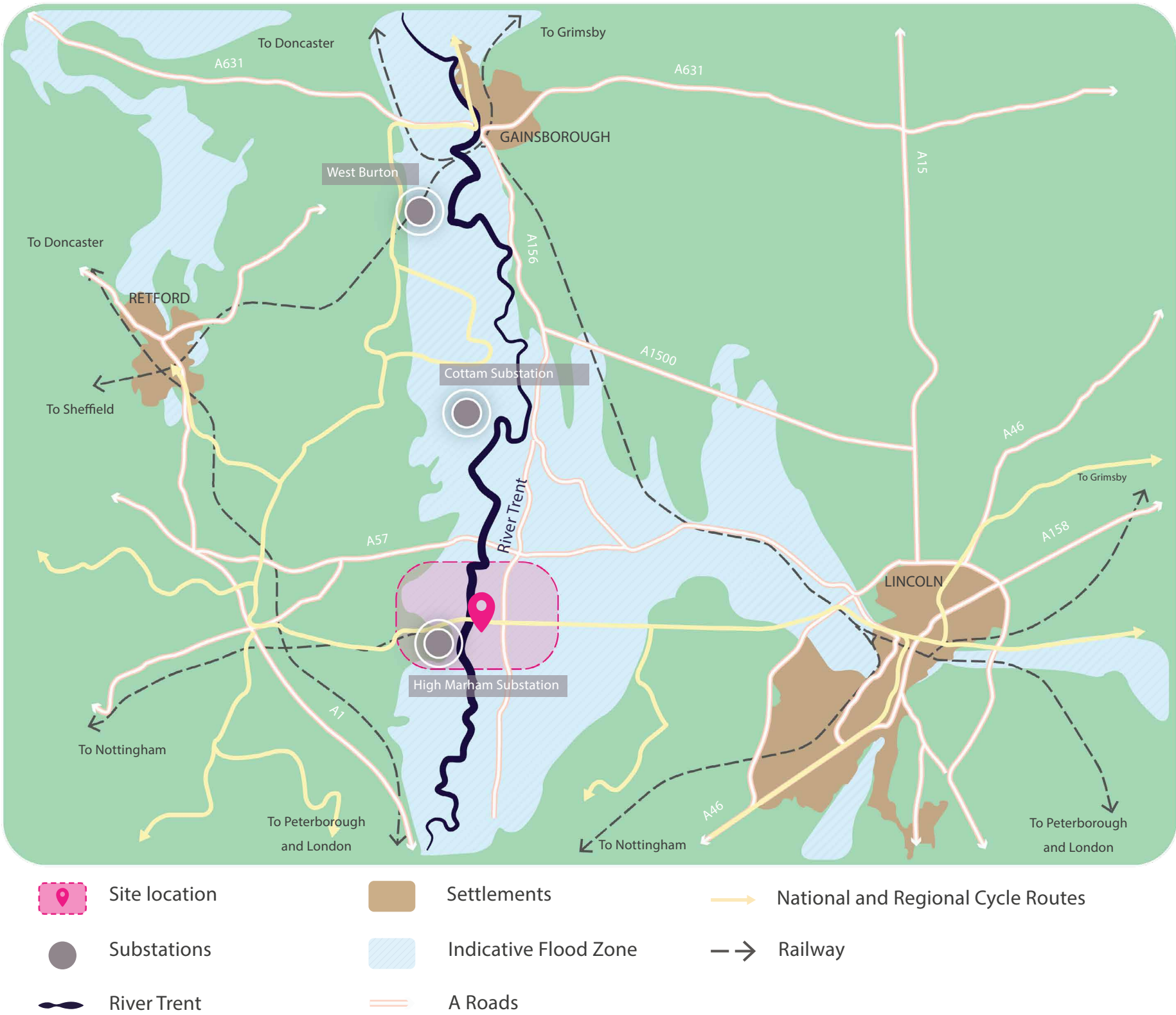


Figure 3: Location

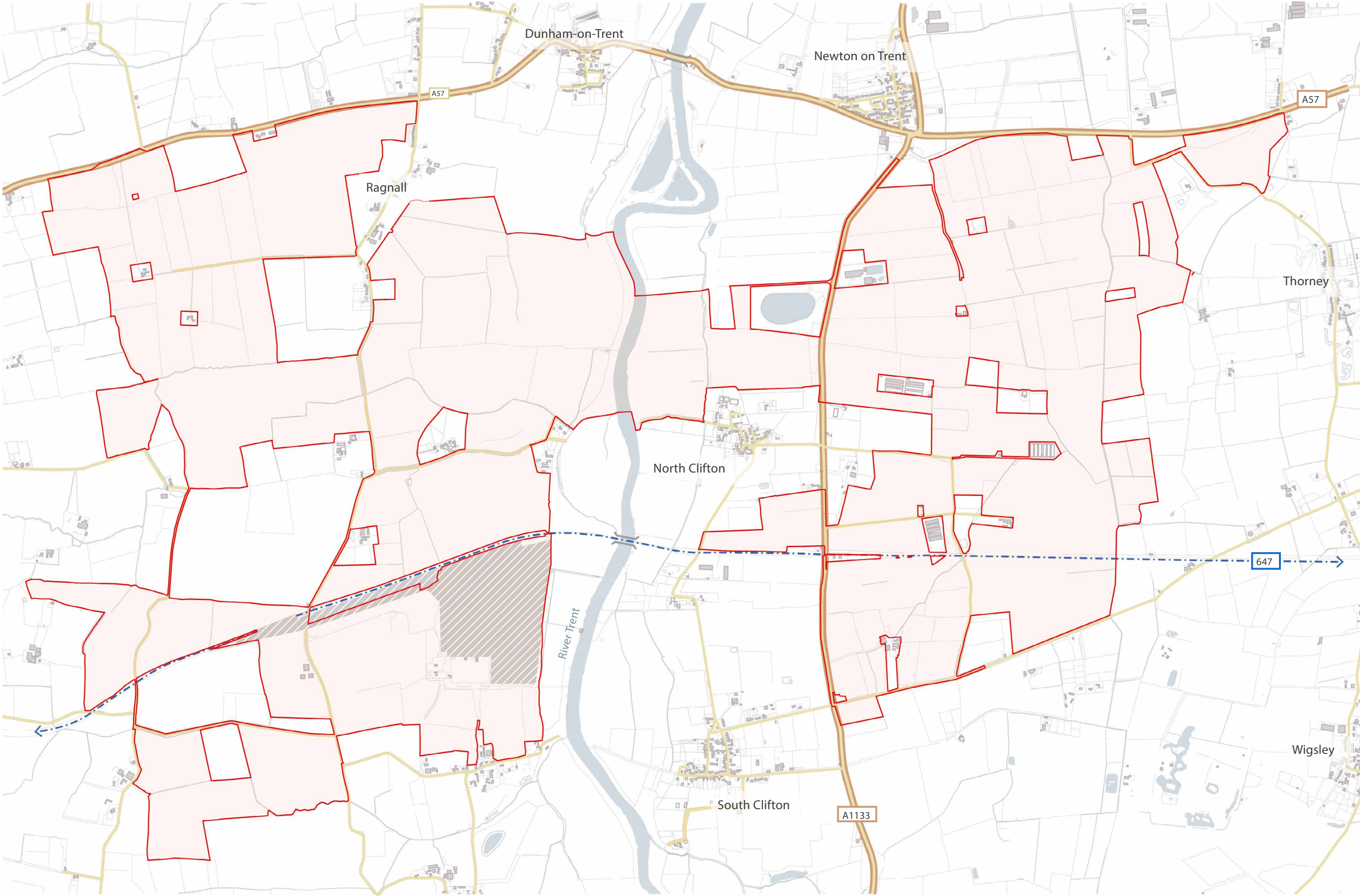


Figure 4: Order Limits



# Topography

The Order Limits are situated across very gently undulating landform at around 4 to 5m Above Ordnance Datum (AOD). In the north-east, the landform rises to a localised ridge, at around 20m AOD to the north of North Clifton, before falling gradually towards Thorney at around 10m AOD.

In contrast, the landform remains low lying at around 5m AOD to the south-east of the River Trent, towards South Clifton, before rising very gradually towards the south-east edge of the Order Limits, situated around 10m AOD, at Vicarage Road.

To the north-west of the River Trent, the landform is gently undulating and rises gradually to around 10m AOD adjacent to Ragnall and 20m AOD adjacent to Darlton.

There is localised level change within this undulating pattern of landform via the embankments of the dismantled railway line which crosses the southern part of the Order Limits. The landform also remains undulating and at around 20m AOD adjacent to Skegby.

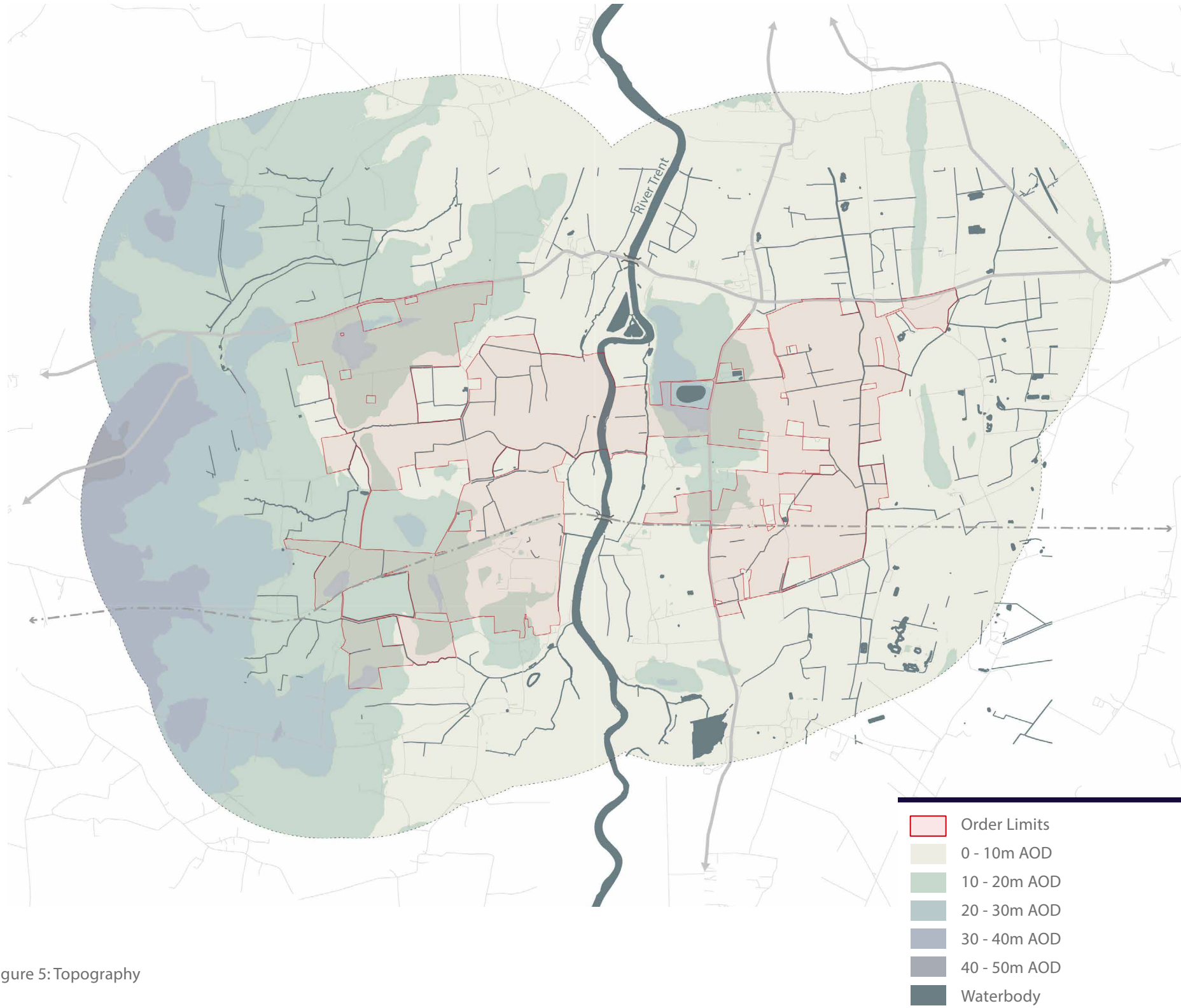


Figure 5: Topography

# Water resources

The River Trent runs through the Order Limits on a general south-north alignment flowing from Staffordshire northwards toward the Humber Estuary. The river effectively separates the Order Limits into those parcels to the west and those to the east. A network of drains and field ditches that follow field boundaries are also present across the Site.

The River Trent is tidal at this location. Parts of the Order Limits fall within Flood Zones 2 and 3, indicating a medium and high probability of flooding from tidal and fluvial sources. This flooding is considered to originate and be predominantly associated with the River Trent. There are a number of flood defences within the Order Limits; this includes embankments between Fledborough and Dunham-on-Trent and at South Clifton and North Clifton. As such, the areas within Flood Zones 2 and 3 would experience a reduction in flood risk due to the presence of the existing flood defences.

The Order Limits are predominantly considered to be at low risk of surface water flooding. However localised areas which are shown to be at low, medium and high risk, which are largely associated with the Fledborough Beck in the west and unnamed Ordinary Watercourses in the southwest and east of the Site.

Further information is provided in ES Volume 2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7], including how project modelling has allowed for the potential impacts of climate change and a scenario in which existing flood defences are breached.

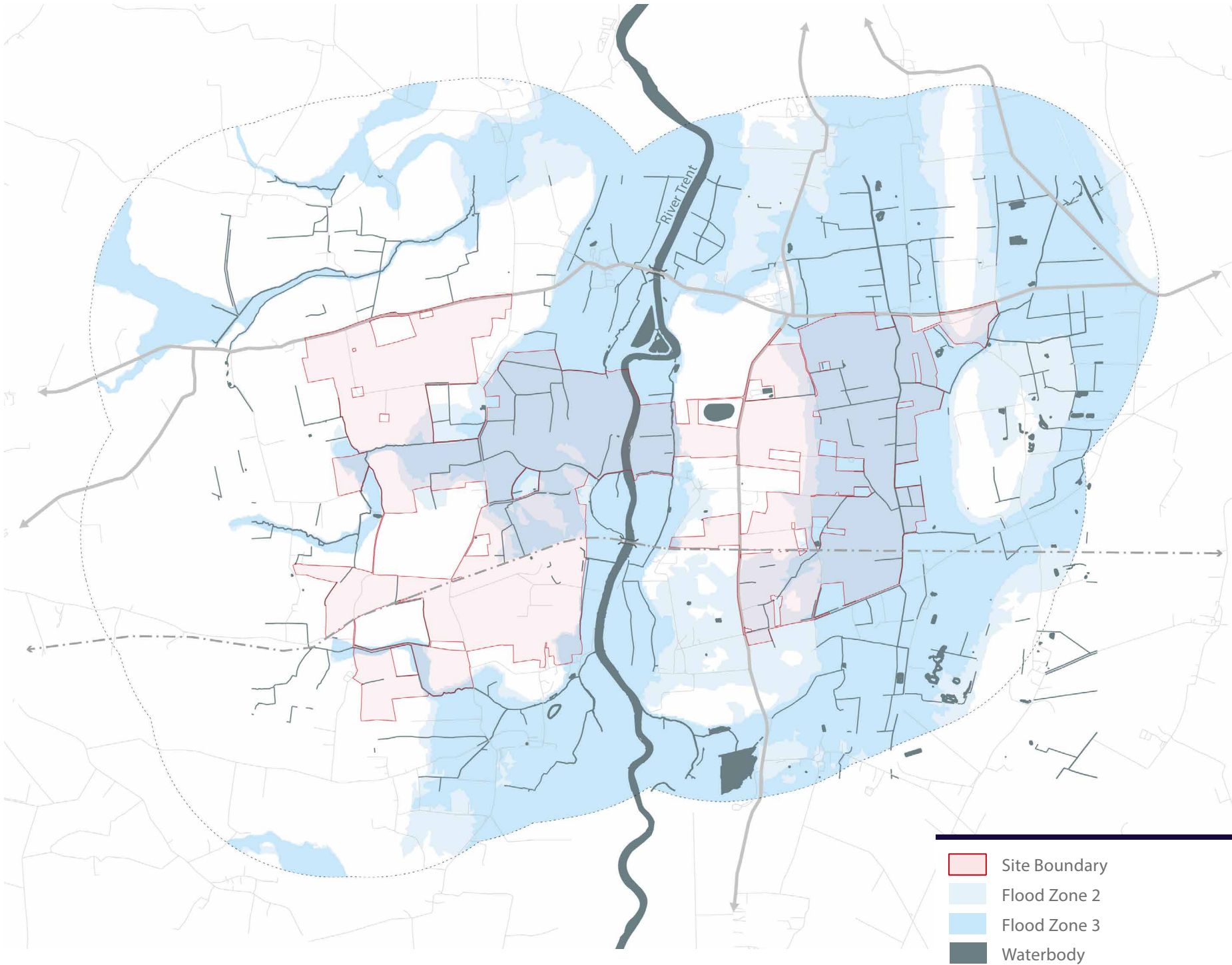


Figure 6: Hydrology



# Land use

The Order Limits comprise predominantly arable agricultural land divided by a network of hedgerows, drains and ditches, and blocks of woodland.

The site of the former High Marnham coal fuelled Power Station, which was decommissioned in 2003, is located in the south western part of the Order Limits. The final site clearance of the facility was undertaken in 2012 with the demolition of the cooling towers. The remaining infrastructure comprises extensive metalled roadways, including the access road from Fledborough to the west, as well as the former pump house that is located adjacent to the River Trent.

On the site of the former High Marnham Power Station remains a National Grid substation.

National Grid overhead power lines carried by pylon structures are located to the east of the River Trent travelling north to south, and are also located throughout the land to the west of the River Trent. The numerous pylons and high voltage overhead power lines are dominant in the localised setting.



Pylons and overhead lines extending across Order Limits

A reservoir and associated water works are located either side of the A1133.

There are several poultry land uses also to the east of the A1133, consisting of large-scale rectangular hen houses. Fields to the west of the River Trent are generally medium scale and geometric in form between the river and Ragnall, before becoming more rectangular in form to the west of Ragnall.

There are several farm tracks and minor roads across the Order Limits, including small sections of Moor Lane and Vicarage Road, to the south-east of South Clifton. The A1133 crosses the eastern part of the Order Limits between the A57 and Moor Lane and Vicarage Road.

A dismantled railway line extends across the south-west and south-east parts of the Order Limits. The south-west part of the Order Limits is also crossed by overhead pylons and associated wires, which connect to the High Marnham sub-station.

Several villages are located beyond the Order Limits. Those

closest are:

- North Clifton and South Clifton, located within 500m;
- Newton on Trent, located within 200m;
- Dunham, located within 800m;
- Fledborough, located within 50m;
- Skegby, located within 50m;
- High Marnham, located within 50m; and
- Ragnall, located within 50m.

# Character of local villages

Consideration of ‘place’ is key to the design of the Proposed Development.

Published Landscape Character Assessments provided detail regarding the agricultural landscape, however there was little information available regarding the characteristics that are distinctive to each of the villages located in proximity to the Order Limits.

ES Volume 2, Chapter 11: Landscape and Visual [EN010159/ APP/6.11] therefore supplemented published landscape character assessments with the identification of 17 Village Character Areas. The key characteristics of these areas (recorded on the following pages) have been a key consideration in the iterative design process as the project has furthered an understanding of what contributes to each village’s sense of identity and considered how this can be protected.

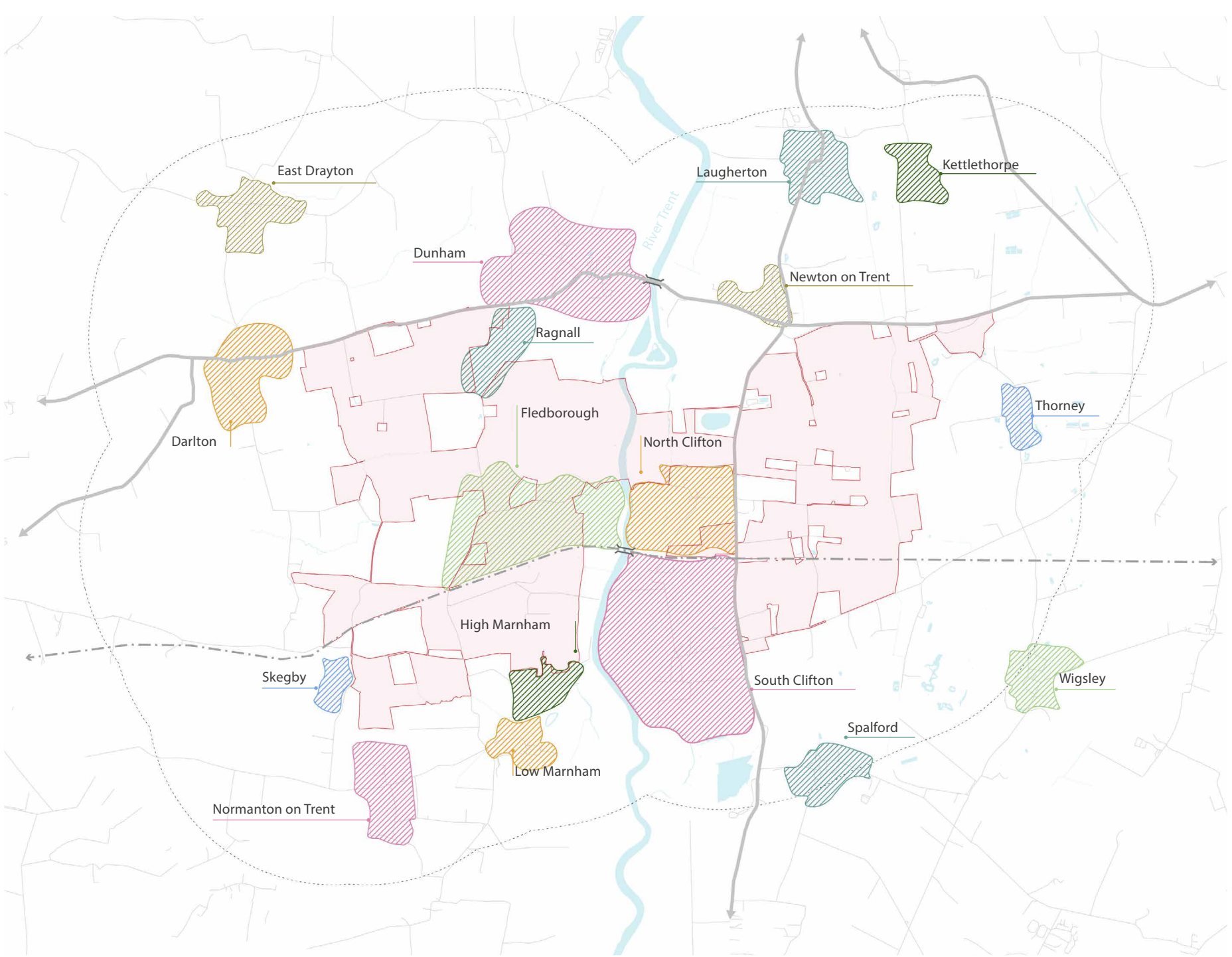


Figure 7: Village character areas



# Character of local villages

**Darlton** is within Bassetlaw, Nottinghamshire. It is situated along the A57 at the junction with Woodcoates Road, 200m to the west of the Order Limits.

Key characteristics include:

- A small farming village with historic references in the Domesday Book.
- The A57 forms the primary movement corridor and a busy through road.
- Two and single storey semi-detached properties extending along the northern side of the A57, with a small number of farmsteads extending along Woodcoates Road.
- A mix of modern ribbon development and C18 farm buildings.
- Red brick and clay pantiles common, particularly within farm buildings.
- A concentration of grade listed buildings and structures at the eastern end including the Grade II\* St Giles Church.
- A settlement edge character defined by mixed farmland including an osier plantation (area of coppiced willow trees).



**Dunham on Trent** is located in within Bassetlaw, Nottinghamshire. It is situated along the A57 on the western bank of the River Trent and is not within the Order Limits, but borders part of the north-west edge of the Order Limits.

Key characteristics include:

- A small village with a rich history dating back to the Roman times and reflected in a collection of grade listed buildings and landmarks.
- The A57 bisects the village and forms a busy through route.
- Mostly two storey properties with single storey mobile homes around the fringes.
- A mix of modern and traditional architectural styles and materiality including red brick and render together with clay pantiles.
- The C12 Church of St Oswald's (Grade I listed) forms a local landmark and well-preserved example of Norman architecture.
- Cultural associations with Dunham Bridge which was built with resources from a group of Lincolnshire businessmen.
- Views of neighbouring electricity pylons and overhead cables in the Trent valley.



**East Drayton** is located in Bassetlaw, Nottinghamshire. It is situated at the cross road junction centred on the Church of St Peter and is 1km to the north-west of the Order Limits.

Key characteristics include:

- A nucleated village with a historic core defined by a collection of two storey farmsteads and cottages in red brick with clay pantiles.
- Modern ribbon development and conversion of farmsteads to industrial sheds around the fringes with more varied architecture and building materials.
- Relatively peaceful and strong sense of remoteness influenced by the small to medium scale farmland adjoining the settlement edge.
- Cultural associations with Nicholas Hawksmoor, a famous architect in the C17 and C18.
- The Grade I listed Church of St Peter forms a local landmark in the centre of the village and dates from the end of the C12.
- Public rights of way connecting with neighbouring villages.



# Character of local villages

**Fledborough** is located west of the River Trent, north of Fledborough Viaduct within Bassetlaw, Nottinghamshire.

Key characteristics include:

- A small, dispersed hamlet with historic references in the Domesday Book.
- Large farmsteads and detached cottages in red brick and white render with clay pantiles, infrequently spaced along rural lanes.
- Views out across the Trent valley heavily influenced by electricity pylons, substation and cooling towers.
- Cultural associations with Fledborough Viaduct which historically carried the double-track Lancashire, Derbyshire and East Coast Railway over the River Trent.
- The Grade I listed Church of St Gregory forms a modest landmark and features many architectural alterations which provides a sense of time depth.



**High Marnham** is situated along the western bank of the River Trent, south of Fledborough Viaduct within Bassetlaw, Nottinghamshire.

Key characteristics include:

- A small village centred around Hollowgate Lane with historic references in the Domesday Book.
- A mix of two storey properties and single storey mobile homes in a general linear pattern along Hollowgate Lane.
- Predominantly modern architectural styles with varied materials, and occasional late C19 cottages and farmsteads.
- Intervisibility with electricity infrastructure including the Marnham Substation and distant cooling towers.
- Marnham Hall (Grade II listed) has associations with the Cartwright family.



**Skegby** is located south-west of the Order Limits and within Bassetlaw, Nottinghamshire. It is situated to the north of Normanton on Trent and west of High Marnham.

Key characteristics include:

- A small, linear hamlet extending along the western side of Skegby Road and with historic references within the Domesday Book.
- Large, detached residential properties and small holdings in large, enclosed plots set back from the road.
- A consistent use of red brick and clay pantiles is common.
- Relatively peaceful and general sense of remoteness.
- Easterly views of electricity network infrastructure towards the background.
- The late C18 manor house of Skegby Manor (Grade II listed) has associations with the Wade family.





# Character of local villages

**Laughterton** is located north-east of the Order Limits within West Lindsey, Lincolnshire. It is situated along the A1133 to the west of Kettlethorpe.

Key characteristics include:

- A medium scale planned village with archaeological links to a medieval settlement.
- Predominantly two storey detached properties interspersed with occasional bungalows and small holdings on the fringes.
- A range of modern architectural styles, building materials and boundary treatments.
- Urbanising influences from the A1133 which forms a busy through route bisecting the village.
- Intervisibility wind turbines and electricity pylons from around the southern part of the character areas.



**Newton on Trent** is located north of the Order Limits, within West Lindsey, Lincolnshire. It is situated adjacent to the A57.

Key characteristics include:

- A small to medium scale village with historic references in the Domesday book.
- Predominantly two storey, semi-detached properties and short terraces arranged in a loose grid pattern.
- Red brick and clay pantiles common, with some instances of painted black and white brick chequered detailing.
- Red brick boundary walls and properties fronting immediately onto the pavement contribute to the historic character and sense of time depth.
- Well-preserved farmhouses and cottages, some of which date from the C15 and are Grade II listed.
- The Church of St Peter (Grade II\* listed) has associations with John Hunt, the early C19 missionary.
- Links to nearby archaeological remains of Roman vexillation fortress, marching camps and monitoring pos.
- Localised influences from road noise associated with A roads defining the eastern and southern settlement boundary.



**Ragnall** is located north-west of the Order Limits within Bassetlaw, Nottinghamshire. It is situated to the south-west of Dunham on Trent and north of Fledborough.

Key characteristics include:

- A very small, linear settlement stemming along Main Street and historic records in the Domesday Book.
- A mix of two storey, detached cottages and farmsteads with a short row of postwar semi-detached housing in the north.
- Predominantly red brick and clay pantiles.
- Low, red brick walls and estate fencing form common boundary treatments.
- Relatively peaceful with only localised influences from A57 road noise.
- Expansive views to the east across rolling farmland interspersed with electricity pylons and overhead cables within the Trent valley.
- A concentration of Grade II listed houses and farm buildings around the late C19 Church of St Leonard (Grade II\* listed) provide a sense of time depth.



# Character of local villages

**Normanton on Trent** is located south-west of the Order Limits within Bassetlaw, Nottinghamshire. It is situated to the west of Low Marnham.

Key characteristics include:

- A small, nucleated settlement with its historic core centred on St Matthew's Church.
- Two storeys, detached and semi-detached cottages in red brick, clay pantiles and timber-framed windows.
- Modern ribbon development along Tuxford Road with a greater variety of building materials.
- Occasional intervisibility with electricity pylons and overhead cables from the western edge of the character area but otherwise a strong rural character and sense of remoteness.
- Many Grade II listed cottages, farmhouses and outbuildings extending from the C13 Church of St Matthew (Grade II\* listed) which provides a sense of time depth.



**Low Marnham** is located south of the Order Limits within Bassetlaw, Nottinghamshire. It is situated south of High Marnham.

Key characteristics include:

- A very small, nucleated village centred on St Wilfrid's Church and with references in the Domesday Book.
- Two storey, detached cottages, farmsteads and small holdings defined by clipped hedgerows, estate walls and fencing.
- Red brick with clay pantiles and timber-framed windows all common.
- Strong rural character and sense of remoteness, with a very limited perception of the neighbouring industrial estate and nearby pylons.
- The Grade I listed St Wilfrid's Church dating from the C12 is built in a Norman style and includes a stained-glass window designed by famous artist Edward Burne-Jones.



**Spalford** is located south-east of the Order Limits within Newark and Sherwood, Nottinghamshire. It is situated south-east of South Clifton.

Key characteristics include:

- A small, clustered hamlet at the convergence of rural lanes and historic references in the Domesday Book
- A tight-knit core defined by detached cottages in relatively small, enclosed plots.
- Predominantly two storey properties in red brick and clay pantiles.
- Small holdings defined by estate fencing contribute to strong rural character.
- Very limited urbanising influences and a relative tranquillity.
- Links to Spalford Warren, a rare reserve of sand-blown heath and conifer plantations which support important flora and fauna.





# Character of local villages

North Clifton is within Newark and Sherwood, Nottinghamshire. It is situated on the eastern bank of the River Trent.

Key characteristics include:

- A small, clustered village concentrated along the High Street which is defined by narrow pavements and grass verges.
- A medieval settlement with historic references in the Domesday Book.
- Two storey cottages and farmsteads in varied plot sizes and orientations.
- Red brick is common and is sometimes found in combination with white render. Modern infill development introduces greater variety of materiality.
- Generally peaceful with only localised urbanising influences from the A1133 in the east.
- Occasional inter-visibility with electricity pylons and overhead cables across open farmland within the Trent valley.
- Strong cultural ties with Fledborough Viaduct through the former Clifton-on-Trent railway station which was situated along the Lancashire, Derbyshire and East Coast Railway.
- Cultural associations with the Pure Land Meditation Centre and Japanese Garden which has featured in the media.



South Clifton is located within Newark and Sherwood, Nottinghamshire. It is situated on the eastern bank of the River Trent, south of the Fledborough Viaduct and North Clifton.

Key characteristics include:

- A quaint farming village with historic references within the Domesday Book and well-preserved buildings that reveal its rich history, exemplified by the Conservation Area.
- Detached cottages and farmsteads defined by low boundary walls and arranged in a loose grid pattern.
- Red brick, painted white brick, and clay pantiles with wrought iron detailing are commonly used throughout. Herringbone brick pattern is also a distinctive feature.
- Very peaceful and general sense of remoteness contributing to a strong rural character.
- Views out across small scale pasture around the settlement edge, interspersed occasionally by electricity pylons within the Trent valley.
- Physical and perceived links with North Clifton through North Clifton School and St George the Martyr Church along Church Lane.



Wigsley is located south-east of the Order Limits within Newark and Sherwood, Nottinghamshire. It is situated to the east of South Clifton and south of Thorney.

Key characteristics include:

- A small linear village with a relatively fine urban grain defined by closely-spaced buildings and narrow lanes.
- A mix of two storey traditional farmsteads and cottages with some modern bungalows in the north.
- Predominately red brick and clay pantiles, with some instances of white-painted brick and render.
- Consistently sized building plots defined by mature hedgerows and arranged in a loose grid pattern.
- Views across large arable fields adjoining the settlement edge.
- Cultural associations with Wigsley I Airfield, which is a former Home Defence landing ground during the World Wars.



# Character of local villages

Thorney is located east of the Order Limits within Newark and Sherwood, Nottinghamshire. It is situated south of the A57 and north of Fledborough Viaduct.

Key characteristics include:

- A small, linear village extending along Main Street with historic references in the Domesday Book.
- A few traditional farmsteads around the Church of St Helen, together with detached bungalows and semi-detached two storey properties in various modern styles.
- Red brick is common and is often found in combination with white render and different roofing tiles.
- General sense of remoteness influenced by small to medium scale farmland surrounding the settlement.
- The mid-C19 Church of St Helen (Grade II\* listed) forms a local landmark and its churchyard features the ruins of the former C13 church which provides a sense of time depth.



Kettlethorpe is located north-east of the Order Limits and within West Lindsey, Lincolnshire. It is situated between the A156 and A1133 to the east and west respectively.

.Key characteristics include:

- A small, linear village extending along Kettlethorpe Road.
- Predominantly two storey, detached cottages and farmsteads in large plots.
- A local vernacular consisting of red brick with clay pantiles and wrought iron detailing.
- A strong rural character influenced by connecting rural lanes and mixed farmland around the settlement edge.
- Some distant views of wind turbines and cooling towers from the fringes.
- Kettlethorpe Hall and the Church of St Peter and St Paul (both Grade II listed) form local landmarks and date back to C14 and C15 respectively.
- Associations with the Commonwealth War Graves at St Peter & St Paul's Church. Kettlethorpe Hall has associations with Swynford family.





# Agricultural land classification

The Agricultural Land Classification system (ALC) is a method of classifying the quality of land used for agricultural purposes, based on the possible limitations on agricultural use due to physical or chemical properties. The three main factors affecting ALC are climate, site, and soil. In addition to the ALC grades, the higher quality land is classified as 'Best and Most Versatile Agricultural Land', known as BMV land. Soils of ALC grades 1, 2 and 3a are considered to be BMV land, while soils of ALC grade 3b, 4 or 5 are considered to be non-BMV land.

An ALC survey of the Order Limits has been undertaken, with site work completed from June 2023 to April 2024, in line with industry best practice and Natural England guidance.

The ALC survey covers the Order Limits, with a total surveyed area of 1240 hectares (ha). The results of the ALC survey are summarised as follows:

- Grade 1 (BMV land): none present
- Grade 2 (BMV land): 19.7% (244.8ha)
- Grade 3a (BMV land): 33.6% (416.1ha)
- Grade 3b (non-BMV land): 46.7% (579.5ha)
- Grade 4 (non-BMV land): none present
- Grade 5 (non-BMV land): none present
- Non-agricultural land: none present
- Urban land: none present

660.9ha of the Order Limits is classified as BMV land (ALC grade 2 and grade 3a) which equates to 53.3% of the surveyed land within the Order Limits, and 46.9% of the whole Order Limits.

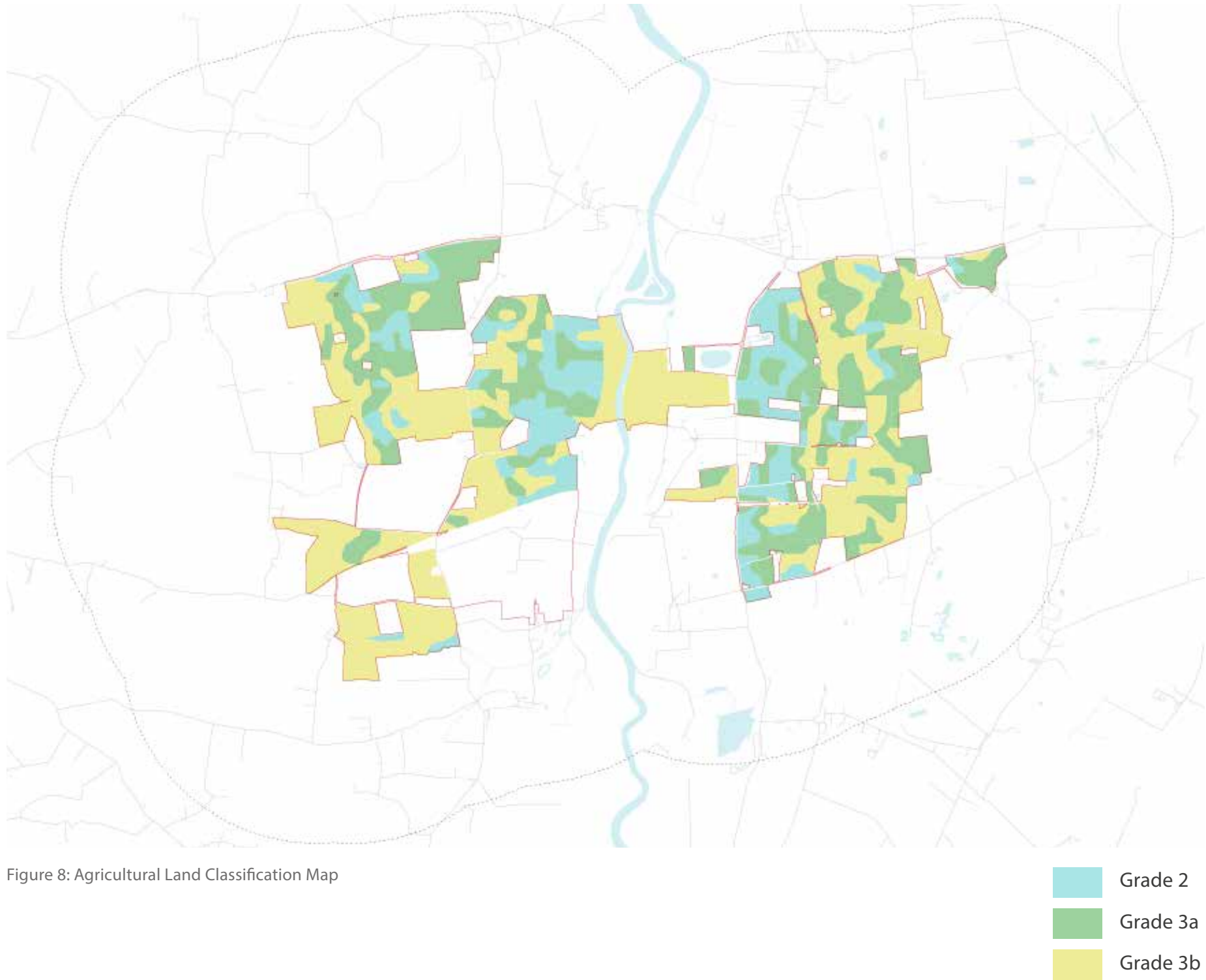


Figure 8: Agricultural Land Classification Map

# Landscape character and green infrastructure

The main land use across the Order Limits is arable agriculture. Field boundary hedgerows and ditches divide the fields.

Woodland cover within the Order Limits is very low, with no woodland to the west of the River Trent and only smaller blocks of woodland in proximity to North and South Clifton and the eastern edge of the Order Limits. There are also clumps of trees and scrub adjacent to the River Trent.

At the national scale, the Order Limits are covered by Natural England's National Character Area 48: Trent and Belvoir Vales (NCA 48). NCA 48 is characterised by the published study as an undulating, low-lying and largely arable area of land centred on the River Trent. The published study notes the biodiversity resource of the River Trent, as a wildlife corridor and area of flood storage. Several 'Statements of Environmental Opportunity' are identified within published guidance for NCA 48 including: enhancing ecological networks, woodlands and hedgerows along the rivers, as well as maintaining the character of the rural landscape.

ES Volume 2, Chapter 11: Landscape and Visual [EN010159/APP/6.11] details the relevant regional, county and district published landscape character areas. The adjacent figure shows the distribution of planning delivery zones (character areas) defined by the Nottinghamshire, Newark and Sherwood and Bassetlaw Landscape Character Assessment.

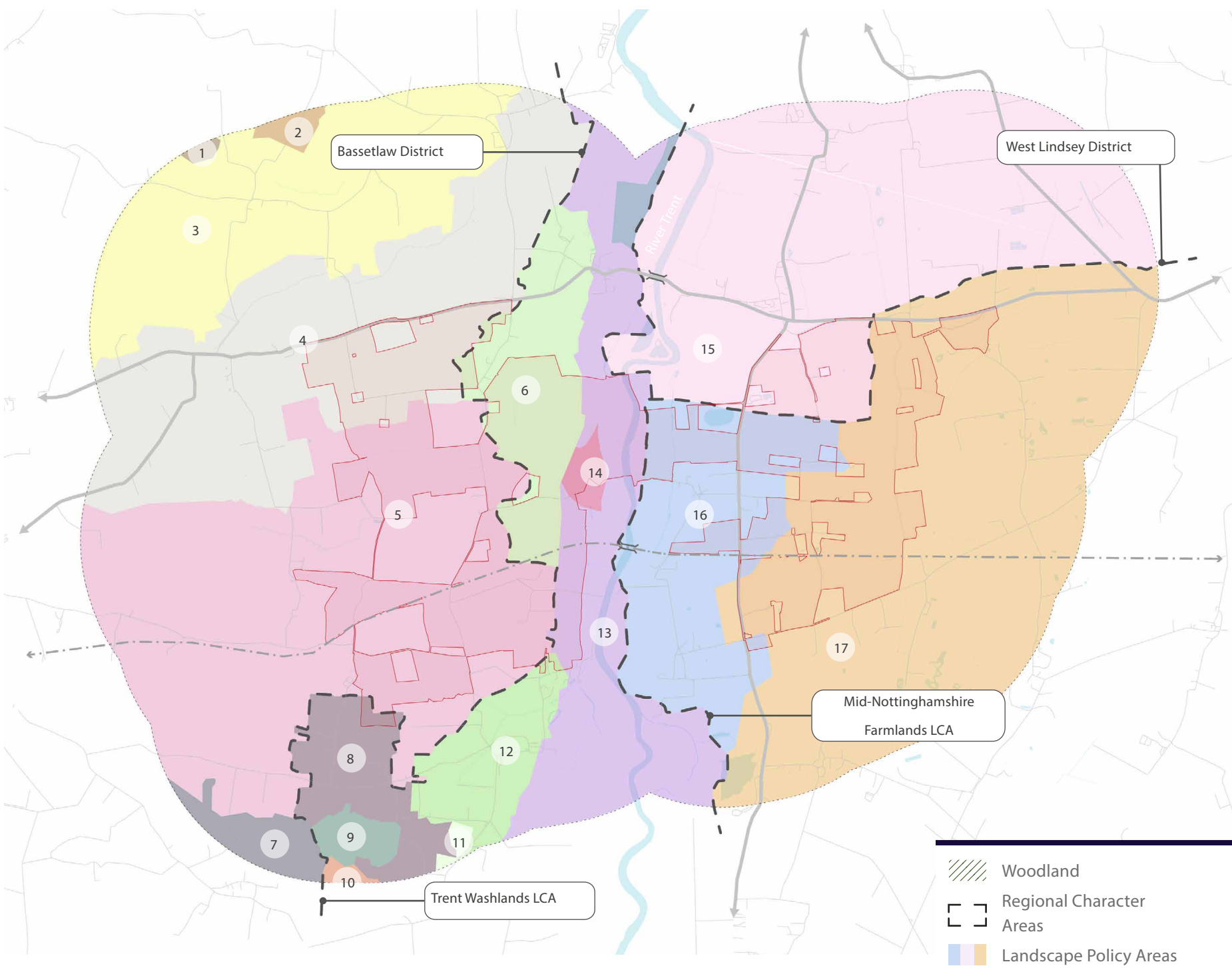


Figure 9: Published Landscape Character Areas



# Heritage and archaeology

There are no listed buildings or Registered Parks and Gardens within the Order Limits . The South Clifton Conservation Area is located to the south, east of the River Trent.

There are a number of designated heritage assets located within 1km of the Site boundary, comprising:

- 3 Grade I listed buildings;
- 6 Grade II\* listed buildings; and
- 61 Grade II listed buildings.

There are no non-designated heritage assets within the Site; but there are 81 non-designated heritage assets within 1km of the Site boundary. The largest of these is the Fledborough Viaduct, a disused railway structure which is now part of national cycle route 647. This crosses the River Trent to the north of the existing High Marnham substation.

There are no Registered Battlefields or World Heritage Sites within the Order Limits or within 1km of the boundary.

Regarding Scheduled Monuments:

- East of the Trent - a Roman Vexillation Fortress, two Roman Marching Camps, and a Royal Observer Corps monitoring post located within land south of the A57 and east of the River Trent. This monument comprises a 1st century Roman vexillation fortress sits on a ridge above the River Trent. The fortress is visible as a series of cropmarks; and
- West of the Trent - Whimpton Moor medieval village and moated site which straddles the A57 to the west of the River Trent. This monument includes the earthwork and buried remains of Whimpton Moor medieval village, including a moated site.

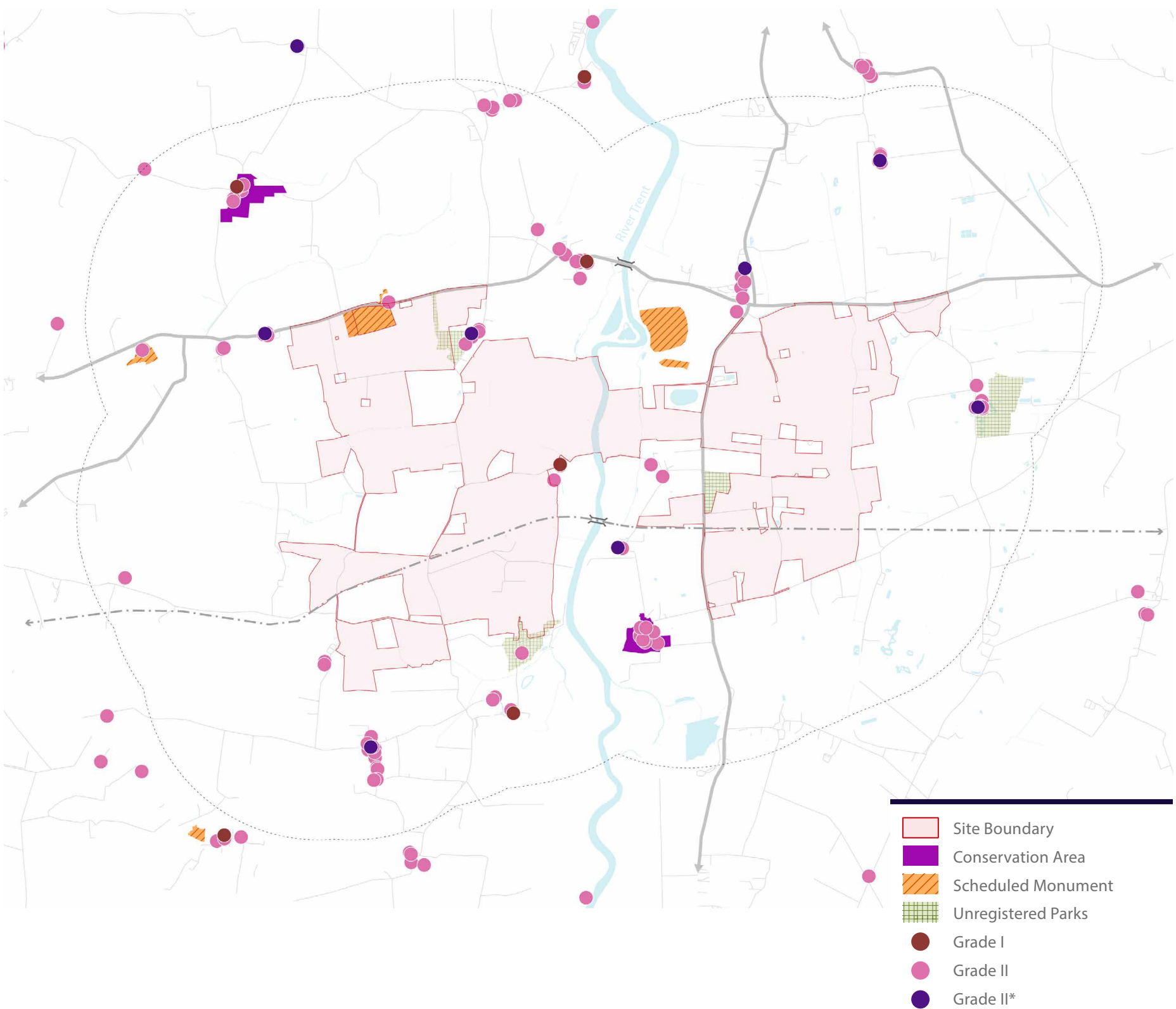


Figure 10: Heritage and archaeological assets



St. George the Martyr North and South Clifton



Fledborough Viaduct



# Ecology and biodiversity

The Order Limits are not covered by any statutory ecological designations. The closest statutory designations comprise:

- Birklands and Bilhaugh Special Area of Conservation (SAC), approximately 12km away;
- Besthorpe Warren Sites of Special Scientific Interest (SSSI), located approximately 5km to the southeast;
- Besthorpe Meadows SSSI, located approximately 5km to the south; and
- Spalford Warren SSSI, located approximately 2.1km to the south.

Habitats located within the Order Limits are dominated by arable fields and areas of modified grassland that are separated by a mixture of hedgerows (both intact and defunct), wet ditches and fence lines. There are small areas of other types of habitat within the Order Limits including scrub, tree lines, ponds and running water (River Trent and watercourses).

The farmland is intensively managed and fields are typically of relatively large size. There is limited evidence of agri-environment schemes being implemented with the vast majority of land held for food production.

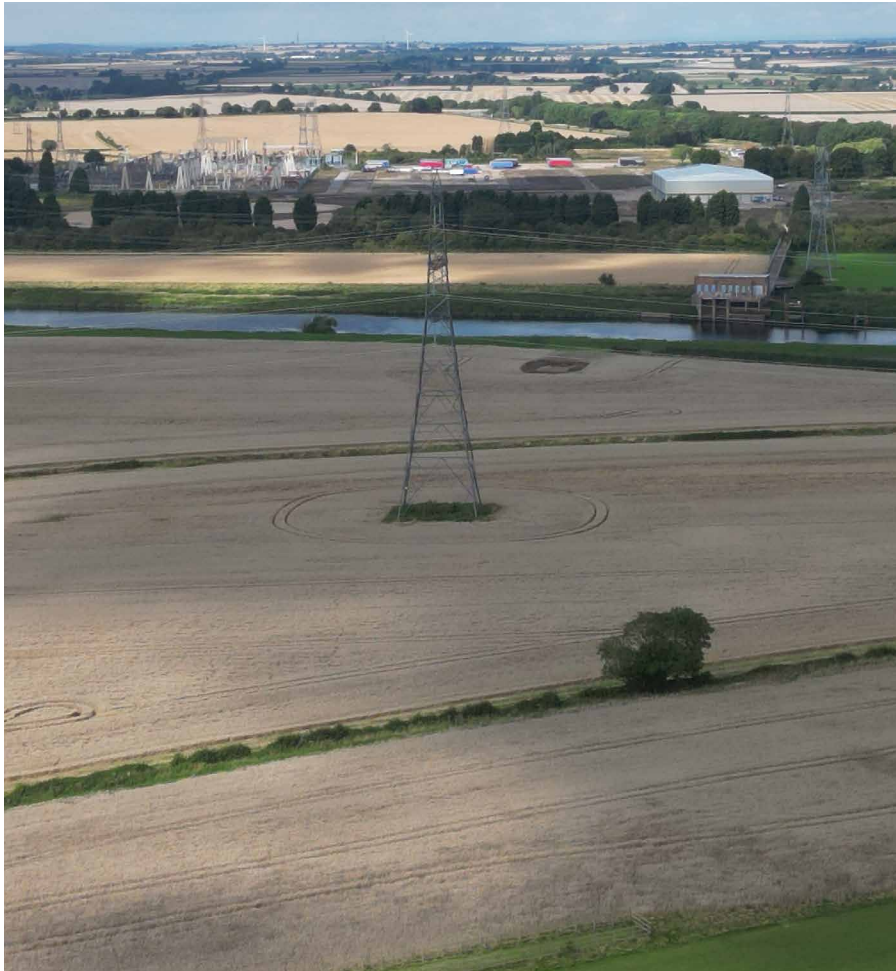
The habitats within the Order Limits support an array of legally protected and notable species. These include a range of mammals including bats, water vole, otter, badger and brown hare, reptiles such as grass snake and common lizard and birds including skylark, barn owl, grey partridge and turtle dove. The River Trent and its tributaries are also known to support river and sea lamprey and European eel. Despite the array of species present, the majority are using relatively small areas of the Order Limits being focused on the network of hedgerows, wet ditches / watercourses and the River Trent.



Variation between arable fields and field margins



River Trent and adjacent grassland



Fragmented hedgerows within Order Limits



Ditches and hedgerows define arable fields

# Movement and access

The Order Limits are accessible from a number of existing field accesses that are currently capable of facilitating the movement of large agricultural machinery.

With respect of the Strategic Road Network (SRN), the A1 which connects Blyth to the north and Stamford in the south, is located approximately 6km to the east of the Order Limits. The A1 forms a junction with the A57, which connects Markham Moor to Lincoln. The A57 is located on the northern boundary. The A57 runs eastwards before forming a junction with the A46 to the east. The A1133 is located within the eastern Site boundary, and connects Torksey Lock with Winthorpe, where it then joins the A46.

The Trent Valley Way extends for 174km from Nottingham in the south, to the Humber Estuary. This long-distance footpath follows the eastern edge of the River Trent as it runs through the Order Limits. In addition, there are several footpaths and bridleways that cross the Site.

To the south of the Order Limits is the Sustrans Cycle Route 647. This path is part of the National Cycle Network (NCN) and is a disused railway line associated with the former Lancashire, Derbyshire and East Coast Railway, which runs east-west and that connected Lincoln to the east with Tuxford to the west. Crossing over the River Trent, the Sustrans Route includes Fledborough Viaduct consisting of masonry arches. This is one of a few river crossing opportunities in the locality.



Figure 11: Movement and connectivity



# Summary of constraints and opportunities

Analysis of the baseline information, outlined above and fully set out in the Environmental Statement, has identified several constraints and opportunities.

The iterative design process has responded to the following constraints:

- Potential flood risk, including areas of Flood Zone 2, 3a and 3b;
- Protection of existing utility corridors across the Order Limits, including overhead lines and buried assets;
- Protection of the intrinsic character and setting of villages and residential properties close to the Order Limits;
- The need to minimise impact on the character of the landscape and embedding characteristic features as part of the mitigation strategy;
- Protection of heritage assets, including three Grade I listed buildings;
- Protection of two Scheduled Monuments located in close proximity to the Order Limits, namely the Roman Vexillation Fortress and Whimpton Moor medieval village;
- The sensitive crossing of the River Trent to connect the two sides of the Order Limits; and
- Protection of locally distinctive species and habitats.

Analysis has also identified the following opportunities:

- The location of the Order Limits adjacent to two A roads allows for most construction traffic to avoid local roads, instead turning off the major road network onto internal access tracks;
- The predominantly flat landform and large field pattern lends itself to accommodating solar development without vegetation removal or extensive earthworks;
- The existing vegetation network is fragmented, highlighting the opportunity for new planting to improve the green infrastructure network;
- The presence of existing infrastructure typically reduces susceptibility to change, with respect of landscape character;
- Most of the fields within the Order Limits are occupied by monoculture of arable crops or turf, presenting the opportunity for diversification, enhancing biodiversity; and
- The extent of public rights of way across the Order Limits, particularly connecting to Newton on Trent, is limited, presenting the opportunity for improvement through the introduction of permissive paths.



Arable fields across the Order Limits



Figure 12: Summary of constraints and opportunities



# Process and vision

## Process

Embedding good design in the Proposed Development requires the adoption of a design focussed vision and design principles, which are then translated into the secured aspects of the Proposed Development.



Vision

‘One Earth Solar Farm will deliver 740MW (ac) of renewable energy to the national grid whilst being sensitive to its surroundings. The project will engage in meaningful conversation with communities and will be sited to take account of the local environment and people’s visual amenity. The project will take opportunities to embed sustainability and resilience, enhancing biodiversity and furthering recreational access across the site.’

## Design principles

Project specific design principles were adopted at the outset of the project. Based on the ‘Design Principles for National Infrastructure’ guidance published by the National Infrastructure Commission Design Group, the design principles were drafted under the headings of **climate, people, places and value**. These four headings highlight the breadth of considerations that should be included under the banner of good design.

It was therefore appropriate to involve a wide range of disciplines in drafting the project’s design principles. As such, the design principles were drafted iteratively, prior to the public launch of the project, including at the following workshops:

Workshop 1: Identification of environmental constraints and opportunities

- Attendees: design lead, all EIA topics, engineering lead, planning lead, communications lead.
- Output: removal of land from developable area, where practical, that posed environmental constraints.

Workshop 2: Drafting of design principles

- Attendees: design lead, all EIA topics, engineering lead, planning lead, communications lead.
- Output: whole team input to project specific design principles.

Workshop 3: Refinement adoption of design principles by Project Board

- Attendees: design lead, EIA lead, engineering lead, planning lead, communications lead, project board.
- Output: Adoption of design principles by project board.

The design principles have been held as the benchmark against which all project design decisions have been measured. Meaningful engagement with stakeholders and local communities has been foundational to the integration of the design principles in the Proposed Development.

The project specific design principles are presented on the following page (see Figure 13). The subsequent section of this DAD explains how the project design has evolved since project launch, in accordance with the design principles, and how these changes have been secured in the DCO.



Elevated view along the River Trent

# Design principles

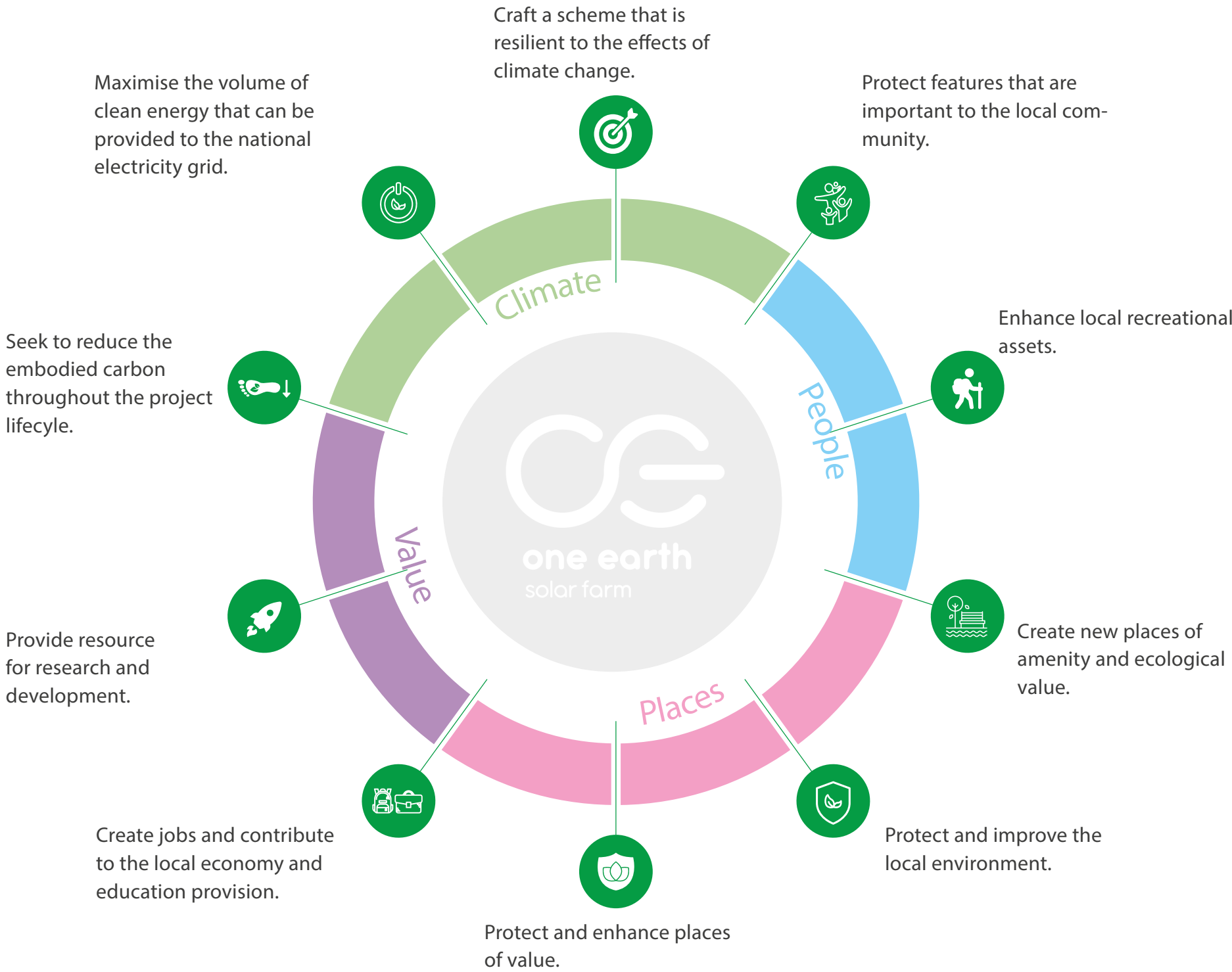


Figure 13: Project specific design principles

# Research

- the narrative of how the design has evolved to mitigate adverse effects
- deliver positive outcomes



# Design evolution

The design of the Proposed Development 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 result in an integrated solution. The decision making process adopted, shown on Figure 14, therefore involved input from multiple teams and stakeholders.

This section of the DAD explains how the design has evolved through each iteration of the masterplan and how this responds to the project design principles. At each stage of design development, the project has sought to embed the guidance presented in the National Infrastructure Commissions guidance to:

- **appreciate the wider context**, for example questioning how the Proposed Development relates to the environment beyond the Order Limits;
- **engage meaningfully**, meeting with statutory consultees and local communities to better understand the Order Limits and people’s relationship to the land; and
- **continually measure and improve**, through holding several design workshops with input from the wider environmental, planning and communications team at each stage of design development.

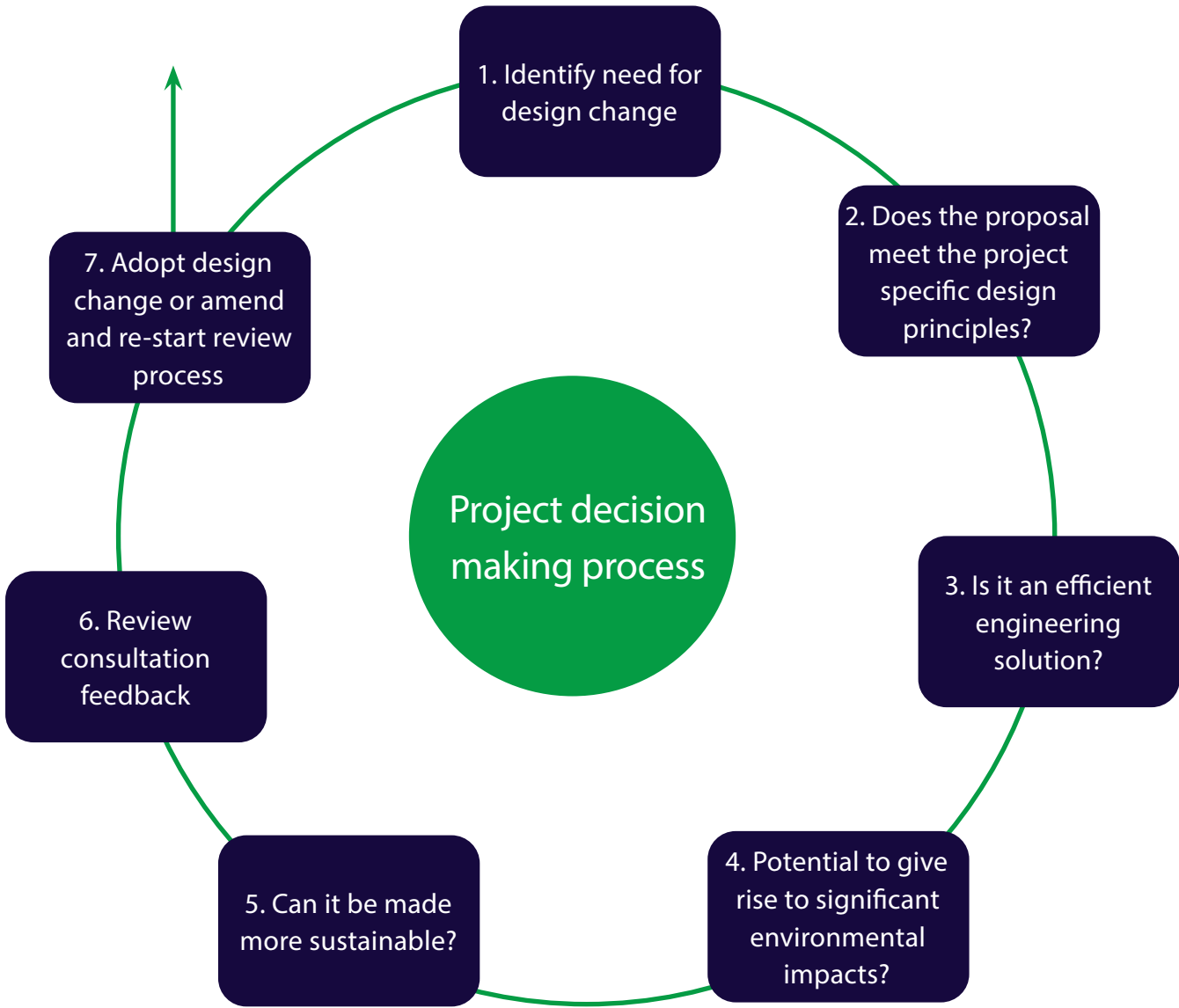


Figure 14: Project decision making process

# Masterplan First iteration

The first iteration of the masterplan was based on a preliminary understanding of the Order Limits and surrounding land. This was gained through review of published material and designations, consideration of maps and aerial imagery, and field work which was completed by members of the project design team. This information was consolidated in a ‘BRAG’ exercise through which field parcels were rated in accordance with their potential to accommodate the Proposed Development. The key outcomes of the BRAG exercise are summarised in Table 2.

Flexibility was embedded in the masterplan in order to allow future response to consultation feedback and findings from environmental surveys. Table 2 records how the initial masterplan was developed in line with the project design principles.

The project has been committed to meaningful engagement throughout design development. Non-statutory consultation was conducted following publication of the first iteration of the masterplan. Consultation activities are listed in the Consultation Report. Key activities included:

- Writing to all s42 consultees, landowners, and local communities;
- Door knock visits to near neighbours;
- Four public in-person information events;
- One webinar;
- Two meetings with Parish Councils; and
- 14 residential visits to properties adjacent to the site boundary.

Details regarding non statutory consultation, including feedback received and the project’s response, is provided in the Consultation Report [EN010159/APP/5.1].

Table 2: Design approach to masterplan iteration 1	
Design Principle	Response in first iteration
Climate 1: Maximise the amount of clean energy provided to the National Grid	The extent of land shown to be ‘Potential solar and associated infrastructure’ is sufficient to generate 740MW of power, in line with the grid connection agreement.
Climate 2: Seek to reduce embodied carbon throughout the project lifecycle.	N/A at early stage of project design
Climate 3: Craft a scheme that is resilient to the effects of climate change	Flood modelling was undertaken to allow for 39% increase to allow for climate change. The extent of land that fell within flood zone 3b following this modelling was excluded from the potential area for solar, BESS and substations. This was mostly located in the corridor east of the River Trent.
Climate 4: Protect and improve the local environment	Land within 50m of the Roman Fort Scheduled Monument (east of the River Trent) and the Medieval Village Scheduled Monument (west of the River Trent) was excluded from the potential solar area.
	Local wildlife sites were excluded from the potential solar area.
People 1: Protect features that are valued by the local community	A buffer between Church Lane and the potential solar area were included, seeking to protect the visual and perceptual experience when travelling between North Clifton and South Clifton.
	An buffer of 50m from the potential solar area was included on both sides of the ‘Access Road to Fledborough’ to retain openness.
	No land adjacent to Fledborough Viaduct was proposed to be occupied by solar infrastructure in order to protect views from the local high point.
	Land adjacent to the Trent Valley Way was excluded from the potential solar area to protect visual amenity for people walking along the route.
Place 1: Protect and enhance places of value	An offset of 10 - 15m from PRoW to the potential solar area was embedded and, where possible, this was extended to one side of routes to maintain a sense of openness.
	Initial offsets were included around residential properties, typically extending to approximately 50m.
Place 2: Create new places of amenity and ecological value	Land adjacent to North Clifton and South Clifton was excluded from the potential area for solar panels to protect the village’s immediate setting.
Place 2: Create new places of amenity and ecological value	Land adjacent to the Local Wildlife Site east of the River Trent was not proposed to be occupied by solar panels but has been retained in the project and would be managed to enhance the function of the adjacent land.
Value 1: Enhance provision of local assets	Land adjacent to the Local Wildlife Site east of the River Trent was not proposed to be occupied by solar panels but has been retained in the project and would be managed to enhance the function of the adjacent land.
Value 2: Contribute to local economy and education	N/A at early stage of project design.
Value 3: Provide resource for research and development	N/A at early stage of project design.



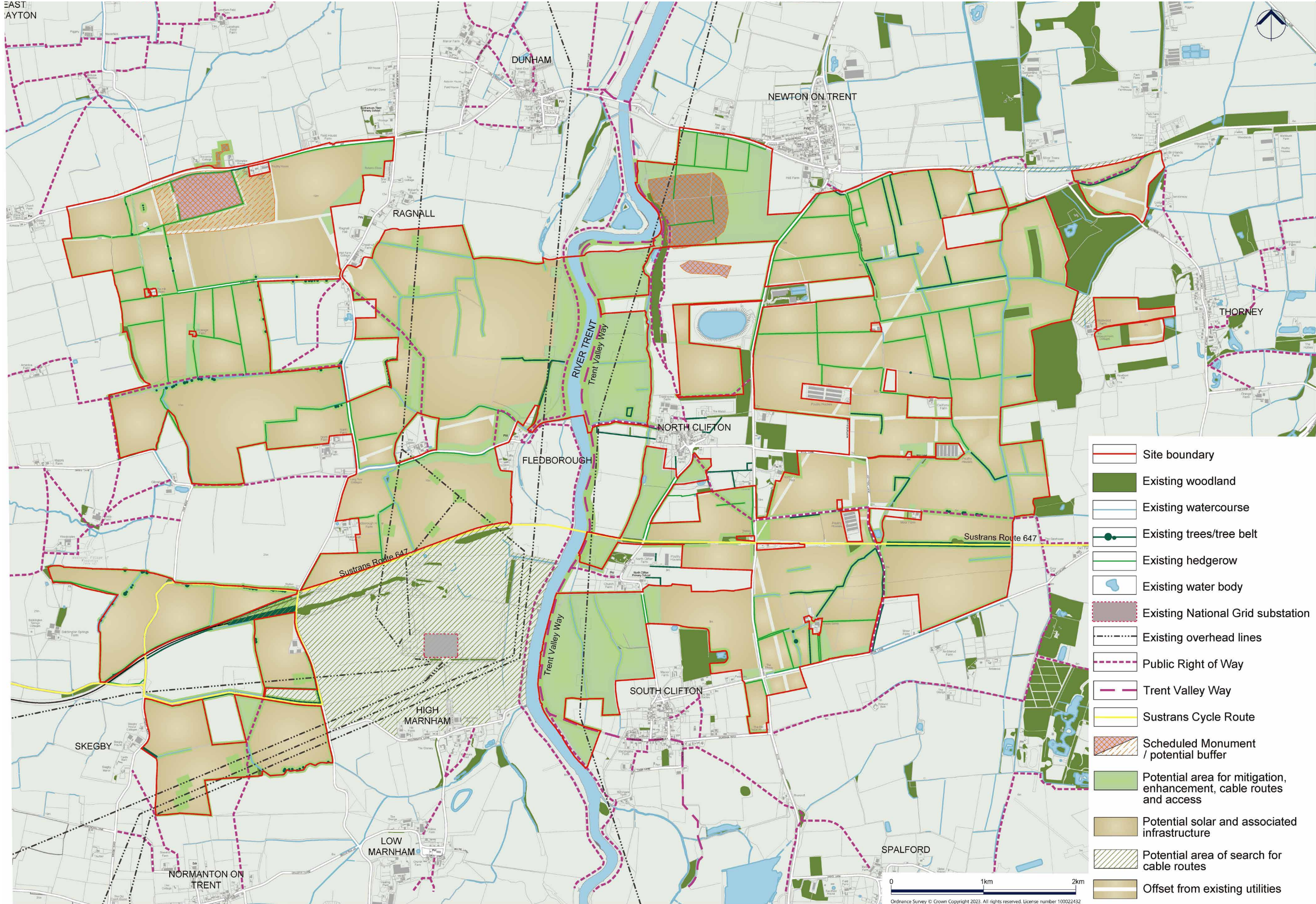


Figure 15: First iteration of masterplan presented at project launch and non-statutory consultation

## Design review

Prior to publication of the second iteration of the masterplan the project underwent review by a team of external experts including communication consultants, planning specialists, engineers, and design experts.

The review covered all aspects of project development including the preliminary identification of likely significant adverse environmental effects and the approach to design.

The following table lists key issues related to design raised by the review panel and the project’s response.

Table 3: Key issues raised during design review	
Issue raised	Design response
How is the project responding to the presence of existing utilities, such as the Exolum gas pipeline?	Existing above and below ground utilities have been mapped and accounted for in technical layouts. Working arrangements around these utilities will be secured via protective provisions.
How has the proposed height of panels been considered in relation to proximity to public rights of way?	Offsets of at least 15m to the closest PV panel will be embedded and secured through the Works Plans. A diverse mixture of species will be planted in hedgerows, parallel to fences, to soften and screen the appearance of PV panels.
How has the project protected residential amenity with respect to noise and visual impact with respect to the potential location of substations and BESS?	The substation and BESS would not be located within 300m of residential properties in order to protect visual amenity and embed mitigation of potential noise impacts. Further consideration has been given to siting and screening to minimise visual impact.
How has the project responded to the character of the landscape in proposed management regimes?	Published landscape character assessments have been reviewed and supplemented by the preparation of ‘Village Character Areas’ to better define existing landscape character area. The prevailing character of the area has informed the species, and management of vegetation, proposed in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].
How has the project considered the potential interface with National Grid’s North Humber to High Marnham project that may require overhead lines and associated pylons within the One Earth Order Limits?	The project team have engaged with National Grid’s team to review potential project programmes with particular regard to construction activity. This engagement will continue. One Earth Solar Farm has made allowance for the required offsets from new National Grid assets in its capacity analysis. Working arrangements around these assets will be secured through protective provisions.



# Masterplan

## Second iteration

A greater level of detail regarding environmental considerations and technical constraints and opportunities was available for the second round of design review, as well as feedback received in response to non-statutory consultation.

Feedback regarding the second iteration of the masterplan was sought through statutory consultation. Key engagement activities included:

- Writing to all s42 consultees, landowners, and local communities;
- five public in-person information events;
- two webinars;
- two Parish Council meetings; and
- 20 residential visits.

The Consultation Report sets out the feedback received and the project’s response.

Table 4 records how the statutory consultation masterplan changed compared to the non-statutory consultation version in

Table 4: Design approach to masterplan iteration 2	
Design Principle	Response in second iteration
Climate 1: Maximise the amount of clean energy provided to the National Grid	Several additional offsets were added post non-statutory consultation. In order to maintain sufficient land to generate 740MW of power to the National Grid, whilst maintaining flexibility for further design changes post statutory consultation, additional land was incorporated into the site by voluntary agreement. In line with the project’s commitment, this additional land was within the outer extent of the previous red line limits (i.e. gaps in the previous red line were filled).
Climate 2: Seek to reduce embodied carbon throughout the project lifecycle.	A preliminary review of the use of concrete across the project was undertaken. The Proposed Development committed to pile/drive the PV frames, rather than using concrete ballast, other than within archaeologically sensitive areas, minimising the extent of embodied carbon across the project.
Climate 3: Craft a scheme that is resilient to the effects of climate change	Further detail was developed (in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]) regarding the landscape strategy, including the planting of a diverse range of species to enhance biosecurity.
	The height of PV Panels was staggered into three categories across the Order Limits, allowing for a 300mm freeboard across the majority of the Order Limits in the occurrence of a designed flood event whilst being cognisant of visual impact.
Climate 4: Protect and improve the local environment	The design responded to information found during environmental surveys, such as the introduction of exclusion zones around badger setts.
	Further detail was developed on the Illustrative Masterplan [EN010159/APP/2.7] and Outline Landscape and Ecology Management Plan [EN010159/APP/7.7] regarding an enhanced local green infrastructure network through the improvement of existing hedgerows and the creation of new green connections. The introduction of new seeding was also introduced to re-create coastal grazing marsh habitat across part of the floodplain, east of the River Trent, as set out in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].
	The character of local villages was protected from the introduction of large vehicles during construction through the design of primary site access points along existing A-roads. Once on-site, vehicles will use a series of internal access tracks wherever possible.
	Fields that occupy the foreground of residential views from Thorney were removed from the Proposed Development.
People 1: Protect features that are valued by the local community	This iteration of the masterplan further incorporated bespoke offsets from residential properties, including: Top Farm, Long Row Cottages, Fledborough House, Station Cottages, The Old Police House, The Old Station House, Clifton Hall, 1 Collingham Road and Westwood Farm Cottages. Offsets are secured by the Works Plan [EN010159/ APP/5.8].
	Tested the most efficient spacing of PV rows to minimise land take, allowing greater offsets to be incorporated in proximity to sensitive receptors. Testing found that this spacing should not be less than 3m between rows, as now secured in the Outline Design Parameters [EN010159/APP/5.9].

Table 4: Design approach to masterplan iteration 2	
Design Principle	Response in second iteration
Place 1: Protect and enhance places of value	Excluded further land across Fledborough, understanding that the village extended between Top Farm in the west, and the Gables in the east
	Integrated a further set back from North Clifton Primary School.
	Varied the height of the proposed PVs, reducing to a minimum in visually sensitive areas where possible, and increasing the height in areas with potential for flooding.
Place 2: Create new places of amenity and ecological value	Provision for a series of beetle banks, herptile hibernaculas and bug hotels were introduced across the site
	Field margins were set to be established in line with the Countryside Stewardship Prescriptions: AB1 (nectar flower mix which can be tailored for turtle dove), AB8 (flower rich margins), AB9 (winter bird mix), AB11 (cultivated areas for arable plants), AB16 (autumn sown bublebird mix).
	Addition of scrapes were introduced across the site to create areas of standing water
Value 1: Enhance provision of local assets	A network of permissive paths was proposed on the east of the River Trent, linking Newton on Trent to the Sustrans route (new paths on the west of the river were subsequently introduced in the final submission masterplan as secured within the oLEMP).
Value 2: Contribute to local economy and education	The project announced a community benefit fund for immediate use, irrespective of whether consent is awarded.
Value 3: Provide resource for research and development	N/A at this stage of project design.





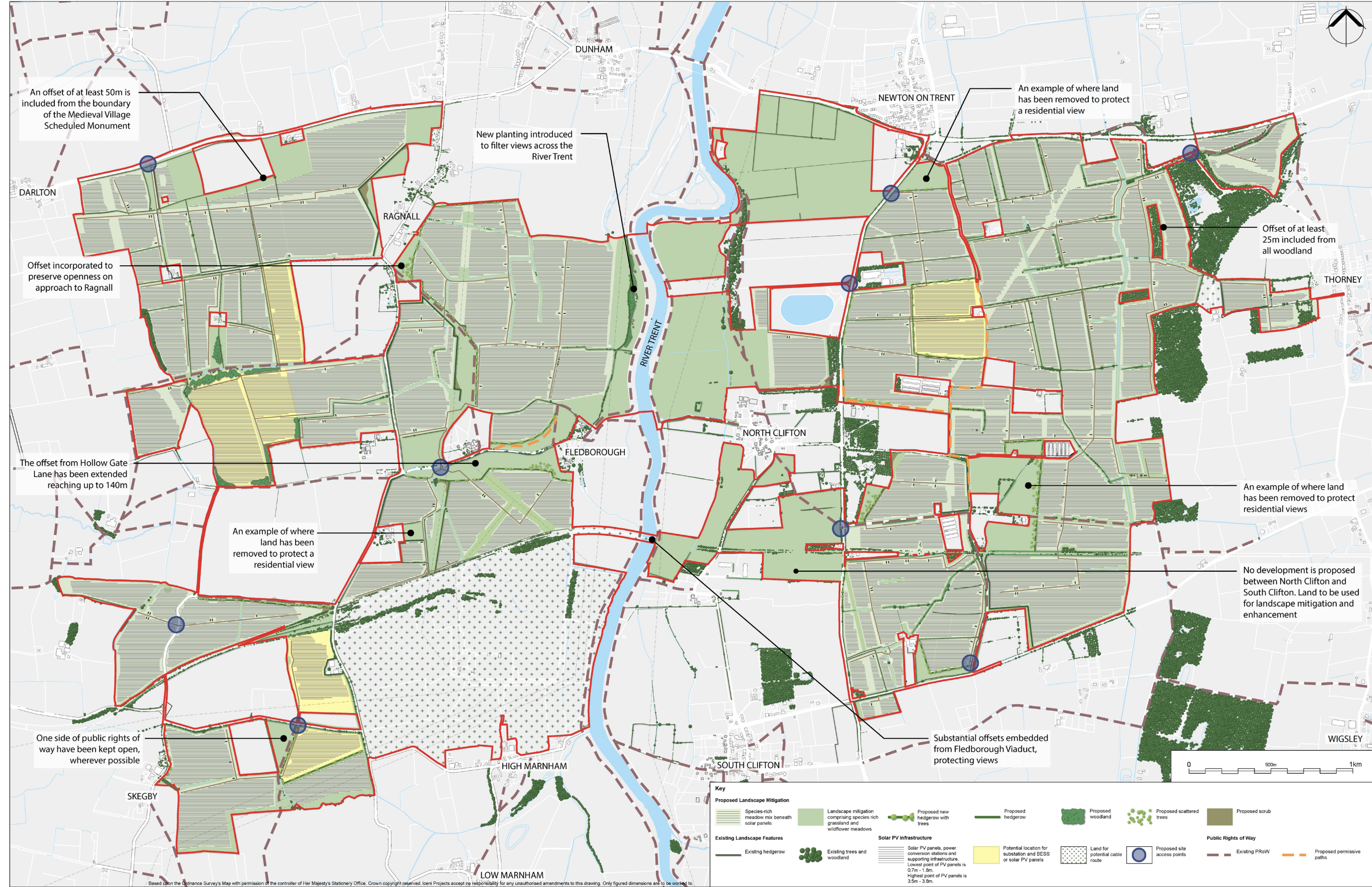


Figure 16: Second iteration of masterplan presented at statutory consultation

## Masterplan: second iteration - siting of substations

Siting of the project substations was an iterative process overseen by the project design lead with input from the project engineers, environmental specialists and feedback from stakeholders.

It was identified that the Proposed Development requires two project substations, one east of the River Trent and one west of the river. This configuration allows for fewer circuits to cross the River Trent. If only a single project substation was located on the western side, there would be far more MV cables crossing the river resulting in higher electrical losses and a much wider trenchless crossing. This would have potential for higher environmental impacts adjacent to the watercourse and local villages. The following list provides an overview of the overarching principles that guided the siting of these substations:

- Flexibility would be embedded to allow for both Air Insulated Substations (AIS) and Gas Insulated Substations (GIS). AIS would occupy a greater land area but is more cost efficient. GIS would allow for a smaller compound at a higher cost and would require the use of Sulphur hexafluoride gas, discussed subsequently in this DAD, based on current market availability. Flexibility is therefore maintained to respond to the highest priority design considerations and technology available on the market in detailed design.
- The western substation will be capable of sending 740MW of power to High Marnham 400kV substation;
- BESS will be located adjacent to the project substations; and
- Substations and BESS will not be located within 300m of residential properties or within 100m of PRoW

The Horlock Rules, published by National Grid to inform the design and siting of substations, were consulted throughout the substation design process. The project's response is set out in Table 5.

Table 5: Response to Horlock Rules

Horlock Rule	Design response
"Consider environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum."	The primary environmental constraints to the siting of the substations were identified early in the process as being flood risk, noise and landscape and visual impacts. Parameters were therefore established in order to identify suitable land which would limit the potential for environmental impact including: the land must be outside of the flood zone, beyond 300m of residential dwellings and beyond 100m of public rights of way.
"Seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections."	No part of the Proposed Development is within a designated land.
"Protect as far as reasonably practicable areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas."	The location of substations allow for the offsets as the wider project including including 10m from waterbodies, 25m from woodland and 5m from hedgerows, as secured in the Outline Design Parameters [EN010159/APP/5.9].
"Take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum."	<p>The land within the Order limits is mostly level and low lying with limited screening; however, new planning is proposed to soften the visibility of new substations.</p> <p>The eastern substation is sited at the foot of a small hill that falls eastwards from the A1133. Siting the substation at this level prevents the distant skyline of Lincoln Ridge from being broken, thereby reducing the prominence of the substation in local views.</p>
"Keep the visual, noise and other environmental effects to a reasonably practicable minimum."	An offset of 300m from residential properties and 100m from public rights of way has been embedded to minimise visual and noise effects.
"Consider the land use effects of the proposal when planning the siting of substations or extensions."	All potential locations for the project substations are on land that is currently agricultural in its use.
"Consider the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum."	Flexibility regarding the specification of equipment has been maintained in the DCO and will be determined at detailed design, post consent. The design approach to post consent decisions will be controlled by the Outline Design Parameters [EN010159/APP/5.9].



# Masterplan: second iteration - siting of substations

Table 5: Response to Horlock Rules	
Horlock Rule	Design response
“Make the design of access roads, perimeter fencing, earth-shaping, planting and ancillary development an integral part of the site layout and design, so as to fit in with the surroundings.”	<p>Earth works have been kept to a minimum in order to limit potential impacts on the flow of surface water across the landscape.</p> <p>The fencing that encloses each project substation will be painted in a muted colour (secured in the Outline Design Parameters [EN010159/APP/5.9]), sensitive to the surrounding environment. New mitigation planting (location of which is secured on the Works Plan [EN010159/APP/2.3]), is designed to be congruous with the local character, will be planted where needed to soften the substations’ appearance in local views.</p>
“In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.”	All cables associated with the Proposed Development will be underground, avoiding a complex wirescape.

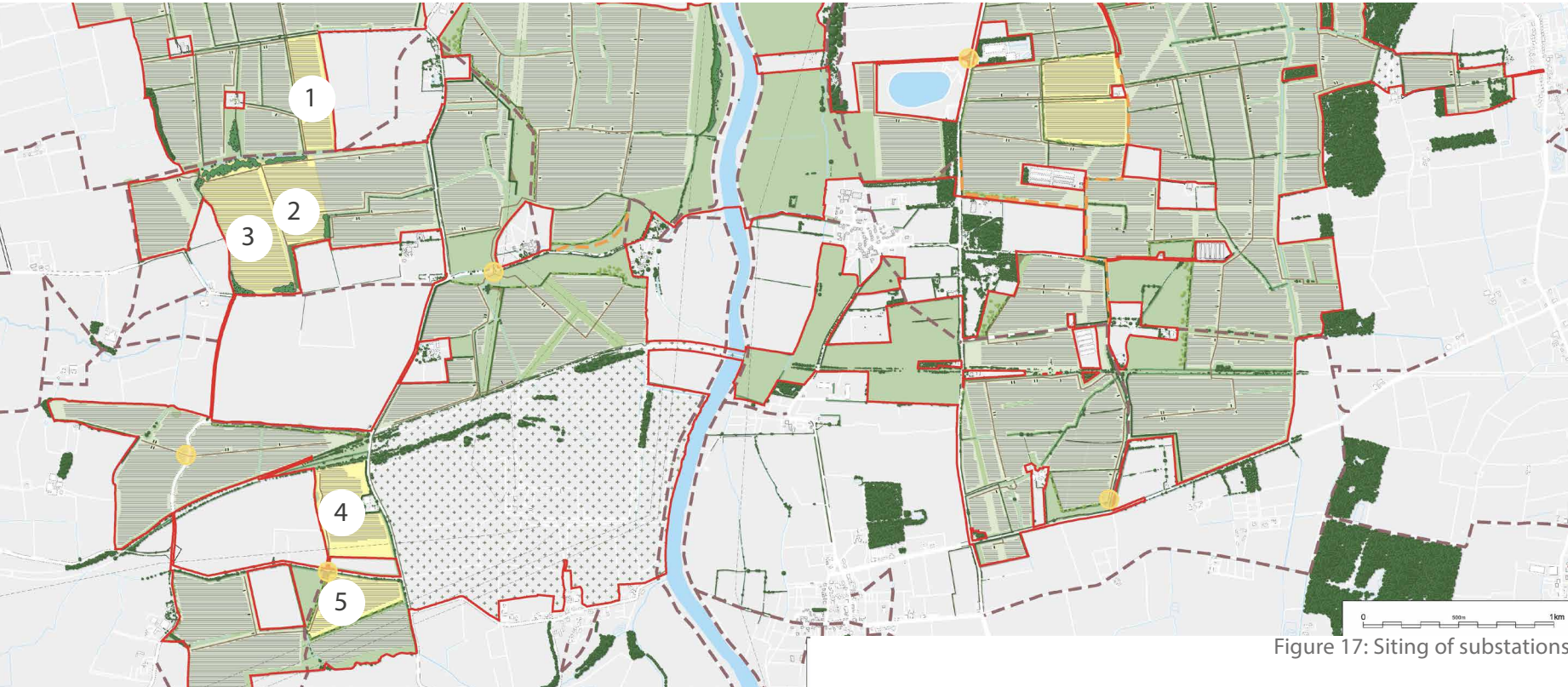


Figure 17: Siting of substations

As shown in the statutory consultation masterplan (Figure 16), five locations were considered for a substation west of the River Trent. These locations are numbered on Figure 17.

Following further environmental assessment and review of feedback received through statutory consultation, the western substation compound was proposed to be sited in location 3.

The key considerations associated with each option are set out below:

- Location 1: Not selected given potential intervisibility with Ragnall and associated public rights of way.
- Location 2: Not selected given potential for flooding during the designed flood event (as defined in ES Volume 2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7]).
- Location 3: Selected given potential to site substation and BESS compounds beyond 300m from residential receptors and outside of land with potential to flood. Siting substation north of the disused railway line/Sustrans route also allows for a single 400kV circuit to cross the line/route, rather than multiple 275kV cables.
- Location 4: Not selected to minimise cumulative impact with National Grid’s new High Marnham substation proposed to the east, proximity to Station Cottages, and requirement for multiple 33kV cables to cross disused railway.
- Location 5: Not selected to minimise cumulative impact with National Grid’s new High Marnham substation proposed to the east, and requirement for multiple 33kV cables to cross disused railway.

# Masterplan: second iteration - method of crossing the River Trent

The Proposed Development spans both sides of the River Trent. A series of options were therefore considered as a means of connecting the two sides, including:

- New pylons with overhead lines;
- A structure spanning the river;
- Utilising existing overground structures, such as the Fledborough Viaduct or Dunham Toll Bridge; and
- A trenchless crossing, under the River Trent.

Each option was analysed from a technical and engineering perspective. In summary, the introduction of new overhead lines and pylons was discounted on account of the potential impact on landscape character and visual amenity, ecological considerations and heritage assets. Similarly, new structures over the River Trent were discounted on account of their environmental impact and the potential conflict with vessels navigating the river.

A subsequent detailed review was undertaken once the options were narrowed down to either crossing via the Fledborough Viaduct or a trenchless crossing under the River Trent. The optioneering exercise resulted in trenchless crossing being identified as the preferred means of crossing the river due to being the shorter cable length (4.38km rather than 6.42km) and therefore the more sustainable option. Avoiding works to Fledborough Viaduct was also considered positive since it would avoid temporary closure/disruption during construction.





# Masterplan: third iteration

The final masterplan was prepared following statutory consultation. This iteration responded to feedback received from statutory consultees, including Historic England and the Host Authorities, as well as local communities.

Each of the changes shown on the illustrative masterplan and described in Table 6 are secured through the Works Plan [EN010159/APP/2.3], Management Plans and Outline Design Parameters [EN010159/APP/5.9].

Table 6: Design approach to masterplan iteration 3	
Design Principle	Response in third iteration
Climate 1: Maximise the amount of clean energy provided to the National Grid	Sufficient land was retained for solar PV panels and BESS to meet the Proposed Development's 740MW grid connection.
Climate 2: Seek to reduce embodied carbon throughout the project lifecycle.	Tarmac (or similar) was limited to the final stretch of access tracks where they meet the public highway, limiting embodied carbon whilst integrating best practice during construction. This is secured in the Outline Design Parameters [EN010159/APP/5.9].
Climate 3: Craft a scheme that is resilient to the effects of climate change	The extent of 3.5m and 3.8m high solar PV panels was refined throughout further modelling and engagement with the Environment Agency in order to provide the 300mm freeboard across the majority of the Site when allowing for 39% climate change.
Climate 4: Protect and improve the local environment	The likely significant effects identified in the Preliminary Environmental Information Report were reviewed. Workshops with the authors were conducted to input to the final design to embed mitigation, reducing the number and level of significant effects.
People 1: Protect features that are valued by the local community	New offsets were introduced to protect residential views including from Farhill Farm, Vicarage Farm, North Farm, Station Cottages, Fledborough Farm, Houses within Fledborough, Houses within Thorney, Station House, The Station, The Chase, and Moor Farm. These offsets are secured by the Works Plan [EN010159/APP/2.3].
Place 1: Protect and enhance places of value	Offsets were introduced from roads that connect local villages, namely Main Street between Ragnall and Fledborough.  A further offset was introduced south east of Ragnall to protect residential views and the setting of St. Leonard's Church
Place 2: Create new places of amenity and ecological value	Greater detail regarding the habitats to be created is provided in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].
Value 1: Enhance provision of local assets	Additional permissive paths have been introduced, as secured by the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].  Paths on the eastern side of the River Trent will connect Newton on Trent, Sustrans, and the Trent Valley Way.  Paths on the western side of the River Trent will comprise a circular route connecting Fledborough, Ragnall and the Trent Valley Way.
Value 2: Contribute to local economy and education	Details of the Proposed Development's contribution are provided in the Outline Skills, Supply Chain and Employment Plan [EN010159/APP/7.8]. In short, contributions to the local economy and education include the provision of opportunities for the involvement of local companies in the construction and operation supply chain.
Value 3: Provide resource for research and development	The Proposed Development will include monitoring of Biodiversity Net Gain and soil recovery, informing ongoing research and best practice.



Figure 18: Third iteration of masterplan



# Design evolution around local villages and residential dwellings

Consideration of ‘place’ is a key aspect of good design, as set out in best practice guidance.

Minimising the impact of the Proposed Development on the character of local villages and residential views has been a key consideration throughout design development. This section provides an overview of how the Proposed Development has been amended through each iteration of the masterplan in areas close to the villages closest to the Order Limits, namely:

- Ragnall;
- Fledborough;
- North Clifton; and
- South Clifton.

This section also details how the design has evolved in response to residential views.

The changes highlighted in this section are provided to illustrate the development of design and incorporation of embedded mitigation throughout each publication of the masterplan, rather than provide a comprehensive list of changes made. The final design is reflected on the Illustrative Masterplan [EN010159/APP/2.7].

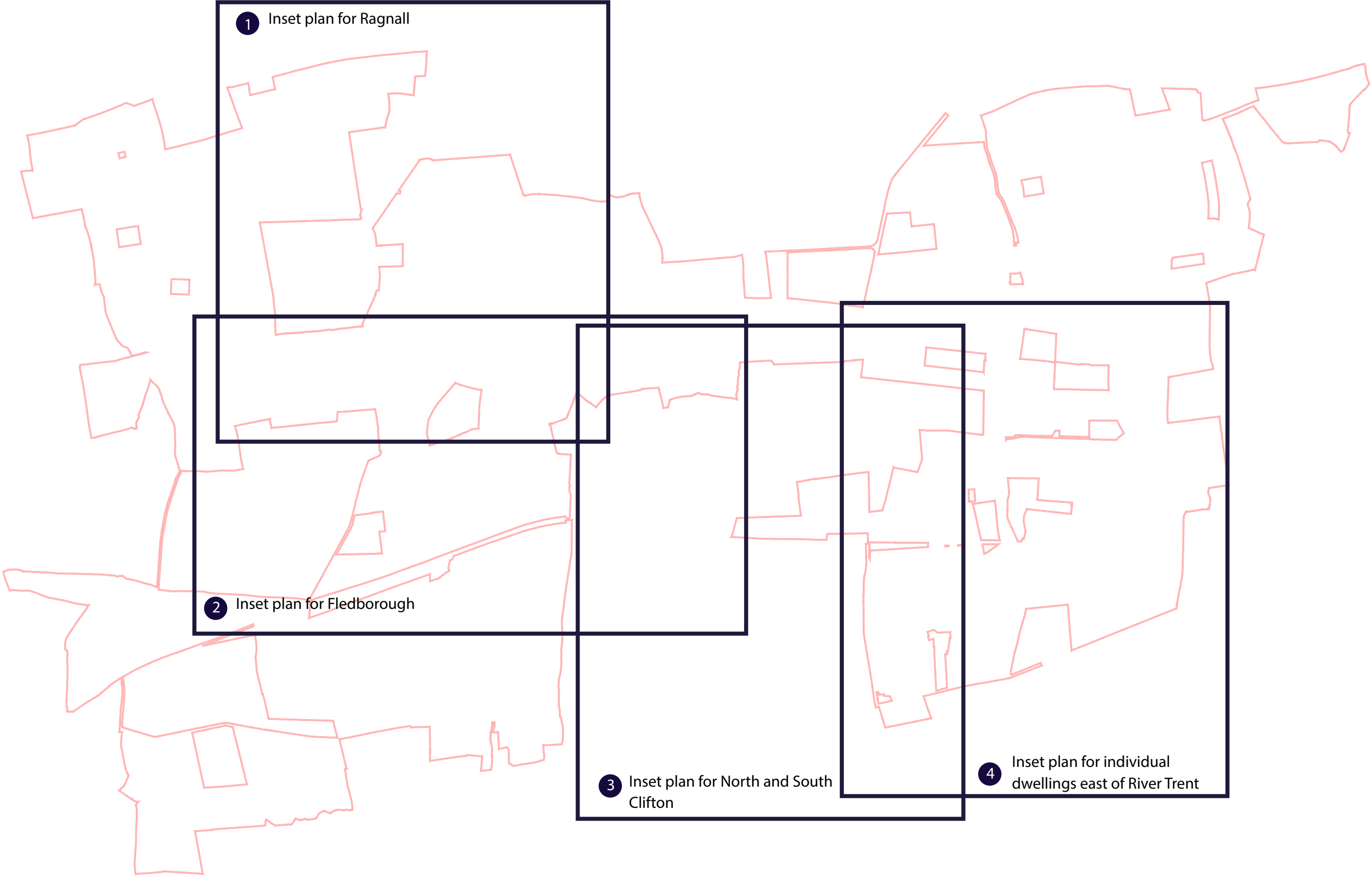


Figure 19: Inset location plan



# Design evolution - Ragnall

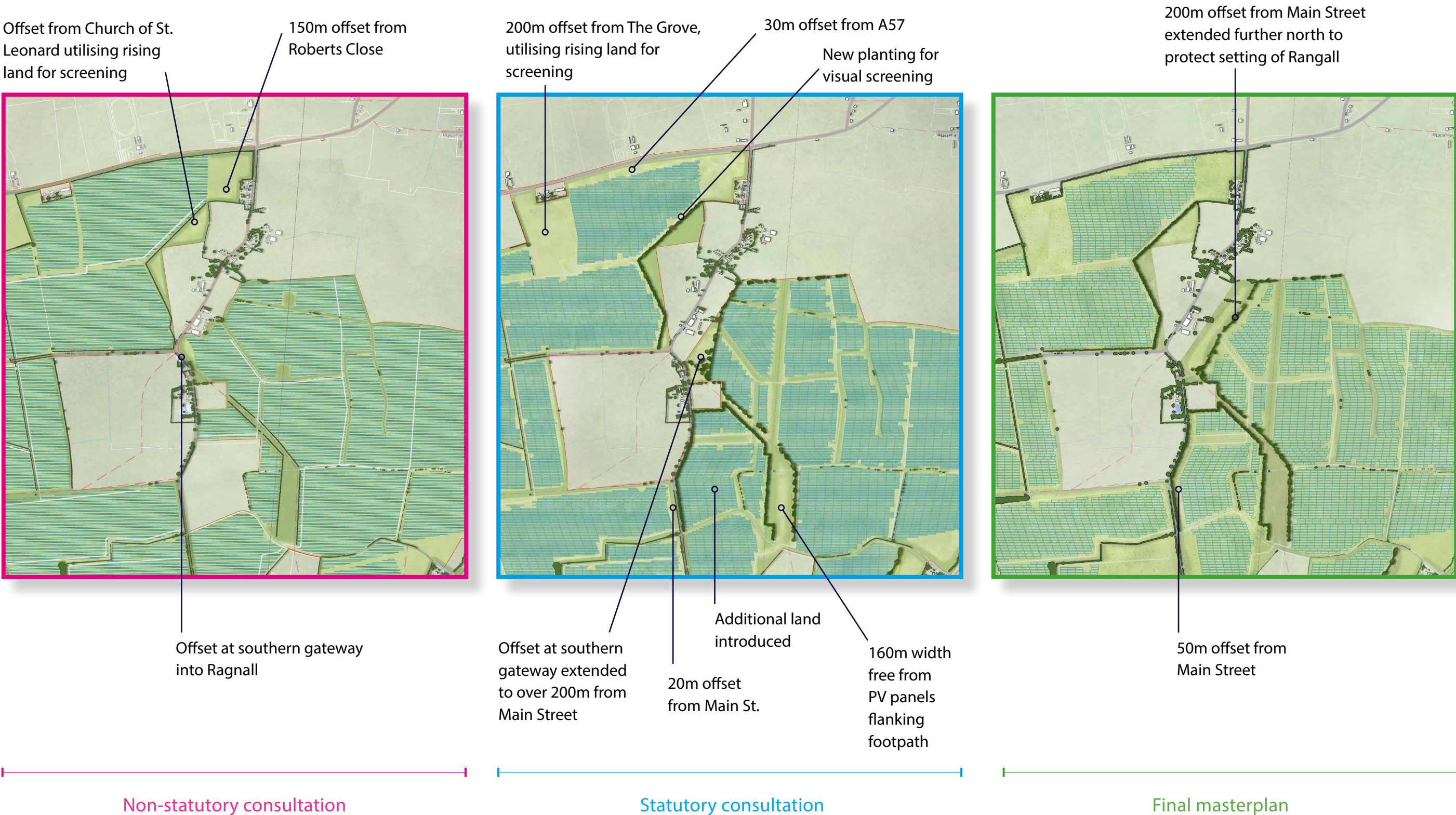
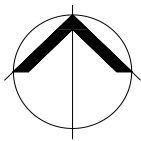
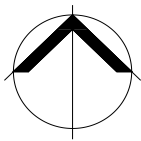


Figure 20: Design changes around Ragnall  
NOTE: Plans are provided to illustrate changes made, rather than provide comprehensive list

# Design evolution - Ragnall





# Design evolution - Fledborough

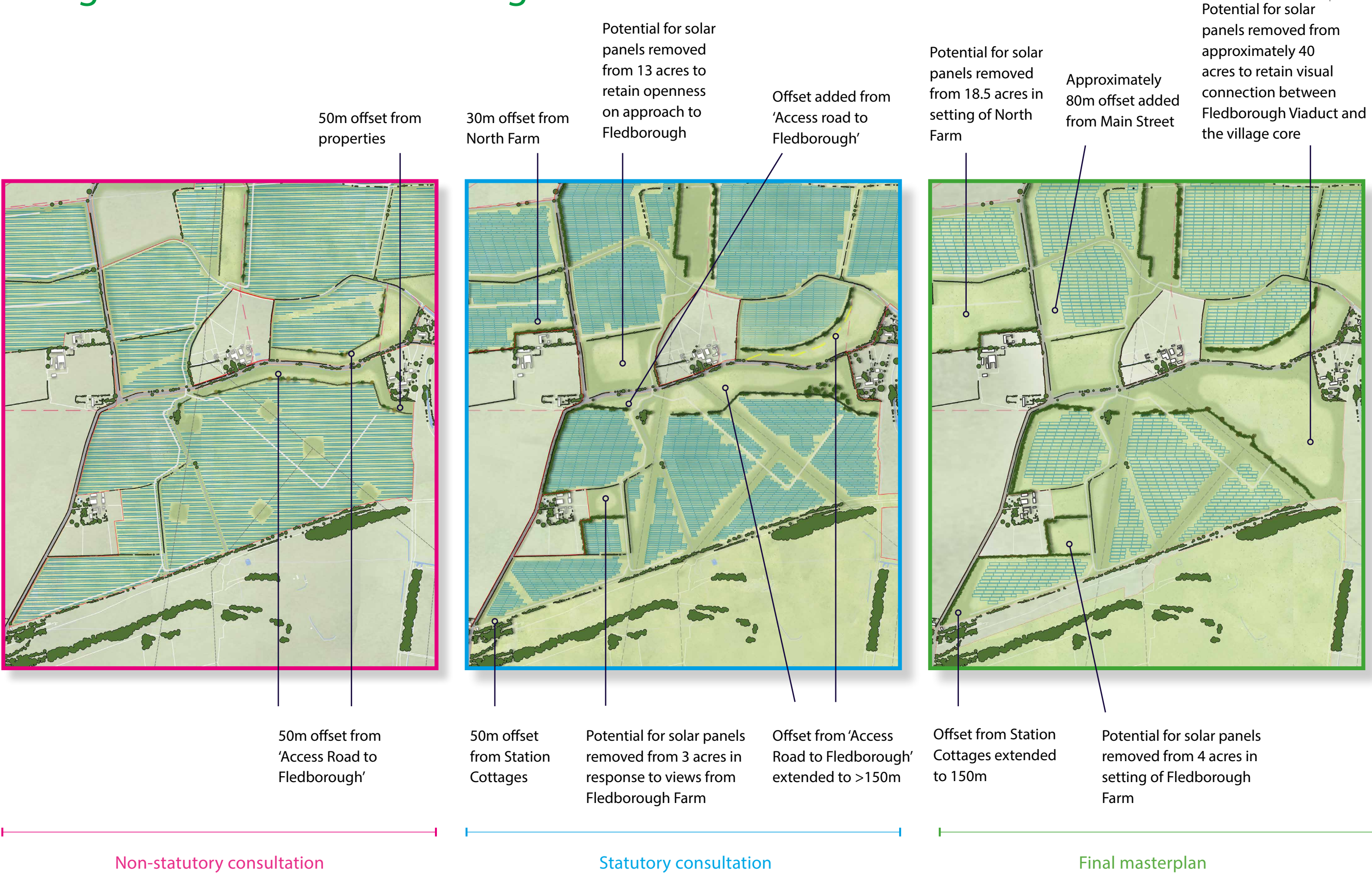


Figure 21: Design changes around Fledborough  
NOTE: Plans are provided to illustrate changes made, rather than provide comprehensive list

# Design evolution - Fledborough



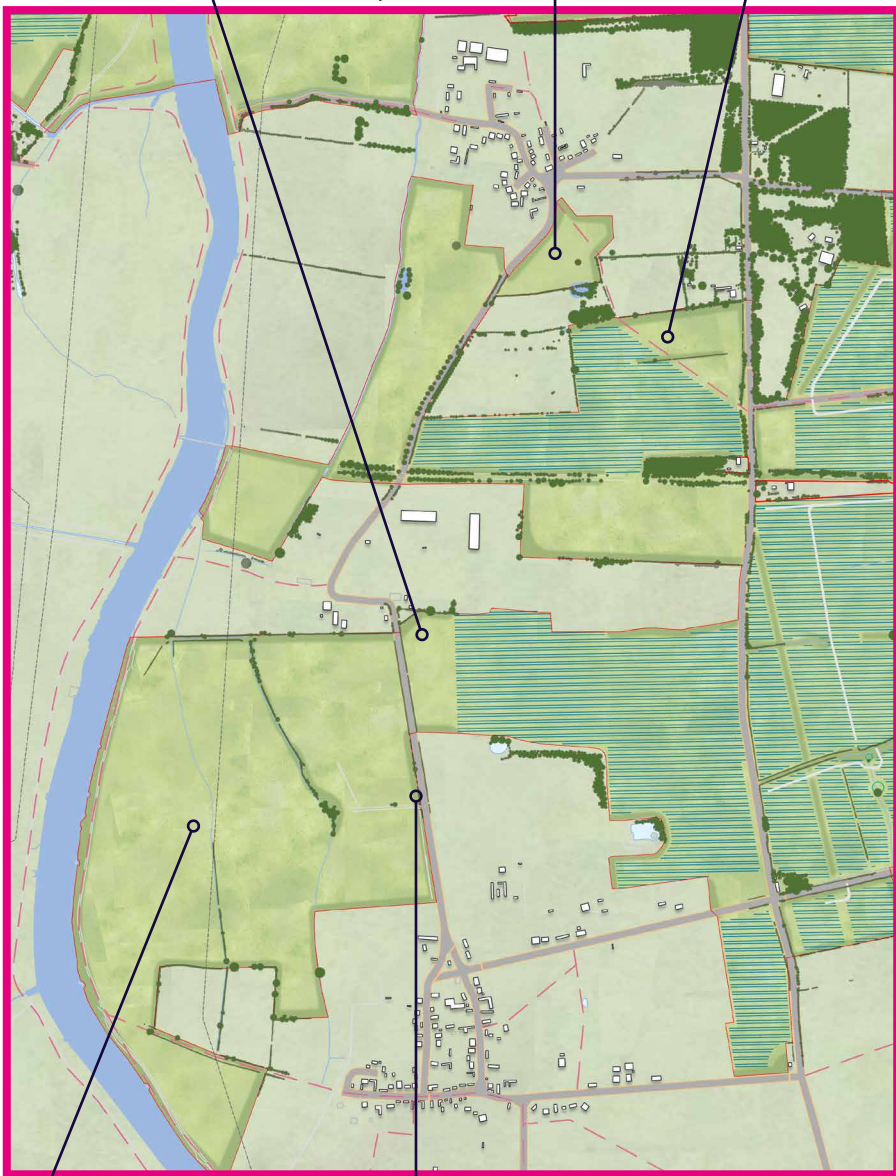


# Design evolution - North Clifton and South Clifton

Solar excluded on land south of North Clifton Primary School

Land close to North Clifton identified for landscape mitigation only

One side of public footpaths kept open where practical only



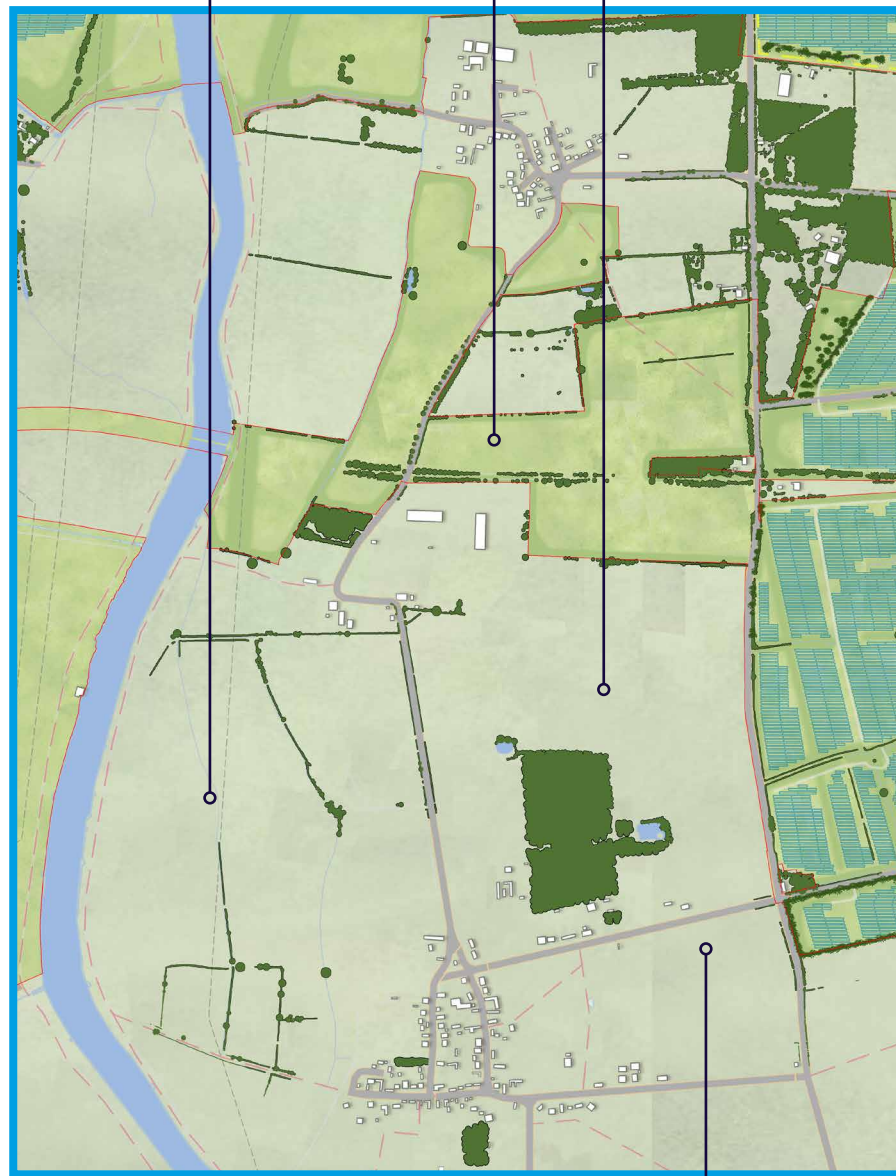
Land excluded from solar development in response to flood risk

Land either side of Church Lane excluded to preserve openness when travelling between North Clifton and South Clifton

Non-statutory consultation

Land west of Church Lane excluded from the Order Limits

All potential for solar development removed from between North Clifton and South Clifton, and from the River Trent to A1133



Land north of High Street removed to preserve current setting of eastern gateway into South Clifton and preserve current residential views

Statutory consultation

Land removed from Order Limits where not required for mitigation of environmental effects



Final masterplan

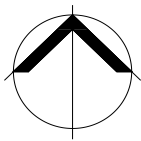
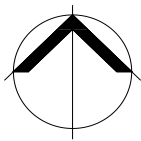


Figure 22: Design changes around North Clifton and South Clifton  
NOTE: Plans are provided to illustrate changes made, rather than provide comprehensive list

# Design evolution - North Clifton and South Clifton



Photomontage (Year 15 summer) looking north east from Fledborough Viaduct towards North Clifton.



# Design evolution - individual dwellings



Figure 23: Design changes around individual dwellings. NOTE: Plans are provided to illustrate changes made, rather than provide comprehensive list

# Design evolution - individual dwellings





# Delivery of positive outcomes

## Recreational access

Consultation, desk based research and field surveys revealed that, whilst there are several footpaths crossing the Order Limits, there was potential to enhance the footpath network, particularly in respect of connections to Newton on Trent.

A series of permissive paths are therefore proposed across the Order Limits, as secured in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]. Permissive paths will be open for the operational phase of the Proposed Development and be open to equestrians, cyclists and pedestrians. The extent and location of the paths is as follows:

- 2.5km of permissive paths are proposed on the east of the River Trent. Baseline research and consultation feedback demonstrated that Newton on Trent is not served by any public footpaths and therefore the permissive path network has been designed to provide a route from south of the A57 to the Sustrans route, and an additional spur heading west to join the Trent Valley Way, enhancing the recreational value of the Order Limits.
- 3.6km of permissive paths are proposed on the west of the River Trent, creating a circular route between Ragnall in the north, existing footpaths on the western bank of the River Trent in the east and Fledborough in the south. Combined with the existing PRow network this would create a circular route for pedestrians extending for approximately 5.6km.

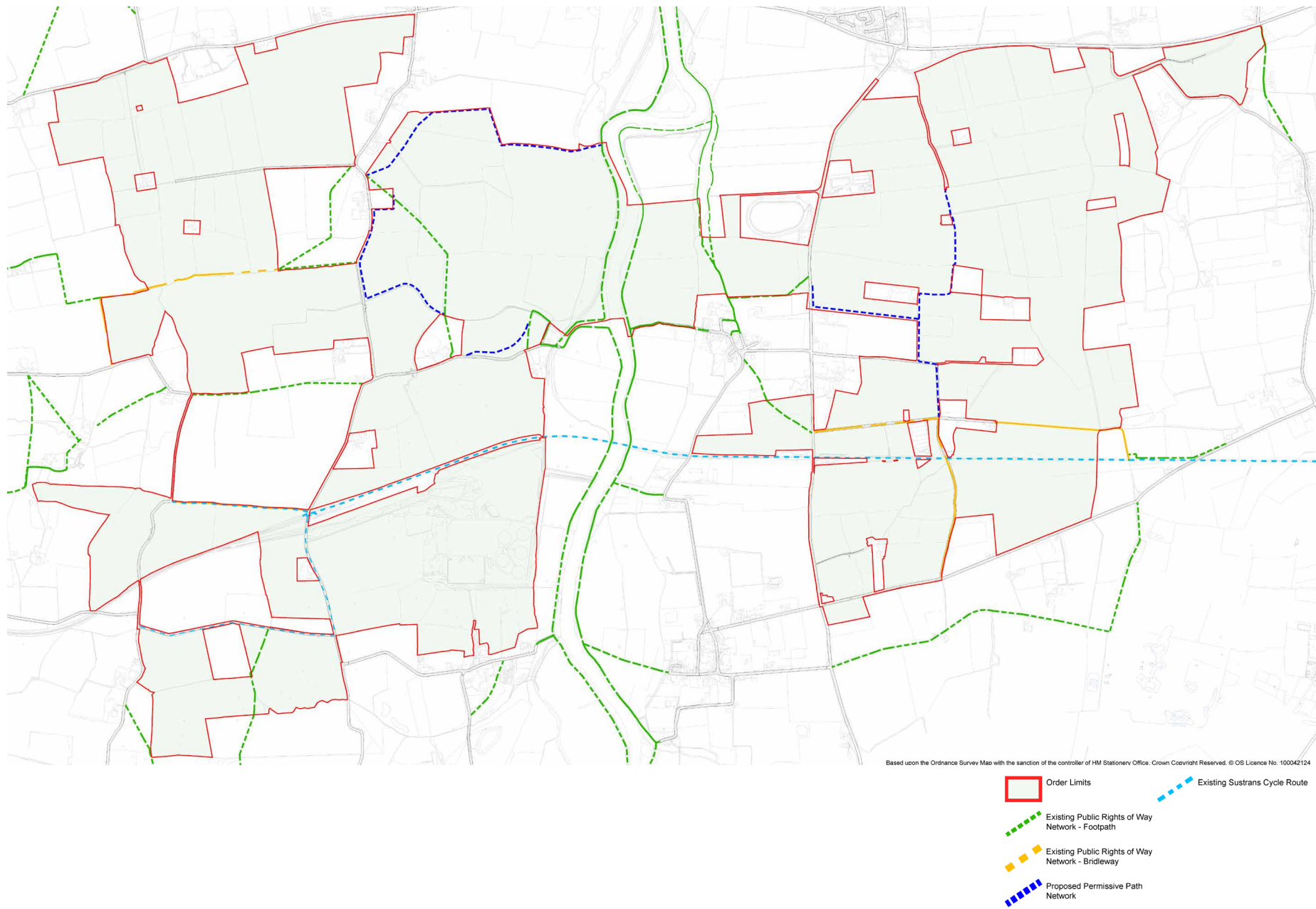


Figure 24: Permissive paths and public rights of way

# Delivery of positive outcomes

## Biodiversity and green infrastructure

The Proposed Development seeks to minimise adverse ecological effects and to maximise the opportunities for biodiversity benefit by following the ‘mitigation hierarchy’ including measures to avoid, prevent, reduce and if possible, offset any identified significant adverse effects.

Avoidance and mitigation measures are being achieved as a result of the careful siting, planning, and design that has occurred. These are listed within the Commitments Register [EN010159/APP/7.15], and secured in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7], Outline Construction Environmental Management Plan [EN010159/APP/7.4], Outline Operational Environmental Management Plan [EN010159/APP/7.5] and the Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6].

The design of the infrastructure and the environmental measures are aimed at both delivering BNG and contributing towards local conservation priorities. This includes providing new and enhanced contribution to the local green infrastructure network including extensive hedgerow networks, coastal and floodplain grazing marsh, field margins and ditches and habitats that could provide increases in the size and distribution of species including brown hare, hedgehog, turtle dove, water vole, otter, green and brown hairstreaks, harvest mouse, bats and farmland birds.

The commitment to enhancing, creating and managing habitats positively recognises that for a large array of flora and fauna, solar farms provide real opportunities to increase biodiversity (see Montag, Parker and Clarkson 2016 , Blaydes et al. 2022 , Solar Energy UK, 2023 , Solar Energy UK, 2024), and that simply providing habitats to align with delivering Biodiversity Net Gain, as measured by the Statutory Biodiversity Metric, misses potential opportunities to contribute towards National and Local conservation priorities. The extent of the One Earth Solar Farm provides the opportunity to deliver landscape scale nature conservation benefits that can positively contribute to the

Local Nature Recovery Strategies (LNR) being developed for Nottinghamshire and Lincolnshire. The Local Habitat Map for Nottinghamshire (that will underpin the Nottinghamshire LNRS) shows habitats identified as ‘areas of particular importance to biodiversity’ both within and close to the Order Limits. These provide a skeleton on which habitats created and managed positively as part of the Proposed Development can be delivered around.

Impacts on the existing green infrastructure network have been minimised through the sensitive siting of key elements and utilising existing gaps in vegetation for access.

Offsets from existing vegetation have also been embedded in the Works Plan [EN010159/APP/2.3] and Outline Design Parameters [EN010159/APP/5.9] to protect the roots of existing vegetation and provide a buffer for habitat and wildlife. The offsets embedded are as follows:

- Hedgerows: 5m
- Woodlands: 25m
- Waterbodies: 10m
- Watercourses: 10m

Beyond the mitigation of impacts, the Proposed Development will deliver an enhanced green infrastructure network designed to improve ecological connectivity across the Order Limits through:

- extensive new planting to improve the existing fragmented network of hedgerows
- areas of natural regeneration around woodlands and waterbodies to further biodiversity
- diversification of grassland and wildflower species across

the Order Limits in response to existing soil conditions, enhancing resource for pollinators.

Specifically, the Proposed Development will include:

- Species-rich grassland and wildflower meadow : 237.5 ha;
- Species-rich grassland under solar PV array : 909.7 ha;
- Hedgerow margin/species-rich grassland : 81.4 ha;
- Riparian zones/species-rich grassland : 9.9 ha;
- Native woodland and tree belts : 4.2 ha;
- Proposed native hedgerows : 5.9 km; and
- Proposed native hedgerows with trees : 9.6 km.



# Delivery of positive outcomes

## Sustainability

Sustainability is a key aspect of good design and has been a key consideration in the development of One Earth. At a high level, this is embedded in the project specific design principles, in particular those under the heading of climate, namely:

- Seek to reduce the embodied carbon throughout the project lifecycle;
- Maximise the volume of clean energy that can be provided to the national electricity grid; and
- Craft a scheme that is resilient to the effects of climate change.

These design principles have been the benchmark against which design decisions have been made throughout the iterative design process. Consideration of sustainability specifically has resulted in the following outcomes:

- The use of concrete footings to fix PV mounting structures has been limited to areas of archaeological sensitivity, as secured by the Outline Design Parameters [EN010159/APP/5.9]. This reduces the amount of concrete used across the project.
- The cable strategy has been designed such that cable crossings under or over linear features, such as the River Trent or Sustrans route, will be made by 400kv cables. This avoids the need for lower voltage cables to cross such assets which would have required many more crossings thereby increasing the energy involved in installation and increase the geographic extent of physical impacts.
- The substation parameters have been drafted to allow for either gas insulated substations (GIS) or air insulated substations (AIS). Whilst from an aesthetic point of view, itself an important consideration of good design, GIS carries greater scope for reducing visual impact, AIS avoids the use of Sulphur hexafluoride (SF6). SF6 is well known as one of

the most potent greenhouse gasses. Solutions to replace SF6 with greener alternatives are in development but are not yet common to the market. Therefore, by retaining optionality in the substation parameters, within the Rochdale Envelope approach, flexibility is maintained to respond to the highest priority design considerations and technology available on the market in detailed design.

- New planting is proposed across the Order Limits to enhance the local green infrastructure network and provide visual screening. This planting has been designed in response to existing conditions, for example the inclusion of a variety of grassland and meadow mixes as set out in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]. The planting proposed also includes a broad range of species, for example eight species are proposed within hedgerows and 10 within woodland blocks. As well as furthering biodiversity, this range enhances biosecurity, improving the planting's resilience to pest, disease, flood and drought.
- Good design from the outset of the project should also consider decommissioning. With reference to the Decommissioning Environmental Management Plan [EN010159/APP/7.6] the Applicant is committed to 100% reuse and recycling of solar panels.

Further information regarding the Proposed Development's approach to sustainable practices proposed throughout construction, including recycling and disposing of waste, is presented in the Construction Environmental Management Plan [EN010159/APP/7.4].

# Coordinate and Secure

- Refinement of details and parameters
- Explanation of the process by which future post-consent decision making will be made with respect to design development



# Refinement of details and parameters

Alongside the refinement of the spatial extent of elements within the Proposed Development, as set out in the previous section, the parameters controlling the design of the proposal have also been refined in line with findings from environmental surveys and consultation.

This has included:

- the location of PCS to embed mitigation with respect to noise impacts;
- refinement of the height of elements proposed across the Order Limits to mitigate visual impact and respond to flood risk;
- consideration of Agricultural Land Classification;
- the colour of elements to best blend with the existing environment; and
- design adjacent to public rights of way.

## Location of Power Conversion Stations

Power Conversion Stations (PCS) incorporate inverters, transformers and swithgear. The PCS will be pre-assembled and preconfigured with a maximum dimension of 13m long by 3m wide. The units will be a muted colour to be sympathetic to surroundings.

Several principle factors were considered in locating the PCS, namely flood risk and noise. With respect to flood risk:

- PCS will be located outside of potential flood extents where possible and therefore the maximum height would be 4.5m above ground level.
- Where PCS need to be within areas with potential to flood as part of the designed flood event, as defined in ES Volume

2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7], they will be mounted on stilts to allow flood water to move beneath the unit during a flood event. In such instances the maximum height would be 6m above ground level.

With respect to noise considerations:

- PCS will not be located within 100m of residential dwellings, and not within 50m of public rights of way without acoustic mitigation.

The parameters set out above are secured within Work Area 1 as shown on the Works Plan [EN010159/APP/2.3] and also the Outline Design Parameters [EN010159/APP/5.9].

## Refinement of height

A sequential approach to the layout has been taken with respect to flood risk. It is proposed that sensitive equipment (such as sub-stations and battery storage) will be located outside of the design flood extents, ensuring they remain operational even in times of flood.

There is a need to incorporate frequent inverters across Work Area 1 (Solar) and as a result of this, there are some locations where these will need to be located within the flood extents. Where this is the case, the inverters will be raised above the design flood level on raised platforms, providing a freeboard of 300mm. To ensure that there will be no loss in floodplain storage or blockage risk, it is proposed that these features will have a voided structure beneath, allowing the flow and storage of floodwater beneath.

With regards to the solar PV arrays, a 300mm freeboard has been provided to the base of the panel itself across the majority of the Proposed Development. The height to which the panels can be raised is subject to a number of environmental, engineering

and maintenance considerations (including visual impact, engineering feasibility, foundation design as well as impacts to archaeology). Through consideration of these elements, the maximum height the panels can be raised is 1.8m above ground level (i.e. between ground level and the base of the panel itself).

Taking into the account the 300mm freeboard (required by the Environment Agency), it is generally proposed that locating solar panels within areas where flood depths exceed 1.5m will be avoided wherever possible. This is reflected on the Works Plan [EN010159/APP/2.3].

There are, however, several localised positions where is it not possible to avoid development within the areas where flood depths exceed 1.5m (namely to the far eastern boundary of the Order Limits and on the western banks of the River Trent). Although the depth of flooding in these locations will be greater than 1.5m, many of the panels set 1.8m above ground will still be above the flood level but will have a freeboard of less than 300mm. Only a small portion of the solar panels would experience flooding at their base, and the depth of flooding to the panels will be limited. This approach has been discussed and agreed with the EA.

Panels will only be raised to the maximum height of 1.8m above ground level where this is necessary. In locations where flood depths are lower, the panels will be raised accordingly to a lower height above ground level and one which is optimal bearing in mind other design constraints.

It is proposed that existing ground levels will be maintained within the Order Limits, ensuring there will be no loss in floodplain storage as a result of the Proposed Development.

In response to the environmental information and consultation listed above, the Height Parameter Plan (within Site Layout Plans [EN010159/APP/2.5]) provided sets out the maximum height permitted across the extent of Order Limits.

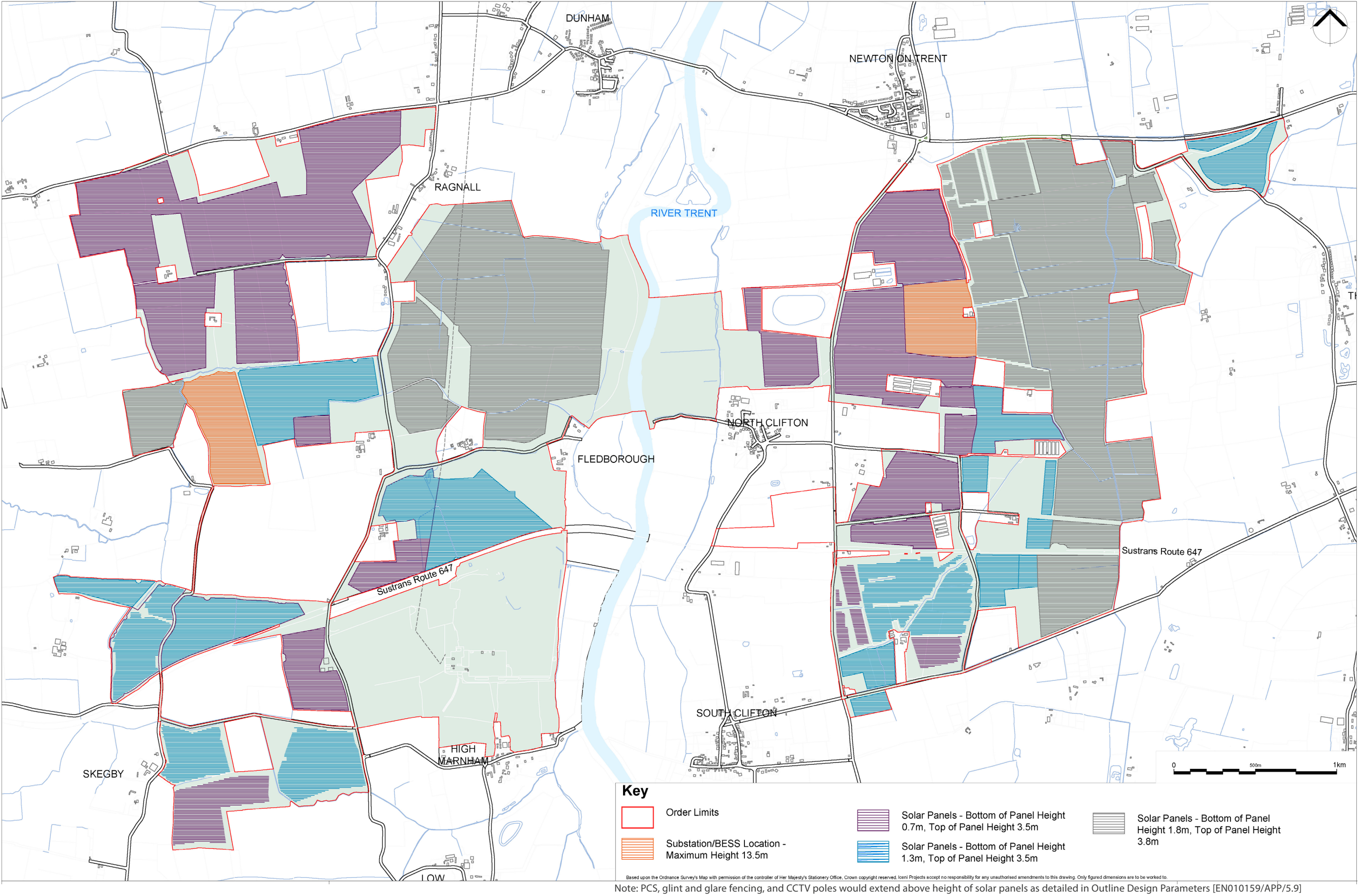
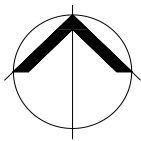


Figure 25: Height parameter plan



# Refinement of details and parameters



## Agricultural Land Classification

The Agricultural Land Classification (ALC) of land within the Proposed Development has been a consideration throughout the iterative design process. As detailed within the ES Volume 2, Chapter 8: Land and Soils [EN010159/APP/6.8], and shown on Figure 8, each field within the Order Limits typically comprises a mixture of different grade soils.

Published ALC mapping, consulted to inform the non-statutory consultation masterplan, showed land across the Site and surrounding landscape as mostly ALC grade 3.

Based upon initial survey results available prior to statutory consultation, 84 acres of BMV land were removed from the potential Order Limits, specifically approximately:

- 10.5 acres between Moor Lane and High St, South Clifton;
- 65 acres between North Clifton and South Clifton; and
- 8.5 acres south of Collingham Road.

Subsequently, 161 acres of BMV land were removed from the potential Order Limits between stat con and submission, namely approximately:

- 25 acres located west of Thorney;
- 118 acres located south west of Newton upon Trent;
- 12 acres south west of North Clifton; and
- 6 acres between North Clifton and South Clifton.

ALC was also a consideration in the siting of the substation and BESS compounds. However, wider constraints such as the extent of potential flood risk, visual and noise impacts limited

the potential locations for the substation and BESS, as detailed previously in this DAD.

Overall, the Proposed Development has sought to make efficient use of land. The area proposed to be occupied by Work Number 1, 2 and 3 (Solar PV array, BESS and Substation Compounds) totals 2,337 acres. This equates to 3.15 acres per MW based on the 740MW grid connection agreement.

## Colour of infrastructure

Several components proposed as part of the Proposed Development, detailed in the Outline Design Parameters, are stated to be a 'muted colour to be sympathetic to surroundings.' This would likely be green, grey or white, as illustrated on the following colour study.



Examples of muted colours considered to be sympathetic to surroundings

# Refinement of details and parameters

## Public Rights of Way

The public right of way network close to, and within, the Order Limits comprises footpaths and bridleways. Consideration of people's views whilst travelling by foot and horse has therefore been a key consideration from the outset of the design process. For example, land on one side of public rights of way was kept open and free from development where possible from the first iteration of the masterplan. Where this was not achievable, a 15m offset either side of the public right of way was implemented. In many instances the offset extended far beyond 15m, as shown on the sections provided.

Land within the offset from public rights of way would be occupied by new planting comprising hedgerows, trees and grassland/wildflower meadows.

Consultation feedback confirmed that the local bridleways are used by equestrians. The Proposed Development has therefore embedded mitigation to minimise the visual impact experienced by people walking and riding on the public right of way network.

With reference to 'Advice on Solar Farms near routes used by equestrians' published by the British Horse Society, the Proposed Development has:

- avoided the creation of narrow corridors around Bridleways extending at least 30m from solar panel to solar panel, beyond the 5m minimum noted in the advice note, as secured on the Works Plan [EN010159/APP/2.3];
- utilised post and wire fencing screened by hedgerows, as secured by the Outline Design Parameters [EN010159/APP/5.9] and Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]; and
- provided additional routes accessible to equestrians via the proposed permissive path network, as secured in the Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].

As well as considering the visual impact of the development on users of public rights of way, the Proposed Development has



Figure 26: Illustrative section of approach to existing public right of way

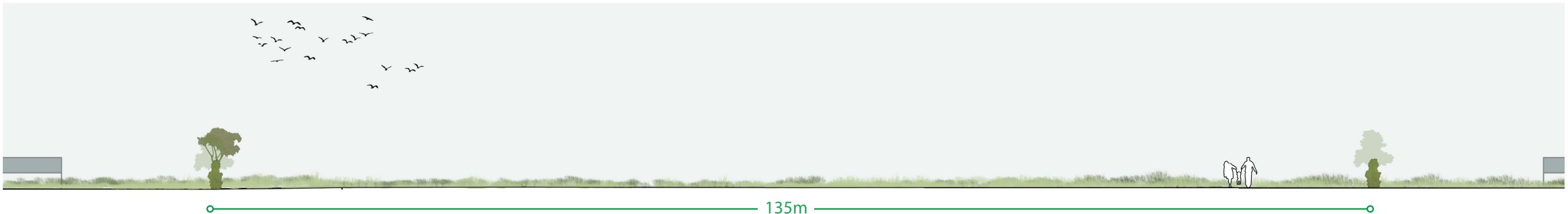


Figure 27: Illustrative section 2 of approach to existing public right of way

also considered the potential impact associated with noise from substations, batteries and inverters. The following offsets have therefore been embedded in the Outline Design Parameters:

- Inverters will not be located within 50m of public rights of way without acoustic mitigation;
- The substation will not be located within 100m of public rights of way; and
- BESS will not be located within 100m of public rights of way.

Figure 28 highlights the routes most likely to be used by equestrians, including bridleways and permissive paths. Annotations provide the offsets from built elements of the Proposed Development.



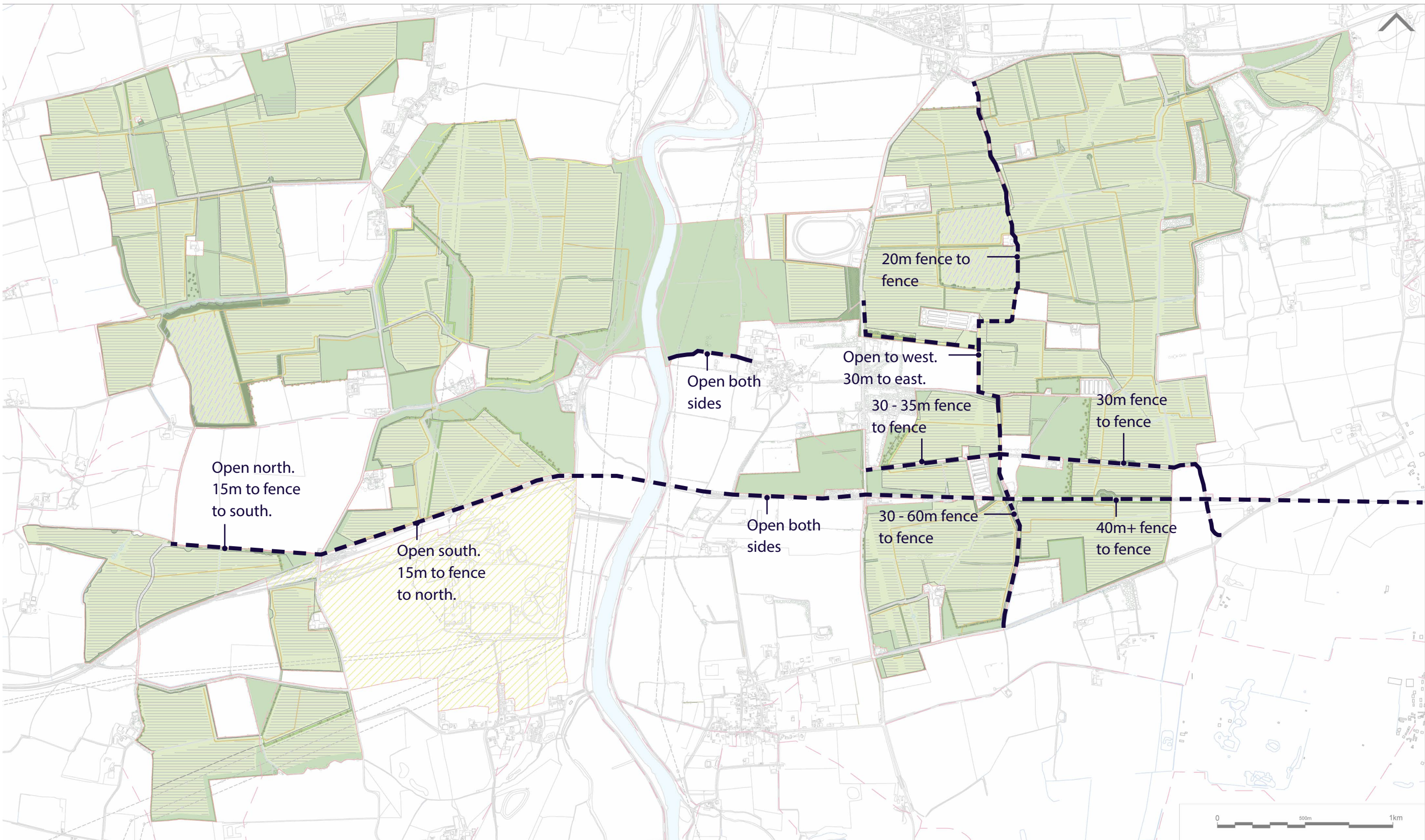
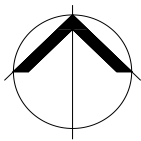


Figure 28: Offsets from routes with potential to be used by equestrians

# Securing good design

## Securing good design

Good design has been in key consideration in the drafting of the Outline Design Parameters [EN010159/APP/5.9], Works Plan [EN010159/APP/2.3], Height Parameter Plan (within the Site layout plans [EN010159/APP/2.5]) and management plans.

The detailed design of the Proposed Development must be in accordance with the Outline Design Parameters [EN010159/APP/5.9]. This approach is taken to ensure suitable flexibility in the design of the Proposed Development, such that new technology can be used, while ensuring that good design will be embedded in the final design and that the impacts of the development will always comply with the ES [EN010159/APP/6.0].

The consent for the Proposed Development is subject to two key controls, which together form the “consent envelope”. These are:

- Works Plan [EN010159/APP/2.3] – in Schedule 1 of the DCO the Proposed Development is divided into a series of component parts, referred to as “numbered works”. Article 3(2) of the Order requires that the numbered works authorised by the Order are situated in the corresponding areas shown on the Works Plans.
- Requirements – Article 3(1) provides that consent for the Proposed Development is only given subject to compliance with the Requirements, set out in Schedule 2 to the Order.

With respect to detailed design specifically, Requirement 5 (Detailed design approval) expressly requires that approved details accord with any details approved under other requirements in relation the approved battery safety management plan, landscape and ecology management plan, fencing and other means of enclosure, surface and foul water drainage, archaeology, operational noise and the approved public right of way management plan.

Any illustrative layout plans & sections have been submitted to provide illustrative examples of the different design layouts that have been considered for the Proposed Development that could be built out within the “consent envelope”. These are provided for illustration only within this DAD, the Illustrative Masterplan [EN010159/APP/2.7] and the ES, Volume 2: Figures [EN010159/APP/6.20] and are not sought to be secured.

The controls placed on the Proposed Development to ensure that good design and environmental mitigation is embedded in the detailed design phase are collated in the Commitments Register [EN010159/APP/7.15]. This draws upon commitments made across the suite of secured documents.

Future design development will be overseen by a technical design team, and emerging design decisions will be communicated to the local community via a community liaison group.



View north towards Cottam Power Station



## Conclusion

The contents of this DAD set out how the Proposed Development will be delivered in accordance with the project vision: ‘to deliver 740MW (ac) of renewable energy to the national grid whilst being sensitive to its surroundings. The project will engage in meaningful conversation with communities and will be sited to take account of the local environment and people’s visual amenity. The project will take opportunities to embed sustainability and resilience, enhancing biodiversity and furthering recreational access across the site.’

The project specific design principles, which were prepared in line with reference to the National Infrastructure Commission’s guidance, have acted as a benchmark against which decisions have been taken throughout the iterative design process.

The design evolution set out in this DAD demonstrates how the design principles have informed the design which has sought to minimise adverse environmental effects and maximise positive outcomes. The design is secured through several means in the DCO, demonstrating the thread of good design, coupled with the application of the mitigation hierarchy, that has been woven through the whole pre-application phase and will continue to inform detailed design development.



View west over Fledborough Viaduct



