Great North Road Solar Park

Environmental Impact Assessment Scoping Report

November 2023

Contents

PREFACE

1 Elements Green Trent Ltd ('the Applicant') proposes to construct and operate Great North Road Solar Park (GNR) ("the Development"), a proposed solar photovoltaic (PV) electricity generating facility within the district of Newark and Sherwood and the county of Nottinghamshire. When built, the Development would have an anticipated solar electricity generation capacity of approximately 1,120 megawatts (MW) Direct Current (DC) / 800 MW Alternating Current (AC) to be connected into the existing National Grid Staythorpe Substation.

2 Solar farms of this scale are defined as Nationally Significant Infrastructure Projects (NSIPs) under Section 14(1)(a) and 15(2) of the Planning Act 2008 ('the Act') and require a Development Consent Order (DCO) to give the required permissions for the Development to be constructed and operated. The Applicant is in the process of preparing an application for a DCO for the Development.

3 The Applicant has confirmed in writing to the Planning Inspectorate, on behalf of the Secretary of State, that an Environmental Statement (ES) will be provided in respect of the application for a DCO for this Development.

4 This Environmental Impact Assessment (EIA) Scoping Report supports a formal request for an EIA Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations').

5 In the interests of good practice, promoting proportionality in EIA, to reduce work for all parties and to focus on the key issues, consultees to this request for an EIA Scoping Opinion are encouraged to request the inclusion of surveys and assessments only where they are required to inform the identification and assessment of likely significant effects, as required by the EIA Regulations. Other information that may be required for other reasons can be provided outside of the EIA process.

1 INTRODUCTION

1.1 DOCUMENT PURPOSE

6 Elements Green Trent Ltd ('the Applicant') has commissioned this Scoping Report relating to the Environmental Impact Assessment (EIA) of the Great North Road Solar Park (GNR) ("the Development"), a proposed solar photovoltaic (PV) electricity generating facility within the district of Newark and Sherwood and the county of Nottinghamshire. When built, the Development would have an anticipated solar electricity generation capacity of approximately 1,120 MW DC / 800 MW AC, to be connected into the existing Staythorpe Substation.

7 Solar farms of this scale are defined as 'Nationally Significant Infrastructure Project's (NSIPs) under Section 14(1)(a) and 15(2) of the Planning Act 2008 ('the Act') and require a Development Consent Order (DCO) to give permission for the Development to be constructed and operated. The Applicant is in the process of preparing an application for a DCO for the Development.

8 The Applicant has confirmed in writing to the Planning Inspectorate, on behalf of the Secretary of State, that an Environmental Statement (ES) will be provided in respect of the application for a DCO for this Development.

9 This Scoping Report forms a formal request for a Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations').

1.2 OUTLINE OF THE DEVELOPMENT

10 The electricity generated by the Development would be exported to the national grid at the Staythorpe Substation.

11 All proposed development activity is within the currently proposed Order Limits, typically shown on plans as a red line, and which is broadly analogous to the "red line boundary" for Town and Country Planning Act (planning) applications. The Order Limits as currently proposed occupy approximately 2,900 hectares (ha) of land.

12 The Development would also include a Battery Energy Storage System (BESS), to provide the option to store electricity prior to exporting it to the grid.

13 The Development would be located to the west of the A1, north of the A617, east of Eakring, and south of Egmanton, occupying two main areas to the north and north-west of Staythorpe. The Order Limits are shown on Figure 1.1: Development Location.

14 The Development essentially consists of a loop of land parcels proposed to be occupied by solar PV panels, connected by cable route areas. The eastern side of the loop runs north from Staythorpe Power Station to Egmanton in the north. The western side of the loop runs north-west from Staythorpe Power Station and then splits at Maplebeck with spurs running to Eakring in the north-west and Kneesall to the north-northeast, eventually connecting with the eastern side of the loop.

15 The current Order Limits are split across multiple land parcels. The Applicant's team are in the process of collecting relevant environmental and other information, and are starting the process of consultation, and these will inform further design iterations. As a result of these, it is expected that the Order Limits proposed in the application for a DCO may be reduced relative to the current Order Limits.

1.3 THE APPLICANT

16 Elements Green Trent Ltd is a business venture being developed by solar and renewables specialists, Elements Green.

17 Elements Green is a United Kingdom (UK) based solar and BESS developer developing projects in the UK, European Union (EU), Australia and the United States. Elements Green manages a development pipeline in excess of 7 GigaWatts (GW).

18 Elements Green has rapidly established a global footprint and a strong reputation for being at the forefront of technological and commercial evolution within the renewable energy sector.

19 Elements Green has a highly experienced greenfield development team in the UK, capable of origination through to construction, connection and operation.

1.4 CONSENTING REGIME

20 The Development falls within the definition of a NSIP under Section 14(1)(a) and 15(2) of the Planning Act 2008 ('the Act') as the construction of a generating station with a capacity of more than 50 MW.

21 The EIA requirement for NSIP developments is transposed into law through the EIA Regulations. The EIA Regulations specify which developments are required to undergo EIA and schemes relevant to the NSIP planning process are listed under either 'Schedule 1' or 'Schedule 2'. Those developments listed in 'Schedule 1' must be subject to EIA, while developments listed in 'Schedule 2' must only be subjected to EIA if they are considered *'likely to have significant effects on the environment by virtue of factors such as its nature, size or location'.* The criteria on which this judgement must be made are set out in Schedule 3.

22 The Development is a 'Schedule 2' development under Part 3(a) of the EIA Regulations as it constitutes 'Industrial installations for the production of electricity, steam and hot water'.

23 Whilst EIA is not necessarily compulsory for 'Schedule 2' developments, an ES will be provided in respect of the Development, so the Development will be termed "EIA Development" under the EIA Regulations.

24 Following the completion of surveys, assessments, design iterations and consultation processes, an application for a Development Consent Order (DCO) will be made to the Planning Inspectorate (PINS). PINS will examine the application and report to the Secretary of State (SoS) for Energy Security and Net Zero for determination in accordance with the Act. The DCO application will be accompanied by an ES that sets out the methods and findings of a full EIA undertaken in accordance with the EIA Regulations. Other information, that may be required by consultees, but which is not required for the identification and assessment of likely significant effects (under the EIA Regulations), may also be presented in the DCO application.

1.5 PURPOSE OF THE SCOPING REPORT

25 The EIA Regulations state at regulation 10(3) that a request for a Scoping Opinion should contain:

"*(a) a plan sufficient to identify the land;*

(b) a description of the proposed development, including its location and technical capacity;

(c) an explanation of the likely significant effects of the development on the environment; and

(d) such other information or representations as the person making the request may wish to provide or make."

26 The guidance highlighted in Planning Inspectorate Advice Note 7 Environmental Impact Assessment: Screening, and Scoping and Preliminary

Environmental Information[1] has also been taken into account in the preparation of this Scoping Report.

27 Accordingly, this Scoping Report presents:

- A plan sufficient to identify the land - the Development Location figure (Figure 1.1);
- A description of the Development (Section 2) and technical capacity (Section 2.4 and Figure 2.2); and
- An explanation of the likely significant effects of the Development on the environment (the Likely Environmental Effects sub-section of technical Chapters 5 to 14 of this Scoping Report).

28 This Scoping Report has also been prepared with a view to inviting early consultation comments on the approach to the EIA and the content of the ES. It provides information on the key issues anticipated and outlines the methodologies proposed for the various technical assessments.

29 This Scoping Report also outlines issues perceived to be 'not significant', which, in the opinion of the authors, do not require formal assessment as part of the EIA. These issues are proposed to be "Scoped Out" of the EIA and where this is proposed it is made clear in this report and summarised in Table 15.1.

30 Comments received in response to this Scoping Report will inform the evolution of the Development design, the EIA methodology and the Development programme, and how responses have been addressed will be reported in the Consultation Chapter and other relevant technical chapters of the ES.

2 PROJECT DESCRIPTION

2.1 FIGURE REFERENCING AND MAPPING

31 Viewed at a scale of 1:60,000 on an A3 map, the Development is broadly bordered to the north by the village of Egmanton, to the east by Cromwell, to the south by Staythorpe, to the north-west by Eakring and to the north-northwest by Kneesall.

32 For ease of reference the Development Figures have been divided into four sectors as demonstrated on Figure 2.1: Figure Referencing. These are referred to as the north-east (NE), south-east (SE), south-west (SW) and north-west (NW) sectors respectively. Individual plans for each sector are provided at a larger scale in some of the Scoping Report Figures *e.g.,* Figure 2.2 – NW, Figure 2.2 – NE, etc. It is proposed that within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES), additional large-scale Figures will also be provided at a scale of 1:5,000. The breakdown of the four sectors into these 1:5,000-scale sub-sectors are shown on Figure 2.1 (Site Referencing). The sub-sectors are labelled, within each sector, as a-f horizontally, and 1-6 vertically. Thus, a

[1] PINS (2020). Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping Republished June 2020 (version 7). Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-and-environmental-statements/ [accessed on 31/10/2023].

figure showing a given sub-sector might be labelled Figure 2.2 – NW-c3, for example.

33 This referencing system will be used as consistently as is practicable within future Development documentation.

2.2 SITE SELECTION PRINCIPLES

34 The selection of the location of the Development, and the current Order Limits, has been driven by a number of technical factors and environmental considerations. On a regional scale the selection of the location was led by the available grid connection capacity at Staythorpe National Grid Substation. The selection process has taken account of important geographical and historic features. The location of the Development is strategically positioned to the east of Sherwood Forest, west of River Trent, north of Southwell and south of Laxton Historic Landscape.

35 On a local level, the selection of each individual field, leading to the current Order Limits, has been guided by principles, underpinned by national and local planning and environmental policy. The following site selection and design aims have been at the centre of the development process:

- Focusing on areas with good irradiance and avoiding topography-rich areas to minimise harm to landscape character;
- Adopting an approach of utilising land abutting existing industrial infrastructure;
- Minimising the use of Best and Most Versatile (BMV) land, avoiding outline Grade 2 agricultural land where possible and practical and avoiding any development on Grade 1 agricultural land;
- Adopting a coherent approach to individual field selection to contain the site and avoid sprawl;
- Avoiding areas with designated heritage assets;
- Avoiding areas with landscape designations;
- Avoiding areas with national and international biodiversity and geodiversity sites;
- Avoiding high-risk flood zones;
- Avoiding abutting large villages and towns to minimise amenity loss;
- Avoiding National Trails;
- Avoiding Public Rights of Way (PRoW) where possible, enhancing PROWs when not;
- Selecting areas near appropriate transport routes; and
- Placing the larger electrical infrastructure in appropriate, well-screened locations.

36 Figures 2.3 and 2.4 show the Site in relation to the key planning and environmental designations. The current Order Limits have been shaped by data available and collected to date and would be further refined following consultation and through project evolution.

2.3 SITE DESCRIPTION

37 The wider area within and surrounding the Order Limits is generally composed of agricultural land, interspersed by occasional woodlands. Villages and hamlets are connected by rural roads and public rights of way.

Smaller fields and tree cover are more common close to the villages and along water courses, with larger and more open fields set further away.

38 The current Order Limits, as shown on Figure 1.1, cover a total area of approximately 2,900 hectares (ha), split across multiple land parcels. The majority of the land within the Order Limits is currently used for arable farming on agricultural land, predominantly classified as Agricultural Land Classification (ALC) grades 3 and 2 (see Section 10.3). Substantial efforts have been made to locate the solar PV infrastructure on the grade 3 land (see Section 2.2).

39 Topographically, the land within the Order Limits is gently undulating and fairly low lying with elevations ranging from approximately 10 metres (m) to 60 m above ordnance datum (AOD). The land is drained via various watercourses and tributaries of the River Trent as well as drainage ditches. Watercourse drainage is generally to the east/south-east towards the River Trent, but does occur to the north or south, dependent on the location within the watershed.

40 During this early stage in the design of the Development, there are a number of settlements in the vicinity of the Order Limits such as Eakring, Maplebeck, Kersall, Knapthorpe, Little Carlton, Bathley, South and North Muskham, Cromwell, Carlton-on-Trent and Ossington.

41 Several Public Rights of Way (PRoWs) and bridleways currently cross the Development at various locations. A list of all the PRoWs within the Order Limits that have been identified to date can be found in Section 10.2 of this Scoping Report. Further information will be collated and presented within the PEIR and ES. Section 10.2 of this report also provides additional information on the locations of the PRoWs and the measures that would be employed to protect these recreational routes.

42 The Order Limits include some public roads, where electrical cabling might cross or run along the road or roadside, and/or where road works, such as temporary or intermittent widening of the road, are required to facilitate construction.

2.4 ITERATIVE DESIGN AND ROCHDALE ENVELOPE

43 The Development design will gradually evolve throughout the EIA process. The design process will be iterative, whereby site-specific constraints and design criteria will be added to the Development layout to guide the location of the solar and electrical infrastructure.

44 The iterative design process will take account of comments made during consultation. The ES will describe how the design of the Development has been influenced by such comments.

45 In order to maintain flexibility in the Development design, it is the Applicant's intention to use the 'Rochdale Envelope' approach within parameter ranges which will be defined in the Project Description chapter of the ES (see also Section 2.5 below). These parameters will be considered in detail by technical authors in the ES to ensure the realistic worst-case effects of the Development are assessed for each potential receptor. This is of particular importance in maintaining flexibility due to the rapid pace of change in solar photovoltaic (PV) and battery storage technology.

2.5 THE DEVELOPMENT

2.5.1 Overview of the Main Development Areas

46 An illustrative layout, that identifies the areas that are being considered for potential solar development, cable routing, substations and energy storage as well as areas for mitigation and enhancement, is shown on Figure 2.2: Indicative Development Areas.

47 The design of the Development, at the time of issuing this Scoping Report, is at an early stage. The general areas within which certain Development activities may take place has been defined, as set out below. These areas are deliberately defined so as to be a worst-case scenario; i.e., they are the maximum extents to which such development is expected. It is highly likely that, during the subsequent design processes that will occur prior to submission of the application, some of these areas will no longer be proposed for the activities as set out here, but will be proposed for activities with lesser adverse, or greater beneficial, environmental effects, relative to that set out here, or potentially removed from the Order Limits altogether (and the Order Limits may be reduced in area as a result).

48 The whole of the area within the current Order Limits is described as being in one, and only one, of the following:

- Solar areas;
- Cable areas; or
- Other areas.

49 In addition, approximate locations for BESS, substations and construction compounds have been identified. These are within either Solar, Cable or Other areas. These areas are referred to as:

- BESS/400 kV compound area;
- Substation areas; and
- Construction compound areas.

50 The main Development activities that may take place in each of the above areas are described in the sections below.

2.5.1.1 Solar Areas

51 Solar Areas may contain the following principal Development components/activities:

- Solar PV panels and mounting structure and poles;
- Inverters;
- Transformers;
- Underground cabling between the above and linking to the nearest intermediate substation (generally lower voltage, up to 33 kilovolts (kV));
- Higher voltage underground cables (circa (c.) 132 kV) linking the intermediate substations to the main grid connection point at the National Grid Staythorpe Substation;
- Access tracks;
- Fencing/gates;
- Security cameras;
- Parking and laydown facilities where required; and

- Planting and vegetation management, and ecological mitigation/enhancement measures.

2.5.1.2 Cable Areas

52 Cable Areas may contain the following principal Development components/activities:

- Higher voltage underground cables linking the intermediate substations to the BESS/400kV substation compound;
- High voltage underground cables linking the BESS/400kV substation compound to the main grid connection point at Staythorpe National Grid Substation;
- Access tracks;
- Archaeological investigations; and
- Planting and vegetation management, and ecological mitigation/enhancement measures.

2.5.1.3 Other Areas

53 Other Areas may contain the following principal Development components/activities:

- Access tracks;
- Fencing/gates;
- Archaeological investigations; and
- Planting and vegetation management, ecological mitigation/enhancement measures.

2.5.1.4 BESS/400 kV Compound Area

54 The BESS/400 kV Compound Area would contain some or all of the following principal Development components/activities:

- Containerised batteries;
- Transformer stations and inverters;
- A substation compound, including electrical infrastructure such as transformers, switchgear, gantries, control rooms and electrical cabling;
- Underground cabling linking the batteries, inverters, transformers and substation;
- Access tracks (likely asphalt) and limited car parking;
- Fencing/gates;
- Sustainable Drainage Systems (SuDS) measures;
- Water tanks (if required);
- Security cameras/lighting;
- Acoustic fencing where necessary; and
- Planting and vegetation management, and ecological mitigation/enhancement measures.

2.5.1.5 Substation Areas

55 Four ‘intermediate’ substations are expected to be required for the Development. Potential locations for these have been identified within the Order limits (note that more than four potential locations have been identified at this stage in the process, but only four actual substations are anticipated; the design would be refined as described above, so that only four are included in the DCO application).

56 The areas identified as being potential locations for substations are generally larger than the actual substations will be. The areas have been drawn larger, at this stage, so that there is flexibility to allow environmental surveys and assessments and consultation responses to inform the location and layout of a substation within a substation area. The principal Development elements that the substations would contain are:

- Fencing/gates;
- Transformers;
- Control rooms with welfare facilities;
- Switchgear;
- Electrical cabling;
- Security cameras/lighting;
- SuDS measures; and
- Access tracks and limited car parking.

57 Land within a "substation area" that is not used for a substation would be used for the underlying purpose (Solar, Cable or Other, as described above).

2.5.1.6 Construction Compound Areas

58 The areas identified as being potential locations for temporary construction compounds are generally larger than the actual construction compounds will be. The actual compounds are likely to be typically 1-2 ha each, in area. The areas have been drawn larger, at this stage, so that there is flexibility to allow environmental surveys and assessments and consultation responses to inform the location and layout of the compound within a compound area. The principal Development elements that the construction compounds would contain are:

- Hardstanding comprising a type 1 or 2 surface;
- Temporary office space with welfare facilities;
- Storage facilities and areas;
- Bunded area for limited oil/fuel/chemical storage;
- Security cameras/lighting; and
- Access tracks and car parking.

59 Construction compounds would be temporary, for the duration of construction works in the area served by a given construction compound, which would be typically six to nine months (see Section 2.5.1). Following this, the compound infrastructure would be removed, and the area restored to its former condition. Land within a "construction compound area" that is not used for a construction compound or following completion of its use as a construction compound, would be used for the underlying Development purpose (solar, cable or other, as described above).

2.5.2 Buffer Zones from Woodland, *etc*.

60 The Order Limits principally comprise agricultural (largely arable) fields, but also include some roads, small areas of woodland, and substantial field boundaries. Field boundaries are typically hedgerows, sometimes with trees, and they can also be watercourses or ditches. These are recognised as having much higher environmental value than the arable farmland itself. Although the Order Limits include these non-arable features, the design will,

as far as practicable, avoid affecting them. Typically, this means leaving at least the following buffer distances between ground works and features:

- Ancient woodland: 15 m;
- Woodland: 15 m;
- Hedgerows: 5 m; and
- Watercourses: 10 m.

61 There will need to be electrical connectivity (cables) around the site, typically connecting one field of solar PV modules to another, as well as through the cable areas. Access for vehicles may also be required from one field to the next. The design process will seek to utilise existing gaps in field boundaries, to minimise effects on these features. Where this isn't available, options are horizontal directional drilling underneath the feature (for cables only) or cutting a limited extent of it to create a route through it. Where this is necessary, suitable mitigation for lost hedgerow and potential ecological effects will be sought.

62 In general, this approach will avoid almost all effects on these features and their ecology.

2.5.3 Project Components, Activities and Design Parameters

63 Solar PV technology is rapidly evolving. In order to maintain flexibility, allowing the latest technology to be utilised at the time of construction, the parameters describing the maximum, or worst-case (for the purposes of environmental assessment), extents or designs of the proposed infrastructure will need to remain flexible throughout the evolution of the Development.

64 The following subsections outline the likely design parameters for each of the principal Development components/activities.

65 The principal components of a solar and BESS development are described below.

2.5.3.1 Solar PV Modules

66 Solar PV modules convert radiation from the sun into electrical energy, which is output as direct current (DC). Individual modules are typically approximately 2 m long and 1 m wide and mounted on a metal frame, such that they are likely to have a maximum height of 4 m. They typically consist of a series of crystalline cells which make up each panel (typically 60 or 72 cells per panel), whilst the module frame is typically built from anodised aluminium.

67 Each module could have a DC generating capacity of approximately 600 Watts or more depending on advances in technology. The number of modules required at the Development will be highly dependent upon the outcome of the iterative layout design process.

68 The modules are fixed to a mounting structure in rows. The Development proposes to utilise one of two designs:

- Fixed modules oriented towards the south, as is commonly seen at existing UK solar parks. The modules would typically be angled at 20 to 30 degrees up from the horizontal; or
- Tracker modules that track the movement of the sun as it passes overhead. Single-axis trackers are under consideration, with the single axis running north-south, and the modules facing east, straight up or west, depending on the time of day. The modules would typically be angled up to 45 degrees from the horizontal, to face towards the sun as far as possible.

69 The number of modules which would make up each row will vary from field to field depending on the field dimensions.

2.5.3.2 Module Mounting Structures

70 Each row of modules would be mounted on a rack supported by galvanised steel poles driven into the ground. Various foundation solutions are available, however, driving poles into the ground is currently the most likely method. Between each row of panels there would be a separation distance of approximately 3 to 8 m to facilitate construction and maintenance and reduce loss of energy by shading of one row by another row.

71 The modules will be mounted such that they have a clearance above ground level (agl) of typically 0.8 to 1 m and will have an upper height of up to 4 m above ground level (agl). These dimensions are indicative at this stage as the final elevations of the strings will be influenced by various design factors such as detailed flood risk modelling and local topography.

2.5.3.3 Inverters

72 Inverters are required to convert the DC electricity collected by the PV modules into alternating current (AC) which allows the electricity generated to be exported to the remote end substations and then the National Grid. Typically, one inverter would serve a number of modules, though this number depends on the type of inverter used.

73 The Applicant is currently considering the use of either central or string inverters. String inverters are small enough to be mounted on the underside of the modules and are therefore of lower visual effect and are not shown on layout plans (they are c. 1.1 m in length with a width of c. 0.4 m and height of c. 0.9 m). One string inverter is generally located for approximately every 200 to 800 PV modules depending on the size of the PV modules and the size of the inverter. Central inverters are larger, stand-alone units (c. 6 m in length with a width of c. 2.5 m and height of c. 3 m). They would be sited at regular intervals amongst the PV modules, but there would be fewer of them.

2.5.3.4 Transformers

74 Transformers are required to modify the voltage of the electricity generated by the inverters so that it is suitable for cabling to one of the four intermediate substations. Transformer cabins are therefore likely to be located across the Development area at regular intervals.

75 Typical, approximate dimensions of the transformer cabins are 3 m by 7 m by 4 m. Transformer cabins are typically externally finished in keeping with the prevailing surrounding environment, often utilising a green painted finish.

2.5.3.5 *Onsite Cabling*

76 Low voltage electrical cabling would be required to connect the PV modules to inverters and the inverters to the transformers. Higher rated cables (33 kiloVolts (kV)) are then required between the transformers to the intermediate substations. 132 kV cables would then be required to export the electricity between the intermediate substations and the main Development substation at the BESS area. Two alternative options are then proposed to connect the 400 kV cable to the National Grid Staythorpe Substation. The first option would be to connect via the substation associated with a proposed grid support BESS on land immediately to the west of the National Grid site. This grid support BESS was the subject of a planning application (ref: 22/01840/FULM) which was refused but is expected to be the subject of an appeal.

77 The second option is for the 400 kV cable to connect directly to the National Grid Staythorpe Substation.

78 The need for these alternative options results from the current uncertainty associated with the grid support BESS. If this were to secure planning permission and proceed, then connecting via its substation allows for a shared connection, which is efficient and cost effective. If it does not proceed, then there would be no shared connection and the 400 kV cable would run directly to the same connection point at the Staythorpe National Grid Substation. It is proposed that both of these options are assessed within the ES to allow for this flexibility.

79 Cabling between PV modules and the string inverters (if used) would be above ground level, fixed to the mounting structures. Cabling between PV modules and central inverters (if used) would be underground. All other cables would be underground.

80 In general, existing above-ground power lines would not be altered as part of the Development. During detailed design, a suitable buffer will be placed between power lines and any Development infrastructure, with the distance dependent on the voltage of powerlines. It is however possible that some existing above-ground wooden-pole lines (11 or 33 kV) that cross solar areas may be re-routed around the edges of fields and underground, to maximise solar electricity generation from the field and reduce visual effects from existing overhead lines.

81 Data cables would also be installed as part of the infrastructure, typically alongside electrical cables, in order to allow for the monitoring of the Development during operation, *e.g.,* such as the collection of solar data from pyranometers.

2.5.3.6 *Fencing and Security Measures*

82 A fence would enclose the operational areas of the Development. The fences are likely to be a ‘deer fence’ design of approximately 1.8 to 2.5 m in height. The fence would require access for maintenance, from both the inside and outside, so would have a gap of at least 3 m between it and surrounding features (including ditches, hedges and solar PV modules).

83 Pole mounted internal facing closed circuit television (CCTV) systems are also likely to be deployed around the perimeter of the operational areas of the Development. These would not cover publicly accessible areas.

84 It is likely that movement-triggered lighting and passive infra-red sensors would be deployed for security purposes around the areas containing electrical infrastructure and potentially at any other pieces of critical infrastructure and construction compounds. No areas of the Development are proposed to be continuously lit.

2.5.3.7 Access Routes, Points and Tracks

85 Access points and access routes to the Development are still under review at this early stage in the Development design.

86 The routes to access the Development are likely to be taken from the A1, A616 or A617 and then follow minor roads to the locations of the temporary construction compounds. Figure 11.1 shows the preliminary access routes and access points that have been identified at this early stage, although these routes and access points may be subject to change as the design progresses and is further refined.

87 Due to the layout of the Development and the fact that it is divided by several public roads, several access points will be required. Wherever viable, existing access points would be utilised. Current understanding of the proposed access routes and access locations to the Development is discussed in Section 11 (Traffic and Access).

88 Where appropriate, any unsurfaced access tracks that run through the Development would be utilised in preference to the installation of new access tracks, to minimise land disturbance and environmental effects. Further transport and access information will be provided within the PEIR and ES as the design progresses.

89 Access to the majority of the PV strings during operation would likely be via grassed tracks. The intermediate substations would require accesses to be constructed of tarmac. Access to construction compounds would likely be made of compacted stone that can readily be taken up and the land reinstated following completion of their use.

2.5.3.8 Intermediate Substations and Control Buildings

90 The Development would include four intermediate substations across the Development. The approximate potential locations of these substations as well as alternative locations are shown on Figure 2.2. Each intermediate substation would consist of electrical infrastructure such as transformers, switchgear and metering equipment required to facilitate the export of electricity from the Development to the main Development substation. Each of the intermediate substations is also expected to include a control building which would include office space and welfare facilities as well as operational monitoring and maintenance equipment. The intermediate substation areas are also expected to include a compound to facilitate maintenance of the Development during its operational phase. The intermediate substation compounds could cover an area of up to 215 m x 155 m, and the control buildings approximately 20 x 20 x 6 m but these dimensions are highly dependent on the findings of further work. The maximum height of the

transformer components would be 12 m. Further detail on these will be provided in the PEIR and ES documents.

2.5.3.9 BESS

91 The Order Limits also include land (see Section 2.5.1.4: BESS/400 kV Compound Areas) proposed to site the Battery Energy Storage System (BESS). This would enable the solar-generated electricity to either:

- Be exported directly to the national grid at times of high demand; or to
- Be stored within the BESS for later export to the national grid electricity transmission network, as required.

92 An outline Battery Safety Management Plan (oBSMP) will be developed in consultation with the local fire and rescue service to ensure that risks associated with potential fire are minimised.

2.5.3.10 Electricity Export Connection to National Grid

93 The BESS/400 kV Compound Areas would include electrical infrastructure to transform the voltage up to 400 kV, suitable for export to the national grid.

94 All of the intermediate substations would be connected to these areas, which would convert the electricity from 132 kV to 400 kV with the use of transformers, switchgear and metering equipment. From there, electricity would be exported to the existing National Grid Staythorpe Substation. This would form the point of electrical connection between the Development and the national grid electricity transmission network. More detail on this is provided in Section 2.5.3.5 (Onsite Cabling).

2.5.4 Landscape and Biodiversity Management

95 An outline Landscape and Biodiversity Management Plan (oLBMP) will be developed and included in the ES. Changes to vegetation may be proposed to enhance the landscape and/or biodiversity, and/or as mitigation for visual effects and potential effects on protected or sensitive species. The oLBMP will describe proposed changes to vegetation, such as where new planting or habitat is proposed, and how those changes will be implemented and overseen, to ensure their successful establishment.

2.6 CONSTRUCTION

2.6.1 Construction Programme and Phasing

96 Subject to grant of the DCO, construction is currently anticipated to commence in 2027. The total duration of the construction phase is currently anticipated to be 24 months. although this will be dependent on the final design and the findings of the access and traffic assessment. It is currently anticipated that the Development would be built in four phases, with each phase being approximately a quarter of the Development and taking 6-12 months. The phases closest to the grid connection point (the National Grid Staythorpe Substation) would be constructed first. Construction is currently anticipated to start on the first two phases in 2027, and the second two phases in late 2027. An outline construction programme, including proposed phasing, will be provided in the PEIR and ES.

2.6.2 Construction Activities

97 The types of construction activities that may be required include (not necessarily in order):

98 Land preparation:

- Import of construction materials, plant and equipment to the construction compound locations;
- The establishment of construction compounds;
- Upgrading of existing site access points and construction of new access points;
- The upgrade or construction of crossing points (bridges / culverts) over drainage ditches as appropriate; and
- Marking out the location of the Development infrastructure.

99 Construction:

- Import of components to the construction compounds;
- Erection of module mounting structures;
- Mounting of modules;
- Installation of electric cabling;
- Installation of inverters and transformer cabins; and
- Construction of intermediate substations;
- Digging of trenches, installation of ducting and electrical cables, reinstatement of the ground over the cables;
- Horizontal directional drilling (HDD), installation of ducting and pulling-through of cables underneath roads, ditches, watercourses and other obstacles as required;
- Testing and commissioning; and
- Ground reinstatement, habitat creation and installation of any other proposed mitigation or enhancement measures.

2.6.3 Construction Environmental Management

100 An outline Construction Environmental Management Plan (oCEMP) will be developed to prescribe management and construction activity control measures designed to ensure normal construction good practice is followed and substantially limit the potential for adverse effects on the environment. Many of these practices are, effectively, mandatory on large construction sites, and development in their absence is inconceivable. As a result, they will be treated as embedded mitigation, and potential effects will be assessed on the basis that these measures are implemented.

2.6.4 Construction Traffic Management

101 An outline Construction Traffic Management Plan (oCTMP) will be developed to guide the delivery of materials and staff onto the Development Site during the construction phase. The oCTMP will be available for comment as part of the consultation process to ensure that the comments of local residents and stakeholders are taken into account.

2.6.5 Temporary Construction Compounds

102 During the construction phase, approximately 22 temporary construction compound(s) would be required facilitate construction of all parts of the Development.

103 Each of the temporary construction compounds would likely be established close to one of the access points (see Chapter 11: Traffic and Access).

2.6.6 Temporary Roadways

104 Depending on conditions during construction, temporary roadways (e.g., plastic matting/geo-grid) may be utilised to access parts of the Development, where ground conditions require.

2.6.7 Site Reinstatement and Habitat Creation

105 Following construction, a programme of Site reinstatement and habitat creation would commence. The oLBMP will set out the proposals for how the land will be managed throughout the operational phase, following the completion of construction.

106 In areas around the solar arrays and on other parts of the Development, opportunities for landscaping, biodiversity enhancements and habitat management will be explored. These will be outlined in the oLBMP.

2.7 OPERATION

107 The operational life of the Development is expected to be 40 years. The 40 years would start when full operation (maximum electrical export) is first achieved. This would be limited to a maximum of three years (36 months) from when electricity is first exported from the Development. This allows for phasing of commissioning, whilst also limiting the duration of the phasing. As such, many of the effects of the operational phase, such as visual effects, will be temporary and reversible upon decommissioning.

108 During the operational phase of the Development, day to day activity would be minimal, being principally: vegetation management; equipment maintenance and servicing; replacement of any sufficiently degraded or failed components; and monitoring to ensure the continued effective operation of the Development.

2.8 DECOMMISSIONING

109 At the end of the operational phase, the Development would be decommissioned. It is anticipated that all PV modules, mounting poles, cabling, inverters and transformers would be removed from the Development Site and recycled or disposed of in accordance with good practice and market conditions at that time. The future of the substations (main and intermediate) and the control buildings would be agreed with the Local Planning Authority (LPA) prior to the commencement of decommissioning. A Decommissioning Plan, to include timescales and transportation methods, would be agreed in advance with the LPA.

110 Decommissioning is expected to take between 18 and 24 months.

111 The effects of decommissioning are often similar to, or of a lesser magnitude than, construction effects. There can be a high degree of uncertainty

regarding decommissioning as the engineering approaches and technologies are likely to evolve over the operational life of the Development. It is proposed that, in the EIA, the effects of the decommissioning phase are assumed to be the same as the assessed construction-phase effects, as a worst-case approach. Therefore, the effects of the decommissioning phase will not be assessed separately.

3 THE PLANNING FRAMEWORK

112 Planning policy is relevant to the decision-making process, however, it is not relevant to the identification and assessment of likely significant effects, as is the subject of this Scoping Report. Assessments proposed in this Scoping Report will, in identifying receptors of potential effects, be cognisant of protections and local designations identified in relevant local government documents.

113 The PEIR and ES will each include a chapter setting out the legislative and planning framework in relation to the application for the DCO for the Development.

4 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

4.1 EIA PROCESS AND METHODOLOGY

114 Each of the technical assessments within the EIA will follow a systematic approach, with the principal steps being:

- Description of baseline conditions;
- Prediction of potentially significant effects including cumulative effects (to include all likely significant effects);
- Assessment of potentially significant effects, to include all likely significant effects;
- Identification of appropriate mitigation measures, including design changes; and
- Assessment of residual (likely) effects.

115 The EIA assessment will be based on a number of related activities, as follows:

- Consultation with statutory and non-statutory consultees throughout the pre-application process;
- Consideration of relevant local, regional and national planning policies, guidelines and legislation relevant to EIA;
- Consideration of technical standards for the development of significance criteria;
- Review of secondary information, previous environmental studies and publicly available information and databases;
- Physical surveys and monitoring;
- Desk-top studies;
- Computer modelling;
- Reference to current legislation and guidance; and
- Expert opinion.

4.1.1 Baseline Description

116 In order to evaluate the likely environmental effects (and therefore ensure that the likely significant effects are identified and assessed, as required by the EIA Regulations), information relating to the existing environmental conditions will be collected through field and desktop research, including consultation. These are known as the baseline conditions. The baseline also extends into the future (the future baseline), although predictions of this can involve potentially large uncertainties. As a result, in most cases, the future baseline is assumed to remain unchanged throughout the operation of the Development. Where this is not the case, this will be stated within the ES technical chapter.

117 The baseline will be used to identify and assess the sensitivity of receptors on and near to the Development, what changes may take place during the construction, operation and decommissioning of the Development and the effects, if any, that these changes may have on these receptors.

118 Within each technical assessment, the methods of data collection will be discussed with the relevant consultees. Data will also be collected from public records and other archive sources and where appropriate, field surveys will be carried out (in some cases these surveys have already begun). The seasonal timing of the work (if appropriate) and the study areas proposed are outlined within each assessment section of this Scoping Report.

4.1.2 Prediction of Likely Effects

119 The prediction of likely effects, including all likely significant effects, covers the three phases of the Development: construction (including pre-construction), operation and decommissioning. During each phase different environmental effects are likely to arise. Each technical assessment of the EIA will cover (as appropriate):

- Direct and indirect effects;
- Short-, medium- and long-term effects;
- Permanent and reversible effects;
- Likelihood of an effect occurring (i.e., very likely, likely, or unlikely); and
- Cumulative effects.

120 Following identification of likely environmental effects, changes to baseline conditions will be predicted, allowing an assessment of the environmental effects of these changes and the identification and assessment of the likely significant effects.

4.1.3 Assessment of Likely Effects

121 The likely effect that the Development may have on each environmental receptor would be influenced by a combination of the sensitivity or importance of the receptor and the predicted magnitude of change from the baseline conditions (either beneficial or adverse).

122 The magnitude of change from the baseline state is defined as high, medium, low, negligible or no change and can be beneficial or adverse. The definition of magnitude varies by technical discipline as described in the technical sections of this Scoping Report.

123 Environmental sensitivity (or importance) may be categorised by a multitude of factors, for example: threat to rare or endangered species; transformation of natural landscapes; or changes to soil quality and land-use. The initial assessment, consultation and scoping phases identify these factors along with the implications of the predicted changes. Unless stated otherwise in each technical chapter, the sensitivity or importance of each identified receptor is defined as high, medium, low or negligible.

124 The overall significance of an environmental effect is determined by the interaction of the above two factors (i.e., sensitivity/importance and predicted magnitude of change from the baseline). In order to evaluate the likely environmental effects, the assessment criteria used are identified and justified within each technical chapter in line with the definitions described above, unless otherwise stated (*e.g.*, the definition of what constitutes a receptor of 'high' sensitivity).

125 Table 4.1 summarises, in the form of a matrix, the generic format by which the significance of a likely effect is determined within each technical chapter. Effects that would be **'significant'** in terms of the EIA Regulations are shaded in Table 4.1 and highlighted in bold.

Table 4.1: Generic matrix for determining the significance of likely effects

Sensitivity of receptor	Magnitude of change			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor	Minor	**Moderate**
Medium	Negligible	Minor	**Moderate**	**Major**
High	Negligible	**Moderate**	**Major**	**Major**

126 For the purposes of EIA, the significance of an effect is generally assessed as being either:

- Negligible – no detectable or material change to a location, environment or species;
- Minor – a detectable but non-material change to a location, environment or species;
- Moderate – a material, but non-fundamental change to a location, environment or species; or
- Major – a fundamental change to a location, environment or species.

127 Given this methodology, it follows that, regardless of a receptor's importance or sensitivity, there can be no significant effect when the magnitude of change is negligible. Similarly, there can be no significant effect where the importance or sensitivity of the receptor is negligible, regardless of the magnitude of change.

128 Some assessments may deviate from this methodology set out above, and where this is the case, the detailed methodology will be stated within the relevant section of this Scoping Report or within the Preliminary

Environmental Information Report (PEIR). It is also important that professional judgement can be applied in concluding on the significance of effects, to allow for receptors and effects which fall between definitions of magnitude and sensitivity, or do not fit well into a rigid matrix-based approach.

4.1.4 Mitigation

129 Where applicable, each technical chapter will propose measures to avoid, prevent, reduce and/or offset any likely significant adverse effects that are identified. These are termed mitigation measures. Such measures may include the consideration of alternatives; physical design evolution such as movement or reduction in scale; and operational and/or management measures.

130 This strategy of avoidance, prevention, reduction and offsetting is a hierarchical one which seeks:

- First to avoid likely effects;
- Then to reduce those which remain; and
- Lastly, where no other measures are possible, to propose compensatory measures to offset the predicted effect.

131 Mitigation will be secured through DCO requirements or other means, and the mitigation and its means of being secured will be documented in a Mitigation Schedule that will be submitted as part of the DCO application.

4.1.4.1 Embedded Mitigation

132 Where possible, mitigation measures will be embedded into the overall design rather than “added on” to the Development proposals. By being flexible with the design, the project design will respond to the findings of consultation and EIA work, and mitigate accordingly, as the Development design progresses.

133 Embedded mitigation measures include features that are a clear part of the Development proposals. Generally, these are features that are shown on layout plans of the Development, but they can also include management and control documents where it is not reasonably conceivable that such a development could proceed without them, such as a Construction Environmental Management Plan (CEMP). Where such documentation is treated as embedded mitigation, this will be made clear in the PEIR and ES, and the outline document will be included in the PEIR and ES, typically as an appendix to the Project Description chapter. A list of proposed documents of this type is included in Section 16.

4.1.5 Residual Effects

134 The assessment process will conclude with an examination of residual effects after mitigation has been applied, *i.e.*, the overall predicted (likely) effects of the Development.

4.1.6 Cumulative Effect Assessment and Interrelationships

135 In accordance with the EIA Regulations, the Environmental Statement (ES) will also identify and assess 'cumulative effects', where these have the potential to be significant. By definition, these are effects that result from

incremental changes caused by past, present or reasonably foreseeable future actions together with the Development. For the cumulative assessment, two types of effect will be considered:

- The combined effect of individual effects, for example noise, airborne dust or traffic on a single receptor; and
- The combined effects of several developments that may on an individual basis be insignificant but, cumulatively, have a significant effect on a receptor, such as landscape and visual effects of many solar developments.

136 The former will be included in a separate ES chapter: Interrelationships.

137 The latter will be dealt with within each technical chapter and the intended scope of each cumulative assessment is set out in the relevant technical sections of this Scoping Report.

138 As a general rule the cumulative assessment will follow the methods and guidance provided in PINS Advice Note Seventeen[2]. In relation to the Development, it is suggested that DCO applications will be identified within a 10 km radius of the Order Limits, EIA projects within a 5 km radius and major planning applications within a 2-3 km radius. All other developments/ planning applications that lie within 100 m of the Order Limits will also be considered.

139 Unless otherwise agreed with statutory consultees, developments whose applications for consent have not yet been submitted at the time of finalising the ES are unlikely to be included in the cumulative assessments given the large degree of uncertainty over the likelihood of an application being submitted and its final design.

140 The range of potential cumulative effects will be defined in the technical chapters of the ES and will cover a study area within which receptors could potentially be subject to cumulative effects for that technical discipline (only). Usually this is no more than twice the range of assessment for the Development in isolation alone.

141 It is proposed that there will be a cut-off deadline for the collation of cumulative development information to be included within the ES. It is proposed that this will be three months prior to the submission of the DCO application.

4.2 SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

142 Schedule 4, Paragraph 2 of the EIA Regulations sets out the information for inclusion in the ES as follows:

143 ‘A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.’

[2] Planning Inspectorate (2019). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ [accessed on 24/07/2023].

144 The ES will therefore include a detailed section presenting the reasonable alternatives considered by the Applicant in respect of the location of the Development, its scale and design and the implications of a “do nothing” scenario.

145 The approach to site selection and the evolution of the design of the Development to date is summarised in Section 2.2 of this Scoping Report.

4.3 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

146 The proposed structure for the ES (and PEIR) is set out in Table 4.2.

Table 4.2: Proposed Structure of the Environmental Statement

Volume	Chapter	Title
1		Non-Technical Summary
2	1	Introduction
	2	Environmental Impact Assessment
	3	Consultation
	4	Site Selection, Development Design and Consideration of Alternatives
	5	Development Description
	6	Legislative and Planning Policy Context
	7	Landscape and Visual Impact Assessment
	8	Ecology, Ornithology and Biodiversity
	9	Hydrology, Hydrogeology, Flood Risk and Ground Conditions
	10	Cultural Heritage and Archaeology
	11	Noise
	12	Socio-Economics, Tourism, Recreation and Land-use
	13	Traffic and Access
	14	Climate Change
	15	Miscellaneous Issues, including Air Quality, Glint and Glare, Human Health, Utilities and Infrastructure; and Waste
	16	Interrelationships
3		Supporting Figures and Drawings
4		Technical Appendices (e.g., baseline survey reports)

5 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

5.1 INTRODUCTION

147 This chapter of the Scoping Report relates to the potential effects of the Development on landscape and visual receptors. This assessment will be undertaken by Abseline Ltd.

148 This chapter includes the following elements:

- Commentary on consultation to date;
- Preliminary baseline conditions;
- Likely environmental effects;
- Assessment methodology; and
- Matters and aspects scoped out.

5.2 CONSULTATION TO DATE

149 Consultation for this Scoping Report in relation to landscape and visual effects has not yet been undertaken.

5.3 PRELIMINARY BASELINE CONDITIONS

5.3.1 Proposed Landscape Study Area

150 For the Scoping and PEIR stages, a landscape study area of 5 km from the proposed Solar Areas as shown by Figures 5.1 and 5.2 is proposed. If, after considering the PEIR, consultees are content to agree that receptors beyond a reduced study area (likely to be 2-3 km) do not require further consideration, a reduced study area may be agreed for the Environmental Statement (ES).

151 Study areas of 2-3 km are usually adequate to identify all potentially significant landscape and visual effects for solar farms unless there are elevated areas with panoramic views and/or nationally designated landscapes with potential visibility just beyond that distance. However, this is an extensive site and the PEIR stage for this application provides the opportunity for wider effects to be initially considered before the final scope for the ES is agreed.

5.3.2 Preliminary Baseline Conditions

152 As illustrated by Figures 5.1 to 5.4, the Development Site (as defined by the Order Limits), would be located to the west of the A1, north of the A617, east of Eakring, and south of Egmanton, occupying two main areas to the north and north-west of Staythorpe.

153 The Order Limits lie to the west of the broad vale of the River Trent, in a gently undulating landscape of mixed, but predominantly arable, farming and occasional woodlands. Villages and hamlets are connected by rural roads and public rights of way. Smaller fields and tree cover are more common close to the villages and along water courses, with larger and more open fields set further away. Roadside hedges and trees are common and tend to constrain views for drivers along many of the routes, but there are also more open vistas available where roadside vegetation is absent, sparse or cut low.

154 There are no National Parks or Areas of Outstanding Natural Beauty nearby; the nearest is located more than 30 km from the Order Limits. Local landscape designations within 5 km of the proposal Solar Areas include Sherwood Forest Regional Park, which the Order Limits lie partly within. Two landscapes within 5 km are also identified as being of heritage value; Rufford Abbey Registered Historic Park and Garden located to the 1.7 km to the west of the Order Limits, and the locally designated Historic Landscape around Laxton approximately 350 m to the north. Rufford Abbey is also a key visitor destination.

155 The Order Limits lie within National Character Area (NCA) 48 Trent and Belvoir Vales as identified by Natural England[3]. NCA 49 Sherwood lies approximately 2 km to the west of the Order Limits.

[3] Natural England (2013). National Character Area Profiles – NCA48. Available at: https://publications.naturalengland.org.uk/publication/7030006?category=587130

156 The relevant local landscape character study for the area including the Order Limits and most of the landscape within 5 km is the Newark and Sherwood Landscape Character Assessment [4]. This identifies Regional Landscape Character Areas (RLCAs) which are further subdivided into landscape types for which characteristics are described, and policy zones which further divide those landscape types. The Order Limits are located within the Trent Washlands and Mid-Nottinghamshire Farmlands RLCAs.

157 Areas within Bassetlaw District and a very small part of North Kesteven are also located within 5 km of the Order Limits. These are covered by the Bassetlaw Landscape Character Assessment [5] and the North Kesteven Landscape Character Assessment [6].

158 Visual receptors within 5 km of the Order Limits include local residents, people using local roads and main routes including the A1 and railway lines; tourists visiting the area, and those using footpaths, open access areas and parks for recreation.

159 The Zone of Theoretical Visibility (ZTV) studies shown on Figures 5.1 to 5.4 and a site visit have informed the proposed viewpoint locations set out in Table 5.1.

5.4 LIKELY ENVIRONMENTAL EFFECTS

160 The key issues for the assessment of potential landscape and visual effects relating to the Development are likely to be:

- Temporary effects arising from the construction and decommissioning phases such as the landscape within the Order Limits taking on the character of a construction site, changes to the landscape fabric within the Order Limits and views of construction activity and vehicles within and travelling to the Order Limits;
- Temporary effects on landscape fabric until the regrowth of vegetation following the installation of underground cables;
- Long term effects arising from the change of the landscape within the Order Limits from farmland to solar farm, and the resulting changes to landscape character and views towards the Development during the operational phase; and
- Permanent changes arising from vegetation removal and new planting within the Order Limits.

[4] NSDC (2013). Newark and Sherwood Landscape Character Assessment. Available at: https://www.newark-sherwooddc.gov.uk/media/newark-and-sherwood/images-and-files/planning-policy/pdfs/adopted-lca/1.-Introduction-etc---WEB-VERSION.pdf

[5] Bassetlaw District Council (2009). Landscape Character Assessment – Bassetlaw, Nottinghamshire. Available at: https://www.bassetlaw.gov.uk/planning-and-building/planning-services/planning-policy/core-strategy-and-development-policies/core-strategy-adopted-development-plan/background-studies/landscape-character-assessment-lca/

[6] North Kesteven District Council (2007). North Kesteven Landscape Character Assessment. Available at: https://www.n-kesteven.gov.uk/planning-building/planning/planning-applications/landscape-character-assessment

5.5 ASSESSMENT METHODOLOGY

5.5.1 Scope of Assessment

161 The Landscape and Visual Impact Assessment (LVIA) will consider effects on landscape fabric, landscape character, visual receptors and designated landscapes.

162 All landscape and visual receptors within the proposed study area (see Section 5.3.1 above) will be considered within the assessment.

5.5.2 Relevant Guidance, Legislation and Information

163 The following guidance, legislation and information sources will be considered when carrying out the LVIA:

- Guidelines for Landscape and Visual Impact Assessment (2013)[7];
- Technical Guidance Note (TGN) 02/21 Assessing landscape value outside national designations[8];
- An Approach to Landscape Sensitivity Assessment (2019)[9];
- Technical Guidance Note 06/19: Visual Representation of Development Proposals[10]; and
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects[11].

5.5.3 Baseline Survey Methodology

164 Baseline information will be gathered via site visits and desk study of relevant documents, including local development plans and the landscape character studies identified in Section 5.3 above. No landscape sensitivity or capacity study relating to solar development within Newark and Sherwood District has been identified during our initial document review.

165 The Newark and Sherwood Landscape Character Assessment will be used as the primary reference to identify landscape character receptors. The regional character areas are large scale and the descriptions do not identify key characteristics which could form the basis for considering the degree of change. Key characteristics are described for both the landscape character types and policy zones. Given the scale of the Development and the number of policy zones included within the proposed study area (see Section 5.3.1 above) it is proposed to treat the landscape character types as the receptors and assess effects on those, referencing the detail of the policy zones both in describing the geographic extent of effects and where they provide additional relevant local detail; including them to inform mitigation design.

[7] Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment: Third Edition
[8] Landscape Institute (2021). Technical Guidance Note 02/21 Assessing landscape value outside national designations.
[9] Natural England (2019). An Approach to Landscape Sensitivity Assessment. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817928/landscape-sensitivity-assessment-2019.pdf
[10] Landscape Institute (2019). TGN 06/19 Visual Representation of development Proposals.
[11] PINS (2019). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/

166 Effects will also be considered for NCAs where significant effects are identified on the local landscape character receptors that lie within them.

167 The Newark and Sherwood Regional Park will be treated as a landscape designation receptor. Heritage related designations (the Historic Landscape around Laxton and Rufford Abbey Garden and Designed Landscape) will be primarily considered within the assessment of heritage effects and will not be considered as landscape receptors. Their presence (and that of Conservation Areas) will be taken into account when considering indicators of landscape value.

168 Visual receptors will be identified based on identifying groups of people based on location. For example, residents of a village and the users of footpaths and local roads immediately radiating from it will be treated as one visual receptor group rather than several. Users of key long-distance routes, *e.g.,* the A1, will also be included as visual receptors.

5.5.4 Methodology for the Assessment of Effects

169 The significance of the potential effects of the Development will be classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

5.5.4.1 Sensitivity of Receptors

170 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Order Limits or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance identified at Section 5.5.2 above and professional judgement. The sensitivity of each receptor will be based on consideration of the value (of the landscape or views) and its susceptibility to the changes which may arise as a result of the Development.

5.5.4.2 Magnitude of Effect

171 The magnitude of potential effects will be identified through consideration of the Development; the scale, extent and duration of change to baseline conditions predicted as a result of the Development, and best practice guidance identified at Section 5.5.2 above.

5.5.4.3 Significance of Effect

172 The sensitivity of the receptor and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects.

5.5.4.4 Proposed Viewpoints

173 Representative viewpoints will be used to inform the assessment of effects upon landscape and visual receptors. The proposed locations for these are shown on Figures 5.1 to 5.4 and listed in Table 5.1.

Table 5.1 Proposed Viewpoint Locations

VP	Location
1	Robin Hood Way near Eakring
2	Eakring
3	Robin Hood Way near Orchard Wood Farm
4	Panoramic Viewpoint near Maplebeck
5	Maplebeck
6	Kersall
7	A616, Kersall Lodge
8	Footpath at Kneesall
9	Minor road, Eakring to Kneesall
10	Footpath near Eakring
11	Mill Field
12	Laxton
13	Moorhouse
14	B1164, Weston
15	A1 layby, south of Weston
16	B1164, Sutton on Trent
17	B1164 (A1 bridge), Carlton-on-Trent
18	Carlton Ferry Lane
19	Cromwell
20	Trent Valley Way, Slough Dyke
21	Vicarage Lane (A1 bridge), North Muskham
22	B6325, South Muskham
23	A616, Little Carlton
24	A616, northwest of Newark-on-Trent
25	Kelham
26	Bridleway north of Caunton
27	Micklebarrow Hill
28	Bridleway near Upton
29	Hockerton
30	Knapthorpe
31	Caunton
32	Norwell Woodhouse
33	Road west of Ossington

VP	Location
34	Minor road near Park Lidget
35	Norwell
36	Bathley
37	Footpath at Hunger Barn
38	Footpath at Kelham Hills
39	Wellow Park
40	A6075
41	Girton
42	South Scarle
43	Upton
44	Pingley Bridge
45	A617 near Averham

174 For the PEIR, annotated photopanels will be provided to illustrate the expected location and extent of the Development structures in views. Photomontages and photowires will be provided with the ES. The selection of viewpoints for each type of visualisation in the ES will be agreed through further consultation following the issue of the PEIR.

5.6 ASSESSMENT OF CUMULATIVE EFFECTS

175 The proposed scope of cumulative assessment is set out within Chapter 4. The cumulative study area for landscape and visual receptors will extend to 10 km from the Order Limits.

176 Existing developments will be considered as part of the baseline, and consented development as part of the future baseline. Thus, cumulative effects with these will be considered in the main body of the assessment. The inclusion or not, of potential future changes (applications, proposals in scoping, allocations) will be guided by Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

177 Effects with relevant proposed developments (or other changes) will be considered in a scenario-based cumulative assessment so that the effects of different combinations are described and considered.

5.7 ASSESSMENT OF EFFECTS ON RESIDENTIAL VISUAL AMENITY

178 In addition to the landscape and visual impact assessment, a separate assessment of effects on Residential Visual Amenity will be provided, based on the guidance set out in TGN 02/19 Residential Visual Amenity Assessment[12].

179 A study area of 100 m from the Solar Areas and other above ground elements (substations, Battery Energy Storage System (BESS)) is proposed for the inclusion of residential properties within the Residential Visual

[12] Landscape Institute (2019). Residential Visual Amenity Assessment (RVAA).

Amenity Assessment (RVAA). This is anticipated to require the consideration of approximately 50 residential properties. Cumulative effects on properties within this area will also be considered if there are other developments of sufficient scale and/or proximity to warrant such consideration.

5.8 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

Table 5.2: Matters to be Scoped Out of the Assessment

Effects	Justification
All effects on landscape and visual receptors beyond 5 km from the proposed Solar Areas	Study areas of 2-3 km are usually adequate to identify all potentially significant landscape and visual effects for solar farms unless there are elevated areas with panoramic views and/or nationally designated landscapes with potential visibility just beyond that distance.
Residential visual amenity of properties beyond 100 m from Solar Areas and other above ground elements of the proposals (e.g., Battery Energy Storage System and substations)	Given the limited height of solar developments, they are unlikely to be overbearing due to their height even at very close proximity. The primary consideration is whether a property may feel surrounded given the extent of the panels and a distance of 50 m is typically used in the assessment of solar farms. Taking account of the dispersed nature of the Development a distance of 100 m is proposed on a precautionary basis.

6 ECOLOGY, ORNITHOLOGY AND BIODIVERSITY

6.1 INTRODUCTION

180 This chapter of the Scoping Report relates to the potential effects of the Development on ecological resources. This assessment will be undertaken by Envams Ltd.

181 This chapter includes the following elements:

- Consultation to Date;
- Preliminary Baseline Conditions;
- Likely Environmental Effects;
- Assessment Methodology;
- Assessment of Cumulative Effects; and
- Matters and Aspects Scoped Out.

6.2 CONSULTATION TO DATE

182 Consultation for this Scoping Report in relation to Ecology has been undertaken with the organisations shown in Table 6.1.

183 Further consultation will be undertaken with Natural England, Nottinghamshire County Council, Newark and Sherwood District Council, Nottinghamshire Wildlife Trust and Nottinghamshire Biological and Geological Record Centre (NBGRC). Other consultees may be identified during the preparation of the application and will be consulted as necessary.

Table 6.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Natural England	Discretionary Advice Service (DAS): Scope of great crested newt surveys (March 2023).	Agreed that a 250 m radius of the Order Limits is an acceptable study area for surveys, subject to certain caveats.	Rationale provided for Study Area (Section 6.5.3) and Survey Methods (Section 6.5.4)
	DAS: Scope of bird surveys (August 2022).	No response received.	N/A

6.3 PRELIMINARY BASELINE CONDITIONS

184 A range of baseline studies has been undertaken to date. These studies have informed both the evolving design of the Development and the need for and scope of additional studies, which are either underway or programmed to be completed before submission of the DCO application. Details of baseline study methods and definition of each of the ecological feature study areas are provided in detail in Section 6.5.3.

185 This chapter includes only the common/vernacular names of species.

6.3.1 Designated Sites

186 Searches of MAGIC[13] and the Natural England Open Data Geoportal[14] have been undertaken to identify statutory designated sites as set out below.

187 'International Sites' within 30 km of the Order Limits:

- Special Areas of Conservation (SAC) (including possible sites; pSAC);
- Special Protection Areas (SPA) (including potential sites; pSPA); and
- Ramsar sites (including proposed sites; pRamsar).

188 'National Sites' within 5 km of the Order Limits:

- Sites of Special Scientific Interest (SSSI);
- National Nature Reserves (NNR); and
- Local Nature Reserves (LNR).

189 Table 6.2 provides a summary of the statutory designated sites and Figure 6.1 shows them in relation to the Order Limits. There is only one International site within 30 km of the Order Limits (which is at 7.0 km) and so Figure 6.1 shows only a 10 km radius for ease of reference.

[13] https://magic.defra.gov.uk/ [accessed on 22/06/2023]
[14] https://naturalengland-defra.opendata.arcgis.com/ [accessed on 22/06/2023]

Table 6.2: Statutory Designated Sites

Site Name	Designation	Distance and Direction from the Order Limits[15]	Description
International Sites within 30 km			
Birklands and Bilhaugh	SAC	7.0 km north-west (NW)	The most northerly site for old acidophilous oak woods. Smaller areas of dry heath. Habitats support rich invertebrate and fungal assemblages.
National Sites within 5 km			
Eakring and Maplebeck Meadows	SSSI	Bordering	Species-rich neutral grassland. Supports notable bird assemblage.
Mather Wood	SSSI	Bordering	Semi-natural ash-oak-maple woodland.
Laxton Sykes	SSSI	0.3 km NW	Traditional (hay and occasional grazing) species-rich neutral grasslands.
Redgate Woods and Mansey Common	SSSI	0.5 km west (W)	Semi-natural ash-elm woodland and species-rich neutral grassland.
Roe Wood	SSSI	1.0 km south-west (SW)	Semi-natural broadleaved woodland.
Bestorpe Meadows	SSSI	2.4 km east (E)	Unimproved alluvial grasslands within the floodplain of the River Trent.
Kirton Wood, Notts	SSSI	3.8 km north-northwest (NNW)	Semi-natural ash-wych elm woodland.
Wellow Park	SSSI	3.7 km north (N)	Largest remaining example of semi-natural ash-wych elm woodland in Nottinghamshire.
Besthorpe Warren	SSSI	3.7 km E	Mosaic of dry acid grassland vegetation including nationally uncommon types of parched acid grassland and an inland example of dune grassland.

[15] At nearest point

Site Name	Designation	Distance and Direction from the Order Limits[15]	Description
Rufford Country Park	LNR	3.6 km NW	A range of aquatic, emergent and marginal species as well as semi-improved grassland, unimproved grassland, secondary mixed deciduous woodland, a small area of yew wood, immature planted areas and mature individual trees.
Southwell Trail	LNR	2.2 km SW	Typical habitats include scrub woodland, gorse scrub, acid and neutral grassland. Supports a diverse breeding bird assemblage, common lizard and a variety of butterflies.
Devon Park Pastures	LNR	2.6 km south-east (SE)	A range of habitats including grassland, marginal river vegetation and an area of deciduous woodland.
Farndon Ponds	LNR	1.3 km east-southeast (ESE)	Large pond and surrounds supporting a range of aquatic and terrestrial species.

190 Information about 31 non-statutory Local Wildlife Sites (LWS) within 2 km of the Order Limits was obtained at an early stage to help inform the Development design and baseline studies. Details of the LWS are not presented in this chapter but will be presented in the PEIR and the ES.

6.3.2 Habitats and Plants

191 A wide range of habitats have been recorded within or surrounding the Order Limits that are characteristic of the local agricultural landscape. Arable farmland dominates and typically occurs in large fields bounded by hedgerows, watercourses, woodlands and roads. Set-aside, conservation headlands, game cover and wild bird crops also form part of the agricultural land-use. Further description of agricultural land-use will be provided in the Socio-Economics, Tourism, Recreation and Land Use chapter of the ES.

192 A variety of grasslands have been recorded. Agricultural grasslands (e.g., pasture) are distributed throughout the Order Limits and are the second most common habitat. Narrow margins of more diverse semi-improved grassland are ubiquitous along field edges, watercourses and hedgerows but the most species-rich grasslands are restricted in extent and distribution.

193 Most woodlands have been excluded from the Order Limits but those within and bordering include both semi-natural and plantation woodlands of varying

age, structure and composition (broadleaved, coniferous or mixed). Some woodlands are classified as Ancient Woodland. Individual trees, including some veteran specimens, are present in fields and hedgerows.

194 Hedgerows are present throughout the Order Limits and are characteristic of the local landscape. The hedgerows vary in structure and composition and include species-poor and species-rich examples, both intact and defunct, some of which included trees.

195 Aquatic habitats include a wide network of watercourses comprising field drains, streams and rivers, some of which are seasonally dry. Waterbodies include seasonal inundations and ponds, the larger ones tending to be artificial fishing lakes.

196 Some of these habitats are likely to be classified as Habitats of Principal Importance under the Natural Environment and Rural Communities (NERC) Act 2006. Many of the habitats support and have the potential to support notable plant species such as regionally rare and scarce species. Invasive non-native plant species have been recorded infrequently.

6.3.3 Protected and Notable Species

197 Evidence of protected and notable species has been recorded and surveys have been completed or are underway to confirm their status and distribution. Table 6.3 provides a summary of the preliminary baseline based on surveys undertaken to date.

Table 6.3: Protected and Notable Species Preliminary Baseline

Species	Preliminary Baseline
White-clawed crayfish	Remains of an individual recorded in a stream in the SE part of the Order Limits.
Great crested newt	130 water bodies have been identified within 250 m of the Order Limits. Of the 48 water bodies accessible and suitable for surveys, great crested newt has been confirmed in two, both in the NW part of the Order Limits.
Reptiles	Suitable habitats for reptiles are mostly limited to the periphery of agricultural land and include grassland, hedgerows, scrub, woodlands edges and the margins of water features. No reptiles have been observed but the land within the Order Limits is likely to support common and widespread species typical of the local landscape.
Water vole	The land within the Order Limits has a large network of water features (field drains, streams, ponds, rivers and reservoirs) and these vary in their potential to support water vole. Evidence of the species has been recorded in five watercourses throughout the Order Limits.
Otter	The land within the Order Limits has a large network of freshwater and associated terrestrial habitats with potential to support otter. Evidence of the species, including 14 potential holts, has been recorded in eight watercourses within the Order Limits.

Species	Preliminary Baseline
Badger	Evidence of badger has been recorded throughout the Order Limits, including badger setts of all types. Further information about and assessment of badger will be included in a Confidential Annex to the ES.
Bats	An assemblage of common and widespread species, characteristic of the local region and surrounding habitats, have been recorded. Bat activity is positively associated with higher value habitats, typically at the margins of agricultural land, including woodlands, hedgerows, water features and less improved grasslands. Barbastelle bats have been recorded with varying frequency throughout the Order Limits. Several hundred trees have been assessed for their suitability to support roosting bats, most having low or moderate suitability to support bats.
Breeding birds	Breeding bird surveys have recorded 81 species of birds, of which 43 are conservation priorities. The assemblage is typical of the predominantly intensive arable habitats and includes a large number of territories of ground-nesting species (*i.e.,* skylark, lapwing and yellow wagtail). Given the scale of the Order Limits, populations of some of these species may be notable in a local and regional context. Species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) have been confirmed breeding: peregrine, hobby, barn owl and kingfisher.
Wintering birds	Winter bird surveys have recorded 80 species of birds, of which 44 are conservation priorities. These are mostly present in low numbers and often associated with restricted areas of higher value habitats (*e.g.,* wild bird cover).

6.4 LIKELY ENVIRONMENTAL EFFECTS

198 The broad ecological potential effects, relating to all stages of the Development, are likely to include (in the absence of mitigation):

- Loss of, and disturbance/changes to, terrestrial and aquatic habitats (including from pollution);
- Loss of, and disturbance/changes to, habitats important for the maintenance of a species' conservation status, including qualifying and notified features of designated sites;
- Direct disturbance of, and harm to, individuals of a species, including the displacement of species from the proximity of the Development Site;
- Spread of invasive non-native species; and
- Potential legal offences arising from the above, even if significant adverse ecological effects are unlikely.

199 These broad effects are associated with a range of more specific direct and indirect effects, such as habitat fragmentation and changes to landscape

connectivity. All effects will be characterised according to the assessment methodology set out below.

6.5 ASSESSMENT METHODOLOGY

6.5.1 Scope of Assessment

200 The ecological features identified in the preliminary baseline are likely to include those that will be identified as 'Important Ecological Features' (IEFs) and thus scoped into the assessment. It is probable that additional features will be identified during the application process as a result of ongoing baseline studies and consultations. It is possible that some of the features identified will fall below the threshold to be classified as IEFs, and thus will be scoped out of detailed assessment, subject to the application of the assessment methodology (Section 6.5.5).

201 Section 6.7 identifies ecological features that are proposed to be scoped out at this stage.

6.5.2 Relevant Guidance, Legislation and Information

202 The following overarching guidance, legislation and information sources will be considered when carrying out the Environmental Impact Assessment (EIA):

- The Environment Act 2021[16];
- The Conservation of Habitats and Species Regulations 2017[17] (as amended) [the 'Habitat Regulations'];
- The Countryside and Rights of Way Act 2000[18];
- Wildlife and Countryside Act 1981[19] (as amended);
- The Natural Environment and Rural Communities (NERC) Act 2006[20];
- The Protection of Badgers Act 1992[21];
- The Hedgerow Regulations 1997[22];
- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine[23]; and
- British Standard BS42020:2013 Biodiversity – Code of Practice for Planning and Development[24].

203 The assessment will also draw on a wide range of other guidance and policy documents, many relating to specific ecological features or issues, and these will be referenced as necessary within the Ecology chapter of the ES and its technical appendices.

[16] https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [accessed on 22/06/2023]
[17] https://www.legislation.gov.uk/uksi/2017/1012/contents/made [accessed on 22/06/2023]
[18] https://www.legislation.gov.uk/ukpga/2000/37/contents [accessed on 22/06/2023]
[19] https://www.legislation.gov.uk/ukpga/1981/69/contents [accessed on 22/06/2023]
[20] Natural Environment and Rural Communities Act 2006 (legislation.gov.uk) [accessed on 22/06/2023]
[21] https://www.legislation.gov.uk/ukpga/1992/51/contents [accessed on 22/06/2023]
[22] https://www.legislation.gov.uk/uksi/1997/1160/contents/made [accessed on 22/06/2023]
[23] Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.
[24] British Standards Institution (2013). Biodiversity — Code of Practice for Planning and Development.

6.5.3 Proposed Ecology Study Area / Survey Areas

204 The ecology study areas include the area within which the baseline needs to be established to understand the effects of the Development for a given IEF. The study areas are defined with reference to the Order Limits and are based on professional judgement and prevailing good practice. In all cases, the study areas extend outwards from the Order Limits, but access restrictions may limit physical access to some of these areas, although observations from a distance may still be possible. The study areas for each ecological feature may be refined based on the Development design and the results of further studies and consultation responses.

205 In defining the relevant study area for each ecological feature, it is recognised that the Zone of Influence (ZoI) of the Development, i.e., the area within which biophysical changes to an ecological feature may be significant, can include a wider area than just the study area, due to the mobility of some species. The ZoI for each IEF will be defined at later stages of the assessment and presented in the PEIR or the ES.

206 The ecology study areas are identified in Table 6.4.

Table 6.4: Ecological Feature Study Areas

Ecological Feature	**Study Area (radius from the Order Limits)**	**Rationale**
International Sites	30 km	Maximum distance over which there could be potential functional links and significant effect pathways for highly mobile or sensitive qualifying features.
National Sites	5 km	Maximum distance over which there could be potential functional links and significant effect pathways for notified features.
Local Sites	2 km	Maximum distance over which there could be potential functional links and significant effect pathways for notified features.
Species and Habitat Records	2 km	Encompasses the study areas of all species and habitats likely to be considered in the assessment. Provides landscape-scale context.
Habitats	Order Limits	Habitats within and contiguous with the Order Limits are mostly likely to be affected.
White-clawed crayfish	200 m	Distance within which surveys will inform assessment and scope of further surveys.
Great crested newt	250 m	Area within which effects for the Development are most likely based on development type, predominant habitats and the likely distribution of species. The study area may be extended to 500 m under certain circumstances (*e.g.,* high-impact works or high-value habitats).

Ecological Feature	Study Area (radius from the Order Limits)	Rationale
Reptiles	Order Limits	Includes habitats likely to be directly impacted by the Development.
Water vole	100 m	Survey area for likely small-scale works to watercourses[25].
Otter	200 m	Maximum distance over which direct effects (*e.g.,* disturbance) are possible.
Badger	30 m	Maximum distance over which direct effects (*e.g.,* disturbance) are possible.
Bats	Order Limits	Includes habitats likely to be directly affected by the Development. Barbastelle Study Area includes contiguous high-value habitat (woodland).
Breeding birds	100 m	To understand the effects of displacement and disturbance. Extended up to 1 km for Schedule 1 raptors.
Winter birds	100 m	To understand the effects of displacement and disturbance.
Other species	Order Limits	To be determined.

6.5.4 Baseline Survey Methodology

207 Survey methods have been and will be based on prevailing good practice (as set out in Section 6.5.2) and professional judgement, but may be refined at a later date, based on the emerging Development design and the results of further studies and consultation responses. The scope of surveys is considered a proportionate approach to the unique challenges and opportunities of a large-scale PV development of this kind.

208 Many surveys started in 2022 and are continuing in 2023 and 2024. One full survey season is sufficient to establish the baseline for the ecological features that have been identified to date. To achieve this over such a large area, with an evolving design, means that different parts of the Order Limits may have been surveyed in different seasons and/or years, such that all parts of the Order Limits will be fully surveyed at least once.

6.5.4.1 Desk Study

209 The desk study that will be presented in the PEIR and ES will obtain information and data about designated sites and protected and notable species. The following sources will be consulted:

- MAGIC[13];
- Natural England Open Data Geoportal[14];

[25] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidelines Series).

- The National Biodiversity Network (NBN) Atlas;
- Nottinghamshire Biological and Geological Record Centre (NBGRC); and
- British Trust for Ornithology.

210 The desk study may also seek information from other planning applications, published material, specialist recorders *etc.* as necessary to inform the assessment.

6.5.4.2 Preliminary Ecological Appraisal (including Habitats)

211 A Preliminary Ecological Appraisal (PEA)[26] was carried out in January and October 2022 and will be continued in 2023 and 2024 for areas subsequently brought into the Order Limits. The PEA includes a Phase 1 habitat survey[27] and UKHab[28] survey to classify and map habitats, record their constituents plant species, and assess their potential to support notable and protected species. The PEA helps to inform the need for and scope of other surveys.

212 More detailed botanical surveys (*e.g.,* National Vegetation Classification[29]) of potentially higher value habitats that may be directly affected by the Development will be carried out as necessary to determine the value of these habitats, including the identification of Habitats of Principal Importance.

213 A tree survey and Arboricultural Impact Assessment (AIA) to British Standards (BS) 5837:2012[30] will also be undertaken to inform design and mitigation in areas where works may affect trees.

6.5.4.3 Invertebrates

214 The need for and scope of invertebrate surveys is yet to be determined. Based on the ecology studies and the Development design to date, surveys for terrestrial and aquatic invertebrates have not been undertaken because the design of the Development will seek to avoid high-value invertebrate habitats, thus greatly reducing potential adverse effects. However, should the ongoing studies and Development design suggest that this is not possible, then invertebrate surveys, relevant to the taxa potentially affected, will be undertaken.

6.5.4.4 White-clawed Crayfish

215 Watercourses will be assessed for their potential to support white-clawed crayfish based on recognised habitat characteristics[31] and supported by desk study data.

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[26] Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Preliminary Ecological Appraisal (2nd edition).
[27] Joint Nature Conservancy Committee (JNCC) (2010). Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit.
[28] Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J. (2020). The UK Habitat Classification User Manual Version 1.1.
[29] Rodwell, J.S. (2006). National Vegetation Classification: Users' Handbook.
[30] British Standard (BS 5837:2012): Trees in Relation to Design, Demolition and Construction – Recommendations.
[31] Peay, S. (2002). Guidance on Habitat for White-clawed Crayfish. Environment Agency Technical Report W1-067/TR

216 Should works be required to a watercourse which has the potential to support white-clawed crayfish, then water samples will be taken (between the months of April and October) and will be tested at an accredited laboratory for environmental DNA (eDNA). Should the result be positive (i.e., confirming the presence of white-clawed crayfish), then additional surveys, typically involving manual search, netting and nocturnal torchlight searches[32], will be undertaken to inform mitigation and licensing. These surveys will be undertaken under licence from Natural England.

6.5.4.5 Fish

217 The need for and scope of fish surveys is yet to be determined. Based on the ecology studies and the Development design to date, as well as likely embedded mitigation to reduce potential effects to the water environment, surveys for fish have not been undertaken. However, the need for fish surveys will be reviewed in light of ongoing studies and Development design.

6.5.4.6 Great Crested Newt

218 Surveys for great crested newt commenced in 2022 and will continue until 2024. Where necessary, surveys are undertaken under licence from Natural England. The survey strategy includes several elements that proceed in a sequential manner:

- An initial Habitat Suitability Index (HSI)[33],[34] assesses the potential of water bodies to support great crested newts and helps to determine the need for and scope of further surveys;
- Water samples are taken from suitable water bodies between mid-April and June and are tested at an accredited laboratory for eDNA. If positive (i.e., confirming the presence of great crested newt), then population surveys of that water body are carried out; and
- Population surveys are undertaken between mid-April and mid-June and follow good practice guidelines[35]. Six visits are made to each water body and on each occasion at least three different survey methods are used: bottle trapping, netting, torch searches and egg searches.

6.5.4.7 Reptiles

219 An initial habitat assessment determines the potential of habitats to support reptiles. Extensive areas of high-value habitat that are at direct risk of harm or disturbance will be subject to detailed surveys following good practice methods[36,37]. Surveys will involve the deployment and collection of artificial refugia with regular monitoring in April and May 2024. Walked transects will also be carried out to supplement the refugia surveys.

[32] Peay, S. (2003) Monitoring the White-clawed Crayfish *Austropotamobius pallipes*. Conserving Natura 2000 Rivers Monitoring Series No. 1.
[33] Oldham, R.S., Keeble J., Swan, M.J.S. & Jeffcote, M. (2000). Evaluating the Suitability of Habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10(4), 143–155.
[34] Amphibian and Reptile Groups of the United Kingdom [ARG UK] (2010). ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.
[35] English Nature (2001). Great Crested Newt Mitigation Guidelines.
[36] Froglife (2015). Froglife Advice Sheet 10: reptile survey.
[37] Gent, T. and Gibson, S. (2003). Herpetofauna Workers Manual.

6.5.4.8 Bats

220 Bat surveys have been carried out 2022 and are continuing in 2023 and, if necessary, 2024. The surveys are based on the Bat Conservation Trust (BCT) survey guidelines[38,39] and comprise several elements:

- An assessment of habitats to determine their suitability to support foraging and commuting bats;
- A ground-level, preliminary roost assessment of trees and structures to determine their potential to support roosting bats;
- Inspections and activity (emergence/re-entry) surveys of trees with at least moderate bat roost potential, that could be directly harmed by the Development. The exact locations of these surveys will be determined after the detailed Development design. Where necessary, surveys will be carried out under licence from Natural England;
- Bat activity surveys comprising walked transects and remote monitoring. The survey effort is determined by the suitability of the habitats. Given the very large extent of the Order Limits, the surveys to date have aimed to sample representative and high-value habitats rather than achieve complete coverage. For instance:
- In low-suitability habitats (typical of the landscape within the Order Limits), transects have been surveyed on three occasions (early, mid- and late-season between April and October). During each survey one remote detector has been deployed for a minimum of five nights on each transect;
- In higher suitability habitats, two transects have been surveyed, monthly between April and October. During each survey two remote detectors have been deployed for a minimum of five nights on each transect; and
- In other areas, additional remote detectors have been deployed between transects, each for a minimum of five nights;
- Surveys for barbastelle bats will be undertaken in July and August 2023. The aim of the surveys is to identify the areas in and around the Order Limits that are of greatest value to the species, with reference to the Nottinghamshire Barbastelle Project. The surveys will be led by specialist bat ecologists with appropriate Natural England licences and under suitable weather conditions. The surveys will comprise: i) a habitat assessment of woodlands to determine their potential to support roosting barbastelle bats and to inform the scope of follow-up 'advanced surveys'; and ii) three nights of advanced surveys will be undertaken in suitable woodlands. Free-flying bats will be caught using harp traps, mist nets, and acoustic bat lures (*e.g.,* Sussex Autobat). Barbastelle bats will be targeted for capture. All bats caught will be released at the site of capture following processing to record key biometrics.

6.5.4.9 Water Vole

221 Water vole survey methods are based on prevailing good practice[25,]. An initial habitat assessment determines the potential of water bodies to support water vole based on a range of variables describing their physical

[38] Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition).
[39] Collins, J. (ed.) (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition).

characteristics. Suitable water bodies are then surveyed between May and September for evidence of water vole.

222 Due to the scale of the Development Site and the relatively limited and localised potential for direct effects to watercourses (note the 10 m buffer proposed in Section 2.4.2), only one survey visit, rather than the recommended two, to each water body will be conducted. If the detailed design of the Development suggests works to or within close proximity of a water body, then additional, targeted surveys of these areas will be undertaken.

6.5.4.10 Otter

223 Otter survey methods are based on prevailing good practice[40,41]. An initial habitat assessment is undertaken to determine the potential of water bodies and nearby terrestrial habitats which could support otter; based on a range of variables describing their physical characteristics. Suitable water bodies are then surveyed for evidence of otter.

224 Potential resting sites will be investigated further (*e.g.,* with endoscopes and camera traps) to determine if they are active. The surveys will be undertaken under licence from Natural England.

6.5.4.11 Badger

225 Evidence of badgers has been recorded as part of the PEA and during other ecology surveys. Surveyors record field signs and setts according to good practice methods[42]. Additional walkover surveys may be undertaken in winter 2023/24 in areas not previously accessible or readily searchable (e.g., dense vegetation).

226 If the detailed design of the Development suggests potentially harmful works to known badger setts might occur, then additional, targeted surveys of these areas, possibly using camera traps and bait marking, will be undertaken to inform mitigation and licensing.

6.5.4.12 Breeding Birds

227 Breeding bird surveys commenced in 2022 and will continue seasonally until 2024. Surveys are based on good practice guidelines[43] and have been adapted to the habitats and the large scale of the Order Limits. The study area is divided into sections, each of which can be surveyed by one surveyor per visit. A transect is walked in each section between approximately sunrise and late morning, during appropriate weather. The surveyors record and map species, including behavioural observations. Survey effort focuses on the habitats of the field margins, with open habitats searched through binoculars, if necessary. This is considered the most appropriate method for the predominantly lowland farmland habitats.

228 Each transect is surveyed four times between the months of March and July. Four visits are considered sufficient to accurately sample the generally sub-optimal habitats across such a large study area and in which the open nature of the habitats facilitates high detection of key species. Additionally, this

[40] Chanin, P. (2003a). Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series No. 10.
[41] Chanin, P. (2003b). Monitoring the Otter. Conserving Natura 2000 Rivers Monitoring Series No. 10.
[42] Harris, S., Cresswell, P. and Jefferies, D. (1989). Surveying Badgers, Mammal Society.
[43] Bird Survey & Assessment Steering Group (2022). Bird Survey Guidelines for Assessing Ecological Impacts.

number of visits is equivalent to, or exceeds, the recommendations[44] for species-specific surveys for farmland bird species, such as skylark, lapwing, and yellow wagtail.

229 Data analysis will focus on identifying the breeding territory locations of bird species of conservation concern, which include any of the following:

- Schedule 1-listed species on the Wildlife and Countryside Act 1981 (as amended);
- Annex I-listed species on the Birds Directive;
- Species of Principal Importance listed in the NERC Act 2006; and
- Red- and Amber-listed birds of conservation concern[45].

230 Targeted and species-specific surveys have been or will be undertaken based on observations from the general Breeding Bird Survey. Surveys for Schedule 1-listed raptor species have to date included a series of watching briefs carried out from vantage points overlooking suitable habitat, with the aim of identifying potential breeding or territorial behaviour. Checks of features with the potential to support nesting barn owl and kingfisher have been undertaken.

6.5.4.13 Winter Birds

231 Surveys of non-breeding birds have been carried out once per month between October 2022 and February 2023. Further surveys will be undertaken between November 2023 and March 2024 for potentially sensitive land within the Order Limits that has not been previously surveyed. Surveys to date have followed the methods recommended by the Bird Survey & Assessment Steering Group[43], which involves surveyors walking the study area and recording all bird species detected (by sight or sound). The surveys have aimed to identify aggregations of birds including waders, gulls, thrushes and granivorous species such as finches and buntings, with a particular focus on recording species of conservation concern (as defined above).

232 The Order Limits have very limited potential to support important aggregations of passage birds and so surveys of the extended winter period to capture autumn and spring migration are not considered necessary.

6.5.5 Methodology for the Assessment of Effects

233 The significance of the potential effects of the Development will be classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

234 The assessment method will follow the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment[23], which can be summarised in the following six steps:

- Identifying Important Ecological Features (IEFs);
- Identifying and characterising effects;

[44] Gilbert, G., Gibbons, D. W. and Evans, J. (1998). Bird Monitoring Methods.
[45] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win, I. (2021). The Status of our Bird Populations: the Fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and Second IUCN Red List Assessment of Extinction Risk for Great Britain. British Birds 114: 723–747.

- Identifying measures to avoid and mitigate effects;
- Assessing the significance of any residual effects (including cumulative) after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

6.5.5.1 Identifying Important Ecological Features

235 The sensitivity, value or importance of ecological features can be related to a wide range of ecosystem services that they can provide to the environment, people or wider society. A summary of the approach to valuing ecological features is provided in Table 6.5 and shows how ecological importance can be determined using a combination of statutory measures (*i.e.,* legally protected sites and species) and non-statutory but widely accepted measures, such as the presence of priority habitats and species.

236 Features of "Less than Local" value, or which fall outside the ZoI of the Development, will be scoped out of the EcIA, except where they have policy implications. The ZoI will vary among ecological features and will be determined iteratively as the baseline studies are completed and the Development design developed.

Table 6.5: Determining the Importance of Ecological Features

Importance	**Example**
International	A designated site of international importance (*i.e.,* SAC, SPA and Ramsar sites) or a site meeting criteria for such designations. This includes candidate/potential sites and mitigation land.
	Species present in internationally important numbers (*e.g.,* >1% of biogeographic populations).
National	A SSSI or NNR, or sites meeting the criteria for such designations.
	Species present in nationally important numbers (*e.g.,* >1% UK population).
	Cited species that are connected to a SSSI or NNR.
	Large areas of priority habitats listed on Annex I of the Habitats Directive and smaller areas of such habitats that are essential to maintain the viability of that ecological resource
Regional	Species present in regionally important numbers (*e.g.,* >1% regional population).
	LNR and LWS, or equivalents.
	Sites meeting the criteria for selection as a LWS.
Local	Sites that may be designated or informally recognised according to criteria at the local authority level.
	Other species of conservation interest, *e.g.,* priority species that contribute to the local community.
	Sites falling below criteria for selection as a LWS.

Importance	Example
	Areas of habitat or species considered to appreciably enrich the ecological resource within the local context.
Less than Local	Usually widespread and common habitats and species. Features of this value are not considered in detail in the assessment process unless they have policy implications for the Development, e.g., legally protected species.

6.5.5.2 Identifying and Characterising Effects

237 An effect is defined as a change in distribution or status of a feature as a result of the Development and can be adverse, neutral or positive. In assessing the magnitude of likely effects, the identified effect will be characterised according to the sensitivity of the receptor and the potential for recovery from temporary adverse conditions, taking into account that: different effects can result in reversible or permanent effects; different effects have different probabilities of occurring; and that some changes may be positive (beneficial). The criteria that will be used in the assessment for describing the overall magnitude of an effect are summarised in Table 6.6.

238 The process will be informed by the conclusions of other disciplines, key amongst these being the Hydrology, Noise, and Agricultural and Soils Chapters of the PEIR and ES.

Table 6.6: Determining the Magnitude of Effects

Magnitude	Example
High	May include those that result in large-scale, permanent or long-term changes in an IEF and are likely to change its ecological integrity. These effects are likely to result in overall changes in the conservation status of a population or habitat type at the location(s) or geographical scale under consideration.
Medium	May include moderate-scale permanent or long-term changes in an IEF, or larger-scale temporary changes, but the integrity of the feature is not affected. This may mean that there are temporary changes in the conservation status of a population or habitat type at the location(s) or geographical scale under consideration, but these are unlikely to be irreversible or long term.
Low	May include those that are small in magnitude, have medium-scale short- or medium-term and temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a population or habitat type at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required.
Neutral	There is no perceptible change in the ecological receptor.

6.5.5.3 Significance of Effect

239 A significant effect is one that either supports (positive) or undermines (adverse) the conservation status or objectives of an IEF, or for biodiversity generally if this is more relevant to the circumstances being assessed.

These significant effects are considered by an ecological professional to be sufficiently important to warrant explicit assessment and reporting so that a decision-maker is adequately informed of the environmental consequences of a proposed project.

240 The significance of an effect on an IEF is given with reference to a specific spatial scale, which may not be the same as the geographical scale used to value the IEF. Effects that are significant at a Local scale are considered to be **'significant'** in the context of the EIA Regulations. However, mitigation and compensation may need to be applied to ensure outcome consistency with the scale at which the significant effect has been identified.

6.5.5.4 Mitigation and Enhancement

241 The EcIA process described above will identify whether or not there are significant ecological effects from the Development that need to be addressed. The requirement for mitigation will be based on the established mitigation hierarchy sequence of avoidance, mitigation, compensation and enhancement. A range of such measures have been incorporated into the design of the Development since its inception, resulting in an ecologically sensitive design. Where mitigation includes the management of vegetation, this will be included in an outline Landscape and Biodiversity Management Plan (oLBMP; see Section 2.4.4).

242 A Biodiversity Net Gain (BNG) assessment will be carried out using the prevailing Department for Environment, Food and Rural Affairs (DEFRA) metric (currently version 4.0[46]). This will calculate the net change in biodiversity value of the Order Limits based on the types and extents of pre- and post-development habitats.

243 The Development is likely to include large-scale habitat creation, management and monitoring and it is envisaged that relevant specialists and stakeholders will be invited to engage with this.

6.6 ASSESSMENT OF CUMULATIVE EFFECTS

244 The purpose of a cumulative effect assessment is to identify effects that might not be significant on their own, but which become significant when considered in combination with effects from other plans or developments. A search radius of 5 km from the Order Limits is sufficient to identify developments with the potential to contribute to cumulative effects to the range of potential IEFs identified to date.

6.7 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

245 All International and National Sites except the four discussed in the following paragraph are scoped out of the assessment (see Table 6.7, below).

246 Eakring and Maplebeck Meadows SSSI and Mather Wood SSSI border the Order Limits and so direct and indirect effects are possible. Parts of the Order Limits are within the SSSI Impact Risk Zone (IRZ) of these two sites and the Development is of a type (i.e., 'Wind and Solar Wind Energy') that warrants consultation with Natural England. Laxton Sykes SSSI and Redgate Woods and Mansey Common SSSI may be directly hydrologically linked to the Development Site and so direct and indirect effects are

[46] https://publications.naturalengland.org.uk/publication/6049804846366720 [accessed on 20/06/2023]

possible. Although the Order Limits are within the SSSI IRZ for these two sites, the Development is not of a type that triggers consultation with the Natural England. For the avoidance of doubt, these four sites are therefore scoped into the assessment.

Table 6.7: Matters to be Scoped Out of the Assessment

Effects	**Justification**
International Sites	
Birklands and Bilhaugh SAC	There are no clear ecological pathways between the Development and the Birklands and Bilhaugh SAC. The qualifying features and integrity of the SAC are extremely unlikely to be dependent on ecological features within the Order Limits. Furthermore, there are no direct hydrological links and the intervening distance and agricultural landscape preclude direct and indirect effect pathways. The Order Limits are not situated within the SSSI IRZ for the SAC. Consequently, it is proposed that the Birklands and Bilhaugh SAC should be scoped out of the assessment.
National Sites	
All National Sites with the exception of: • Eakring and Maplebeck Meadows SSSI • Mather Wood SSSI • Laxton Sykes SSSI; and • Redgate Woods and Mansey Common SSSI	Most of the SSSIs identified within this scoping chapter are notified for their habitats and plants, although these may support other valuable species. The LNRs are designated in large part for their amenity value and whilst they support valuable ecological features, they are not recognised as the most ecologically sensitive sites. Most nationally designated sites are also separated from the Development by relatively large distances, extensive agricultural landscape, and also lack hydrological connectivity. Consequently, it is extremely unlikely that the integrity of the National Sites depends on ecological features within the Order Limits and there are no clear effect pathways. For the National Sites scoped out, the Order Limits are not within a SSSI IRZ associated them or the Development is not of a type (*i.e.,* 'Wind and Solar Wind Energy') that triggers consultation with Natural England.

7 HYDROLOGY, HYDROGEOLOGY, FLOOD RISK AND GROUND CONDITIONS

7.1 INTRODUCTION

247 This chapter of the Scoping Report relates to the potential effects of the Development on hydrological and hydrogeological resources. This assessment will be undertaken by Raincloud Consulting Ltd (Raincloud).

248 This chapter includes the following elements:

- Consultation to Date;
- Preliminary Baseline Conditions;
- Likely Environmental Effects;
- Assessment Methodology;
- Assessment of Cumulative Effects; and
- Matters and Aspects Scoped Out.

7.2 CONSULTATION TO DATE

249 Consultation for this Scoping Report in relation to Hydrology, Hydrogeology, Flood Risk and Ground Conditions has been undertaken with the organisations shown in Table 7.1.

Table 7.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Environment Agency (EA).	Flood data request: 21/04/2023.	Partial response provided on 25/05/2023. Data set provided on 01/08/2023 – data between Averham and Micklebarrow Hill assumed to be missing from data set.	Confirmed the need for all data within the Development Site (which is defined by the Order Limits). Follow up request sent on 23/10/2023 requesting full data set.
Water Management Consortium on behalf of Trent Valley Internal Drainage Board (IDB).	Data request: 11/05/2023.	Provided GIS files of IDB assets within the operational boundary of the IDB.	n/a.

250 Prior to the Preliminary Environmental Information Report (PEIR), Raincloud will consult the following organisations:

- The Lead Local Flood Authority (Nottinghamshire County Council (NCC)) to discuss the proposed drainage measures to manage surface water

flows using Sustainable Drainage Systems (SuDS) and Rural Sustainable Drainage Systems (RSuDS)[47] techniques;
- Severn Trent Water – to request details of assets and groundwater abstraction within the Study Area;
- The EA – to request data on licenced abstractions Public Water Supply (PuWS); and
- Newark and Sherwood District Council (NSDC) to request details of Private Water Supplies (PWS).

7.3 PRELIMINARY BASELINE CONDITIONS

7.3.1 Proposed Hydrology Study Areas

251 The Order Limits will form the immediate study area (the Hydrology Study Area).

252 Baseline data will be used to assess potential effects of the Development on hydrological and hydrogeological resources within a 5 km study area of the Order Limits (the Wider Hydrology Study Area). This wider study area is based on the hydrological and hydrogeological connectivity of water bodies located downstream from the Development.

253 At distances greater than 5 km, it is considered that solar developments in low lying catchments are unlikely to contribute to chemical or sedimentation effects due to attenuation, dilution and deposition.

254 The Wider Study Area will also be used for the cumulative assessment.

255 A smaller 1 km study area based upon the Order Limits will be applied to assess PWS and PuWS abstractions and will be termed the Water Supplies Study Area (WSSA). The WSSA distance is based on Paragraph 2.15 of guidance issued by the Scottish Environmental Protection Agency (SEPA)[48], in the absence of guidance relating to study area distance issued by the EA or the BGS.

256 These study areas are defined based on the author's professional judgement and experience assessing similar scale developments (DCO solar developments) within lowland agricultural environments and similar hydrological catchments in England.

7.3.2 Preliminary Baseline Conditions

257 A desk-based survey was undertaken in June 2023 to provide an overview of the baseline conditions for water resources and ground conditions within the Study Area.

[47] Rural Sustainable Drainage Systems (RSuDS). Environment Agency (June 2012) [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291508/scho0612buwh-e-e.pdf

[48] Land Use Planning System
SEPA Guidance Note 31 Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems [online]. Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed 28/06/2023].

7.3.2.1 Hydrological Setting

258 The Study Area is located within the primary catchment of the River Trent, which borders the south-east at its nearest point.

259 The Study Area is drained by a network of ordinary watercourses and drainage ditches, which ultimately discharge to the River Trent.

260 The western section of the Study Area is drained by The Beck, draining from west to east before its confluence with the River Trent approximately 700 m east of the Study Area.

261 The northern section of the Study Area is drained by Moorhouse Beck, which drains from southwest to north-east, before its confluence with Goosemoore Dyke approximately 1 km north-east of the Study Area.

262 Watercourses within the Study Area have an overall Water Framework Directive (WFD) classification of Moderate (*e.g.*, The Beck), while watercourses within the Wider Study Area have classifications ranging from Moderate (River Trent) to Bad (The Fleet).

263 The IDB have identified watercourses and assets within the Study Area which fall under their maintenance remit, including The Beck and Moorhouse Beck.

264 A section of the Study Area in the north is located within a Drinking Water Protected Area identified as the Trent from Carlton-on-Trent to Laughton Drain.

7.3.2.2 Flood Zones

265 The majority of the Study Area is located within Flood Zone 1 as shown on Figure 7.1.

266 There are areas classed as Flood Zone 2 and 3, predominately in the eastern section of the Study Area associated with the River Trent, with other areas associated with The Beck in the west and Moorhouse Beck in the north (see also Figure 7.1).

267 Figure 005 "*River Trent: Fluvial Q20 Maximum Flood Depths*" of the Strategic Flood Risk Assessment 2016 Review (SFRA)[49] shows that there are minor areas in the southern extent of the Study Area which are located within the 5 % Annual Exceedance Probability (AEP) area, defined as Functional Floodplain (Flood Zone 3b) within the SFRA.

268 Data from various previous flood studies is still to be received from the EA.

269 Data provided by the EA shows flood defences along the River Trent as it passes the Study Area in the form of embankments and naturally high ground.

270 It is noted that the River Trent is tidally dominated north of Cromwell Lock and a breach of flood defences scenario will be considered in the Flood Risk Assessment (FRA) with the use of existing, modelled data.

[49] Newark & Sherwood District Council Strategic Flood Risk Assessment Update (2016) [online]. Available at: https://www.newark-sherwooddc.gov.uk/sfraupdate/ [Accessed 28/06/2023].

271 The EA Surface Water Flood Map shows that modelled surface water flooding is largely confined to topographical depressions associated with watercourse channels across the Study Area.

7.3.3 Geology

272 British Geological Society (BGS) datasets show that the majority of the Study Area is underlain by mudstone of the Mercia Mudstone Group, with a minor section in the south being underlain by mudstone of the Gunthorpe Member. A minor section in the west is underlain by siltstone, mudstone and sandstone of the Tarporley Siltstone Formation.

273 Superficial deposits are shown to be absent across the majority of the Study Area. There are minor corridors of alluvium (clay, silt, sand and gravel) associated with Moorhouse Beck in the north and The Beck in the western and central section of the Study Area.

274 There is a small band of glaciofluvial deposits in proximity to Kneesall Lodge in the north of the Study Area.

275 The eastern section of the Study Area is underlain by sand and gravel of the Holme Pierrepont Sand And Gravel Member with thin corridors of alluvium.

7.3.4 Hydrogeological Setting

276 The Hydrogeology 625,000 digital hydrogeological map of the UK (BGS) shows that the Study Area is underlain by Triassic Rocks (undifferentiated), characterised as a Low Productivity Aquifer where flow is virtually all through fractures and other discontinuities.

277 The Aquifer Designation Map (Bedrock) (England) identifies that the Study Area is underlain by aquifers classed as Secondary (undifferentiated) and Secondary B.

278 The Study Area is not located within Drinking Water Safeguard Zones (Groundwater).

279 The western section of the Study Area bisects Source Protection Zones 1, 2 and 3, approximately 250 m west of Caunton.

280 A section in the west of the Study Area is located within Source Protection Zone 3.

7.3.5 Designations

281 Designations located within the proposed Wider Study Area (i.e., 5 km from the Order Limits) are outlined in Table 7.2.

Table 7.2: Designations within the Wider Study Area

Designation	Qualifying Interest	Approximate distance and direction from the Order Limits
Eakring and Maplebeck Meadows Site of Special Scientific Interest (SSSI)	Neutral grasslands	Immediately adjacent (north)
Mather Wood SSSI	Ash-oak-maple woodland	Immediately adjacent (west)
Laxton Sykes SSSI	Neutral grasslands	365 m north
Redgate Woods and Mansey Common SSSI	Broad-leaved semi-natural woodland and neutral grassland	475 m south-west
Roe Wood SSSI	Semi-natural broad-leaved woodland	1.1 km south
Farndon Ponds Local Nature Reserve (LNR)	Wetland habitat	1.3 km south
Southwell Trail LNR	Various	2.2 km south-east
Besthorpe Meadows SSSI	Alluvial grasslands	2.4 km east
Devon Park Pastures LNR	Terrestrial and Inland Waters	2.6 km south-east
Rufford Country Park LNR	Various	3.5 north-west
Besthorpe Warren SSSI	Dry acid grassland vegetation	3.7 km east
Wellow Park SSSI	Semi-natural woodland	3.7 km north-west
Kirton Wood SSSI	Ash-wych elm woods	3.8 km west

7.4 LIKELY ENVIRONMENTAL EFFECTS

282 The following potential effects, for all phases of the Development, will be scoped into the assessment:

- Chemical pollution;
- Erosion and sedimentation;
- Impediments to surface water flow;
- Changes in soil interflow patterns;

- Changes in groundwater flow;
- Compaction of soils;
- Increase in surface water run-off rates;
- Displacement of flood storage;
- Changes in quality or quantity of supply (PWS and PuWS); and
- Migration of Pollutants from Contaminated Land.

283 The receptors identified in Section 7.3 of this report will be included in the ES chapter, with the exception of Besthorpe Warren and Besthorpe Meadows SSSIs and Farndon Ponds and Devon Park Pastures LNRs, which will be scoped out, as outlined in Table 7.6.

7.5 ASSESSMENT METHODOLOGY

7.5.1 Scope of Assessment

284 The key issues for the assessment of potential hydrological and hydrogeological effects relating to the Development are likely to be:

- Short-term effects arising from the construction phase, such as chemical pollution and sedimentation; and
- Permanent effects, including long-term effects that last for the operational phase only.

7.5.2 Relevant Guidance, Legislation and Information

285 The following guidance, legislation and information sources will be considered when carrying out the EIA:

- National Policy Statement (NPS): Overarching National Policy Statement for Energy (EN-1, March 2023) Section 5.8: Flood Risk. This outlines the requirements for a Flood Risk Assessment (FRA) and the promotion of the use of SuDS;
- National Planning Policy Framework (NPPF) (2021), paragraphs 159 to 169. This states that for development comprising one hectare or above, the vulnerability to flooding, or the potential to add to flooding elsewhere should be assessed in a FRA;
- Water Resources Act 1991;
- Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009;
- Land Drainage Act 1991 as amended 1994;
- Flood and Water Management Act 2010;
- Water Act 2003 as amended 2014;
- Water Supply Regulations 2016 as amended 2018;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- The Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017;
- The Groundwater (England and Wales) Regulations 2009;
- Groundwater Daughter Directive (2006/118/EC) 2006;
- Anti-Pollution Works Regulations 1999;
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015;
- Conservation of Habitats and Species Regulations 2017;

- Environment Act 1995;
- The Environmental Permitting (England and Wales) (Amendment) Regulations 2018;
- The Environment Agency's approach to groundwater protection (2018 v1.2);
- Good Practice Guide for Environmental Impact Assessment (EIA), 2006 (withdrawn but still considered relevant in the absence of superseding guidance);
- Nottinghamshire Local Flood Risk Management Strategy (LFRMS) 2021-2027;
- Pollution Prevention Guidelines (PPGs). These have been withdrawn but are still considered relevant in the absence of superseding guidance;
- Construction Industry Research and Information Association (CIRIA) C753 'The SuDS Manual' (CIRIA, 2015); and
- Environmental good practice on site guide (5th edition) C811 (CIRIA, 2023).

7.5.3 Baseline Survey Methodology

286 A desk-based approach to identifying receptors will be employed, utilising data sets from the regulators and consultees such as the EA, Natural England, the IDB. This will also involve data requests to consultees such as NSDC and Severn Trent Water to supplement the freely available datasets.

287 Where PWS are identified within the WSSA, a questionnaire will be sent to properties to request details of the supply. This will inform which supplies require a site visit to ground truth the information supplied.

288 A site walkover will be undertaken for land within the Order Limits and will focus on ground truthing the location and visible condition of receptors such as surface water and superficial geology.

7.5.4 Methodology for the Assessment of Effects

289 The significance of the potential effects of the Development will be classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

290 The approach for the hydrological and hydrogeological impact assessment for the Development has been developed in consultation with the several statutory consultees and Internal Drainage Boards over numerous Town and Country Planning Act applications and DCO applications for solar and energy storage sites.

291 The assessment will be based on a source-pathway-receptor methodology, where the sensitivity of the receptors and the magnitude of potential change (effect) upon those receptors is identified within the study areas identified in Section 7.3.1.

292 As sections of the Study Area are located within Flood Zone 2, 3a and 3b, the FRA will need to demonstrate that, where development is proposed in those areas, it passes the Exception and Sequential tests outlined in the NPPF and NPS. There will be a requirement to raise all electronically sensitive equipment at least 300 mm above the highest modelled flood level for the 1 % AEP event (plus climate change allowance) or have a commitment to install flood resilient measures onsite.

293 The climate change allowance data will be obtained from the Environment Agency Climate Change Allowances for Peak River Flow in England (2022) for the Lower Trent and Erewash Management Catchment. As the Development is classed as Essential Infrastructure as per Annex 3: Flood risk vulnerability classification of the NPPF and will be operational between the 2050's and 2080's epochs the Higher Central band of 23 % will be used for fluvial flows.

294 The FRA will focus on the following elements:

- The risk of flooding to the Development from fluvial, tidal, pluvial, groundwater and artificial (reservoir and drainage infrastructure) sources;
- Assessment of the introduction of new hardstanding and impermeable ground areas on the greenfield run-off rates, using InfoDrainage software;
- Storage requirement calculations to accommodate the 3.33 % and the 1 % AEP storm events including an allowance for climate change, i.e., 25 % for the Central band for the 2070s epoch (2061 to 2125) as the Development is time-limited;
- The management of surface water run-off rates using RSuDS techniques for the photovoltaic (PV) arrays; and
- The FRA will also conclude how the Development complies with local planning policy, the Newark & Sherwood District Council Strategic Flood Risk Assessment and Section 5.8 of the NPS EN1.

295 The FRA will utilise fluvial and tidal data and results from various flood studies. It is not proposed to model fluvial and tidal flooding based on the validity and acceptance of published flood studies by the Lead Local Flood Authority (LLFA; Nottinghamshire County Council) and the EA. Both sources are considered suitable for use to inform the FRA.

296 Areas shown to be at risk of pluvial flooding will be verified through two-dimensional (2D) direct rainfall modelling.

7.5.4.1 Sensitivity of Receptors

297 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Development or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

298 Table 7.3 details the proposed framework for determining the sensitivity of receptors.

Table 7.3: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	• A watercourse or water body with a WFD classification of "High" or "Good"; • The receptor and associated downstream environment has limited capacity to attenuate fluctuations in hydrochemistry and cannot buffer further changes without profoundly altering its characteristics or natural processes; • The hydrological receptor is designated as having international importance, such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs); • Water abstractions used for the production of mass-produced consumables (food and drink); • Areas classed as Functional Floodplain (Flood Zone 3b) and flood storage areas not protected by flood defences; and • Flood defences.
Medium	• A watercourse or water body with a WFD classification of "Moderate"; • The receptor and associated downstream environment has some capacity to attenuate fluctuations in hydrochemistry but cannot absorb prolonged changes without profoundly altering its baseline characteristics / natural processes; • The hydrological receptor is of high environmental importance or is designated as having national importance, such as SSSIs; • Areas classed as Flood Zone 3a; and • Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS).
Low	• A watercourse or water body with a WFD classification of "Poor" or "Bad" and / or a Current Chemical Quality classification of "Fail"; • Heavily modified watercourses or manmade drainage ditches; • The receptor is not of regional, national or international environmental importance; • The hydrological receptor does not support abstractions for public water supply or private water abstractions; • Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible; and • Areas classed as Flood Zone 2.
Negligible	• The receptor is resistant to change and / or is of little environmental value; and • Areas classed as Flood Zone 1.

7.5.4.2 Magnitude of Effect

299 The magnitude of potential effects will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

300 The criteria for assessing the magnitude of an effect are presented in Table 7.4.

Table 7.4: Framework for Determining Magnitude of Effects

Magnitude of Effect	Definition
High	• A major shift in hydrochemistry or hydrological conditions sufficient to negatively change the function of the receptor. This change would result in a downgrading of an WFD Quality classification by two classes, e.g., from “High” to “Moderate”; • A material increase in the probability of flooding onsite and offsite, adding to the extent which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with NPPF paragraphs 159 to 169) i.e., loss of functional floodplain (Flood Zone 3b) storage; • A permanent or long-term degradation of quality to groundwater quality or a long-term reduction in the available yield; and / or • A greater than 50 % loss of a geological receptor or peat habitat site, or where there would be complete severance of a site such as to fundamentally affect the integrity of that site (e.g., severing hydrological connectivity).
Medium	• A non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change would result in a downgrading of an EA water quality classification by one class, e.g., from "Good" to "Moderate"; • A loss of between 15 % to 50 % of a geological receptor or peat habitat site, complete or substantial severance and effects to its integrity as a feature, or disturbance such that the value of that site would be affected, but could still function; • The yield or quality of PWS or PuWS may be temporarily reduced; and / or • A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water i.e., moderate loss of storage within Flood Zone 3a.
Low	• A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change would not reduce the WFD status of the receptor; • Loss of storage within Flood Zone 2; • Interaction with the groundwater table which will marginally alter local ecology or will lead to a slight detectable displacement of groundwater; and / or • A detectable but non-material effect on the receptor or a moderate effect on its integrity as a feature or where there would be a minor severance or disturbance such that the functionality of the receptor would not be affected.

Magnitude of Effect	Definition
Negligible[50]	• No detectible changes to the baseline hydrochemistry or hydrological environment; and • No increase in the probability of flooding onsite and offsite.

7.5.4.3 Significance of Effect

301 The sensitivity of the receptor and the magnitude of the predicted effect will be used as a guide, in addition to professional judgement, to predict the significance of the likely effect. Table 7.5 summarises guideline criteria for assessing the significance of effects.

Table 7.5: Framework for Assessment of the Significance of Effects

Magnitude of Effects	Sensitivity of Resource or Receptor			
	High	**Medium**	**Low**	**Negligible**
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Negligible
Low	Minor	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

7.5.4.4 Embedded Mitigation

302 Embedded mitigation measures will be included within the outline Construction Environmental Management Plan (oCEMP) (as set out in Section 2.5.3). The oCEMP will comprise good practice construction methods and works that are established and effective measures to which the Applicant will be committed throughout the development process, and which can be secured by an appropriate Schedule 2 Requirement.

303 There is confidence in the effectiveness of the measures that will be outlined in the oCEMP (*i.e.,* these have been observed to function effectively on similar projects) for them to be treated as part of the Development for the purposes of the assessment. As such, the assessment of significance of effects of the Development will be considered assuming implementation of the measures in the oCEMP.

304 The measures to be included in the oCEMP are fundamentally part of the Development design and should be treated as embedded mitigation.

305 The Hydrology, Hydrogeology, Flood Risk and Ground Conditions Chapter of the ES will consider the likelihood of an event occurring and concludes whether the residual or overall significance will be Major, Moderate, Minor or Negligible, before appropriate mitigation (beyond that specified in the oCEMP) has been implemented. The assessment will rely on professional judgment to ensure that the effects are appropriately assessed.

[50] Negligible magnitude of change also includes magnitude of effects that are assessed as no change to the baseline scenario.

306 A residual effect is considered to be a likely significant effect in accordance with EIA Regulations if assessed as Moderate or Major following the implementation of necessary mitigation measures.

7.6 ASSESSMENT OF CUMULATIVE EFFECTS

307 The methodology to assess the cumulative effects will be the same as that used for the Development in isolation.

308 A cumulative effect is considered to be an additional effect on a hydrological or hydrogeological resource (*i.e.*, within the same hydrological catchment) arising from the Development in addition to the contribution of other developments likely to affect the hydrological environment but whose effects are not represented in the baseline data. At distances greater than 5 km, developments are unlikely to contribute to a cumulative hydrological effect due to attenuation, dilution and deposition over distance of potentially polluting chemicals and sediment. Therefore, for the purposes of the assessment of potential cumulative effects on the catchment in which the Development is located, only proposed developments, which require large scale construction / excavation, within approximately 5 km of the Order Limits will be considered.

7.7 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

309 Table 7.6 outlines the effects that are proposed to be scoped out of the EIA.

Table 7.6: Effects to be scoped out of the EIA

Potential Effect	Phase of Development	Reason
Any effect on Besthorpe Warren and Besthorpe Meadows SSSIs.	All	Both SSSIs are hydrologically disconnected from the Order Limits by the River Trent.
Farndon Ponds and Devon Park Pastures LNRs.	All	Both LNRs are hydrologically disconnected from the Order Limits by the River Trent and are hydrologically upstream of the Order Limits.
Transfer of sediment to surface water resources.	Operation	Establishment of onsite vegetation cover within the Order Limits, which will reduce sediment mobilisation, in addition to the physical separation between infrastructure and surface water resources (see Section 2.4.2).
Transfer of chemicals to surface water resources during operation.	Operation	Only occasional maintenance visits limiting the presence of chemicals / hydrocarbons onsite, in addition to the physical separation between infrastructure and surface water resources (see Section 2.4.2).

Potential Effect	Phase of Development	Reason
Chemical pollution from damaged PV arrays / leakage from the PV arrays.	Operation	Due to the composition of the surface of the PV modules, they are likely to remain intact both at the surface and underside near the racking system, even in the event of damage / impact and not leak.

8 CULTURAL HERITAGE AND ARCHAEOLOGY

8.1 INTRODUCTION

310 This chapter of the Scoping Report relates to the potential effects of the Development on cultural heritage and archaeological resources. This assessment will be undertaken by Wessex Archaeology.

311 This chapter includes the following elements:

- Consultation to Date;
- Preliminary Baseline Conditions;
- Likely Environmental Effects;
- Assessment Methodology;
- Assessment of Cumulative Effects; and
- Matters and Aspects Scoped Out.

8.2 CONSULTATION TO DATE

312 Specific consultation has been undertaken with the archaeological advisors at Newark and Sherwood District Council and Historic England regarding the scope of proposed archaeological trial trenching to be undertaken in early 2024 (the purpose of this trial trenching will be to provide information to inform the proposed assessment). This consultation has been limited to the issue of a draft Written Scheme of Investigation for comment. The following stakeholders will be consulted with regard to the assessment:

- Historic England with regard to the setting of designated heritage assets;
- The archaeological advisor to Newark and Sherwood District Council (NSDC), regarding the assessment of archaeological remains; and
- The conservation officer at NSDC regarding the assessment of designated and non-designated built heritage, conservation areas and the setting of heritage assets.

8.3 PRELIMINARY BASELINE CONDITIONS

8.3.1 Proposed Archaeological and Heritage Study Areas

313 For the purposes of the assessment of direct effects to archaeological remains, baseline conditions will be established through a desk-based review of publicly accessible sources of primary and synthesised information pertaining to the historic environment within a 1 km radial Archaeological Study Area buffered from the Order Limits. The recorded historic environment resource within 1 km is considered to be sufficient to provide a

context for the discussion and interpretation of known and potential archaeological resource that could be affected by the Development (Figure 8.1).

314 For the purposes of the assessment of indirect effects to the heritage significance of heritage assets through change within their setting, an Inner Study Area consisting of a radius of 2 km from the Order Limits will be used for the consideration of designated heritage assets. This will comprise Grade I, II* and II listed buildings, scheduled monuments, Grade I, II* and II registered parks and gardens. There are no world heritage sites, Grade I and II* registered parks and gardens or registered battlefields within this radius (Figure 8.1).

315 An Outer Study Area (a radius of 5 km from the Order Limits) will be used for indirect effects for the consideration of any highly designated assets which fall within this area. For this assessment, taking into consideration the nature of the Development, the highly designated assets to be considered will comprise Grade I and II* listed buildings, scheduled monuments, Grade I and II* registered parks and gardens and registered battlefields (Figure 8.1).

316 Based upon the nature of the Development and the surrounding topography, likely significant effects to designated or non-designated heritage assets are not anticipated beyond the defined study areas.

8.3.2 Archaeological and Historical Background

317 The Historic Environment Record (HER) has been consulted for the purposes of the Development. A brief high-level summary of this information is provided below to provide context for the scope of the assessment. This information will be rigorously assessed as part of a Desk-Based Assessment and supplemented with information from the sources described in Section 8.5.2.3. The Desk-Based Assessment will be included as a Technical Appendix to the ES.

8.3.2.1 Prehistoric

318 The early prehistoric period is often ephemeral and difficult to identify within the archaeological record, with hunter-gatherer societies traversing the landscape and largely settling around areas such as river valleys as they provided constant access to water and food sources. The eastern section of the Order Limits is therefore positioned advantageously along the River Trent. Evidence for artefact scatters of worked flints has been found in the south-east extent of the Order Limits, near South Muskham and North Muskham.

319 Alongside numerous Neolithic flint scatters, once again within the areas of North and South Muskham, there is also evidence for Neolithic axes and arrowheads within the Order Limits, particularly around Bathley, Averham and Caunton. Most significantly for the period is the possible Neolithic henge, at South Muskham, identified as a small henge-like enclosure via cropmarks. Aerial photography has also identified a cropmark associated with Neolithic- Bronze Age funerary activity, this is located south of Cromwell and the A1 road.

320 Into the Bronze Age period, funerary activity appears to again be focused along the banks of the River Trent. Significantly, a possible barrow cemetery

has been identified via aerial photography which indicated parts of four circles including one large one with an internal concentric circle. At Cromwell a Bronze Age round barrow was identified and excavated in the 1950s. These alongside a small assortment of Bronze Age finds such as flint and pottery indicate a strong Bronze Age presence surrounding the settlements of Cromwell and Muskham.

8.3.2.2 Iron Age to Romano-British

321 Substantial cropmarks have been identified in and around the settlements of Little Carlton and South Muskham, which could indicate the presence of Iron Age settlements. These cropmarks include features such as enclosures of various form with internal features, and with possible pit alignment, as well as a possible double ring ditch. These possible Iron Age settlements are situated within an already existing prehistoric landscape, and Iron Age pottery sherds have been uncovered within and around the areas of interest. These features have not however been subject to intrusive archaeological investigation.

322 The Romano-British archaeological record within the Order Limits, largely consists of pottery finds and crop marks indicating possible Roman settlement activity. One of these groups of features, has been identified northwest of Little Carlton as a series of angular features and pit alignments with smaller rectangular enclosures. A complex of contiguous enclosures have been identified from aerial photography as a possible Romano-British settlement, located to the west of South Muskham. Further north, within the settlement of Cromwell aerial photography has also identified cropmarks of a rectangular enclosure, possibly a Roman villa which extends within the Order Limits. The Great North Road follows sections of the Roman Road of Ermine Street which connected London to Lincoln and York. It is thought to have earlier origins in the prehistoric period.

8.3.2.3 Anglo-Saxon and Medieval

323 The Anglo-Saxon period is one of the least visible archaeological periods, certainly within the region, with only one identified Anglo-Saxon find within the Order Limits, which is a fragment of a brooch.

324 There are a number of villages within 1 km Archaeological Study Area, which can be found within the Domesday Records indicating they were established prior to 1086 AD. This widespread medieval activity can be seen through the large amounts of medieval pottery discovered throughout the Order Limits. A deserted medieval village was identified at Willoughby adjacent to the Order Limits. The earthworks that can still be seen, indicate possible house platforms and ridge and furrow, as well as a well-defined moat.

8.3.2.4 Post-medieval to Modern

325 During the Post-medieval period the Order Limits continued to be rural and lay within an important landscape relating to the 17th century English Civil War, with the main quarters of the Scots army lying within the Site between the Kelham and Muskham bridges. A number of scheduled monuments relating to civil war defences around Newark are recorded to the south-east of the Order Limits. As well as the military encampment, gunflints have also been identified in and around South Muskham and Kelham.

326 The 'Great North Road' is commonly associated with the coaching route out of London to the north, which was established in the 18th century. Prior to this the 'Old North Road' had been in use and followed a slightly different alignment in places.

327 Further significant changes during the period include the establishment of Averham Park, in the south-west of the Order Limits which was an 18th century Hunting Park associated with the Grade II* listed hunting lodge. Ossington Hall and Park, in the north of the Site was an 18th century Hall and associated landscaped gardens, although the buildings have largely been demolished the landscape remains virtually untouched. A small plantation, square in shape, north of Kelham marks the site of an old brickworks, typical of the 'Brickyard Plantations' which can be seen in many parts of the region.

328 Within the north of the Order Limits within the Ossington Airfield, there is a ruined Battle Headquarters dating back to the Second World War.

8.3.2.5 Undated/Unknown

329 The National Mapping Programme (NMP) survey has identified a large number of cropmarks within a 1 km Archaeological Study Area that are undated due to a lack of investigation. Possible archaeological features digitised from the survey are available through the Historic England Aerial Mapping Explorer. The HER provides polygons and points around features identified from aerial photographs but does not provide the digitised versions of the features.

8.3.3 Designated Heritage Assets

330 There are no designated heritage assets within the Order Limits, however there are a number which lie adjacent to the Order Limits.

331 The following assets lie within the 2 km Inner Study Area;

- 19 Grade I listed buildings;
- 13 Grade II* listed buildings;
- 190 Grade II listed buildings;
- 27 scheduled monuments;
- One Grade II registered park and garden; and
- 17 conservation areas.

332 The following highly designated assets lie within the 5 km Outer Study Area (in addition to those listed above):

- 18 Grade I listed buildings;
- 27 Grade II* listed buildings;
- 29 scheduled monuments;
- One Grade II* registered park and garden; and
- One registered battlefield.

8.3.4 Non-Designated Heritage Assets

333 Non-designated heritage assets within the Order Limits largely relate to buried archaeological remains that have been identified from analysis of aerial photographs. The archaeological resource within and surrounding the Site is briefly described in Section 8.3.2 above. Non-designated heritage assets within the Order Limits include:

- Cropmarks of potential archaeological features (including possible henge, possible prehistoric funerary monuments, possible settlement, trackways, linear features and enclosures);
- Possible buried remains of civil war battery;
- Former farmstead;
- Averham Park;
- Park at Ossington Hall; and
- Battle headquarters at Ossington Airfield.

8.4 LIKELY ENVIRONMENTAL EFFECTS

8.4.1 Direct Effects

334 Direct effects on heritage assets arise from physical damage or disturbance which gives rise to loss of heritage significance. These effects could range in significance from nationally significant to locally significant. Direct effects to heritage assets would be permanent and irreversible.

8.4.2 Indirect Effects

335 Indirect effects are those which result in potential change to heritage significance but do not give rise to physical damage or disturbance to an asset. In this context, these effects will generally arise through change to the setting of an asset.

336 Annex 2 of National Planning Policy Framework (NPPF)[51] defines the setting of a heritage asset as 'the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.' The setting assessment will be guided by The Setting of Heritage Assets; Historic Environment Good Practice Advice Note 3[52], which advocates a systematic and staged approach to the assessment of the effects of a development. The indirect effect under consideration is an effect to the significance of a heritage asset caused by the change in the contribution made by the asset's setting to its significance, as a result of development within that setting.

8.4.3 Construction Phase Effects

337 The following potential effects during the construction phase of the Development will be scoped into the assessment:

- Damage to or destruction of archaeological remains through physical effect such as ground disturbance for enabling works including the construction of working areas, haul roads and compounds, topsoil stripping, construction of foundations for the Solar Areas including piling,

[51] Ministry of Housing, Communities and Local Government, 2021. National Planning Policy Framework, Annex 2 Glossary. Available at: https://www.gov.uk/guidance/national-planning-policy-framework/annex-2-glossary [Accessed on 15.06.2023]

[52] Historic England, 2017. The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3, Second edition. https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/ [Accessed on 15.06.2023]

construction of the cable route, hard and soft landscaping and creation of ecological mitigation areas;
- Changes to the historic landscape such as the removal/interruption of field boundaries/systems; and
- Change within the setting of a heritage asset which would affect its heritage significance arising from construction activities causing noise, dust and flashing lights from plant movement.

338 Any below ground disturbance has the potential to have a direct effect upon archaeological remains resulting in total or partial loss of significance. Removal or interruption of field boundaries could affect the integrity of the historic landscape.

8.4.4 Operational Phase Effects

339 The following potential effects during the operational phase of the Development will be scoped into the assessment:

- Change within the setting of a heritage asset which would affect its heritage significance arising from the presence of the Development within the setting of the assets.

340 Change within the setting of an asset could affect its heritage interests from which its significance is derived and therefore lead to a reduction in its overall heritage significance. Effects on the significance of heritage assets are a material consideration in the determination of a DCO application.

8.4.5 Decommissioning Phase Effects

341 Effects to heritage assets during the decommissioning phase are not anticipated. It is anticipated that all effects will have occurred during the construction phase (direct effects) and operational phase (indirect effects). This is based upon the assumption that no additional land take or ground removal will be required for decommissioning works and that all above ground elements of the Development will be removed, returning the landscape to its former state, removing any effects identified from the presence of the Solar Areas during the operational phase.

342 As no significant effects to heritage assets are predicted to arise during the decommissioning phase, it is proposed that this phase is scoped out of the cultural heritage and archaeology assessment.

8.5 ASSESSMENT METHODOLOGY

8.5.1 Scope of Assessment

343 The key issues for the assessment of potential effects to cultural heritage and archaeology relating to the Development are likely to be:

- Permanent direct effects to archaeological remains arising from the construction activities and groundworks which may result in damage to or removal of archaeological remains;
- Permanent or long-term direct effects to the historic landscape through removal of historic hedgerows;

- Temporary indirect effects as a result of construction activities within the setting of heritage assets, where this affects the ability to appreciate or experience the significance of heritage assets; and
- Indirect permanent or long-term effects, as a result of the presence of the operational Solar Areas within the setting of heritage assets, where this affects the ability to appreciate or experience the significance of heritage assets.

8.5.2 Relevant Guidance, Legislation and Information

344 The following guidance, legislation and information sources will be considered when carrying out the Environmental Impact Assessment (EIA).

8.5.2.1 Relevant Guidance

345 The cultural heritage and archaeology Environmental Statement (ES) chapter will follow professional guidance set out below:

- Chartered Institute for Archaeologists (CIfA) 'Standard and Guidance for Historic Environment Desk-Based Assessment'[53];
- 'Managing Significance in Decision-taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2'[54];
- The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3[55];
- Management of Research Projects in the Historic Environment. The MoRPHE Project Managers Guide[56];
- Principles of Cultural Heritage Impact Assessment in the United Kingdom (UK)[57]; and
- Historic England's Statements of Heritage Significance: Analysing Significance in Heritage Assets, Advice Note 12[58].

8.5.2.2 Legislation and Policy

346 The following legislation underpins the assessment of cultural heritage within the planning process:

- Ancient Monuments and Archaeological Areas Act 1979[59];

[53] Chartered Institute for Archaeologists (CIfA), 2014, updated 2020. Standard and Guidance for Historic Environment Desk-Based Assessment.
[54] Historic England, 2015. Managing Significance in Decision-Taking in the Historic Environment, Historic Environment Good Practice Advice in Planning Note 2. Available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/gpa2/ [Accessed on 15.06.2023]
[55] Historic England, 2017. The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3, Second edition. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/ [Accessed on 15.06.2023]
[56] Historic England, 2016. Management of Research Projects in the Historic Environment. The MoRPHE Project Managers Guide. Available at: https://historicengland.org.uk/images-books/publications/morphe-project-managers-guide/heag024-morphe-managers-guide/ [Accessed on 15.06.2023]
[57] IEMA, IHBC and CIfA, 2021. Principles of Cultural Heritage Impact Assessment in the UK. Available at: https://ihbc.org.uk/brighton2021/resources/Principles-of-CHIA-V2%5B4%5D.pdf [Accessed on 15.06.2023]
[58] Historic England, 2019. Statements of Heritage Significance: Analysing Significance in Heritage Assets. Available at: https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/heag279-statements-heritage-significance/ [Accessed on 15.06.2023]
[59] Ancient Monuments and Archaeological Areas Act, 1979. Available at: https://www.legislation.gov.uk/ukpga/1979/46 [Accessed on 15.06.2023

- Protection of Military Remains Act 1986[60]; and
- Planning (Listed Buildings and Conservation Areas) Act 1990[61].

347 The assessment of effects upon cultural heritage and archaeology will be made with reference to the UK Government National Policy Statements (NPSs). The NPSs set out policies of circumstances that the UK Government considers should be taken into account in decisions on Nationally Significant Infrastructure Projects (NSIPs). The following will be relevant to the assessment:

- Overarching NPS for Energy (EN-1)[62]; and
- NPS for Renewable Energy Infrastructure (EN-3)[63] (DECC 2011).

348 In addition to the current NPS, draft NPS(s) were consulted upon in November 2021 although they are not yet adopted. The current NPS EN-3 does not include specific reference to solar technologies however, the latest draft NPS includes a section on solar photovoltaic generation, and this will be considered as the draft progresses.

349 The Site lies within the administrative boundaries of Newark and Sherwood District Council and relevant local planning policy comprises:

- Newark and Sherwood District Council, Amended Core Strategy[64] (Adopted March 2019).

8.5.2.3 Information Sources

350 Key information sources for the assessment of cultural heritage and archaeology are as follows:

- National Heritage List for England (NHLE), which is the only official and up to date database of all nationally designated heritage assets[65];
- The Nottinghamshire HER, comprising a database of recorded archaeological sites, findspots, and archaeological events within the county;
- Relevant national, regional and thematic research frameworks;
- National heritage datasets including the Archaeological Data Service, Heritage Gateway, OASIS database and the National Record of the Historic Environment (NRHE) Excavation Index;
- Historic manuscripts, surveyed maps and Ordnance Survey maps held at the Nottinghamshire Records Office;

[60] Protection of Military Remains Act, 1986. Available at: https://www.legislation.gov.uk/ukpga/1986/35/contents [Accessed on 15.06.2023]
[61] Planning (Listed Buildings and Conservation Areas Act), 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/9/contents [Accessed on 15.06.2023]
[62] Department for Energy, Security and Net Zero, 2011. Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf [Accessed on 15.06.2023]
[63] Department of Energy and Climate Change, 2011. National Policy Statement for Renewable Energy Infrastructure. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf [Accessed on 15.06.2023]
[64] Newark and Sherwood District Council, 2019. Amended Core Strategy. Available at: https://www.newark-sherwooddc.gov.uk/amendedcorestrategy/ [accessed on 15.06.2023]
[65] National Heritage List for England. Available at: https://historicengland.org.uk/listing/the-list [accessed on 15.06.2023]

- Results of Site walkovers and specific heritage asset site visits;
- Relevant primary and secondary sources held at the Nottinghamshire Records Office and in Wessex Archaeology's own library;
- Conservation Area appraisals and Local Planning Policy from Newark and Sherwood District Council;
- Historic Landscape Characterisation[66];
- Publicly available LiDAR and Aerial Photographs;
- Digitised cropmark information from the National Mapping Programme (NMP) available from Aerial Archaeology Mapping Explorer[67]; and
- Geological data available from the British Geology Survey.

8.5.3 Baseline Survey Methodology

8.5.3.1 Direct Effects

351 The baseline survey data will be gathered from within a 1 km Study Area from the sources outlined in Section 8.5.2.3 above. This information will be presented in an Archaeological Desk-Based Assessment which will form a Technical Appendix to the ES chapter.

352 In addition, a geophysical survey will be undertaken across the Order Limits in all areas suitable for survey. The geophysical survey report will be provided as a Technical Appendix to the ES chapter.

353 The results of the geophysical survey and the data gathered for the desk-based assessment will inform the design process and location of infrastructure associated with the Solar Areas. The information will also inform the scope of trial trenching required to inform the ES chapter in consultation with the statutory authorities. The results of trial trenching or other intrusive archaeological works required for the submission of the Development Consent Order (DCO) will be provided as Technical Appendices to the ES chapter.

8.5.3.2 Indirect Effects

354 Indirect effects are those which result in potential change to heritage significance but do not give rise to physical damage or disturbance to the asset. In this context, these effects will generally arise through change to the setting of heritage assets. Setting is not explicitly defined in either statute or NPS EN-1. However, the draft NPS EN-1 does make reference to setting and provides a definition[68], and goes on to set out how setting should be taken into account. Setting is also defined in the NPPF glossary as '*the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an*

[66] Bishop, M (2000). *The Character of Nottinghamshire's Historic Landscape*. Nottinghamshire County Council, Nottingham.
[67] Historic England, Aerial Archaeology Mapping Explorer. Available at: https://historicengland.org.uk/research/results/aerial-archaeology-mapping-explorer/ [Accessed on 15.06.2023]
[68] Department for Business, Energy and Industrial Strategy, 2021. Draft Overarching National Policy Statement for Energy (EN-1). Paragraph 5.9.3, footnote 103. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf [Accessed 16.05.2023].

asset, may affect the ability to appreciate that significance or may be neutral'[69].

355 The Historic England guidance 'The Setting of Heritage Assets'[70] follows this definition and sets out guidelines for considering any effects on the significance of heritage assets arising from change to setting. The guidance accords with the NPS and NPPF in recognising that it is effects to significance which are of concern. The guidance specifically states that 'Setting itself is not a heritage asset' and that 'its importance lies in what it contributes to the significance of the heritage asset or to the ability to appreciate that significance'[71].

356 Assessment of setting is primarily associated with designated heritage assets or non-designated heritage assets of equivalent heritage significance (where such assets are identified). The assessment will follow steps 1-4 of the following five-step sequential process set out in Historic England guidance[72]:

- Step 1: Identify which heritage assets and their settings are affected;
- Step 2: Assess the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated;
- Step 3: Assess the effects of the development, whether beneficial or harmful on that significance or the ability to appreciate it;
- Step 4: Explore ways to maximise enhancement and avoid or minimise harm; and
- Step 5: make and document the decision and monitor the outcomes.

357 In order to better understand the potential effect, a clear statement of the assets' overall heritage significance is required as well as the contribution that setting makes to that heritage significance. It is the final effect on the overall heritage significance of an asset which will be assessed, not simply the degree to which the contribution to that heritage significance made by setting is changed.

358 The baseline for this assessment will be provided within a Historic Environment Settings Assessment document which will be provided as a Technical Appendix to the ES chapter. This will provide an initial assessment of the assets within the 2 km and 5 km Heritage Study Areas. The document will provide a list of the assets considered, their designation and a description of their setting and significance. Observations made during site

[69] Ministry of Housing, Communities and Local Government, 2021. National Planning Policy Framework, Annex 2 Glossary. Available at: https://www.gov.uk/guidance/national-planning-policy-framework/annex-2-glossary [accessed on 15.06.2023]
[70] Historic England, 2017. The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3, Second edition. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/ [accessed on 15.06.2023]
[71] Historic England, 2017. The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3, Second edition. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/ [accessed on 15.06.2023]
[72] Historic England, 2017. The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3, Second edition. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/ [accessed on 15.06.2023]

visits will feed into the rationale as to whether the assets are included for further assessment within the ES chapter.

359 The assessment will identify the assets initially considered. This will be analogous to Stage 1 of the Historic England process set out above, but in order to make a decision on whether to go forward with detailed assessment, consideration will be given to setting and significance, as well as to whether the development will affect heritage significance through change within setting (as per Stage 2 and 3 of the process). The ES chapter will expand upon Steps 2 and 3 for those assets scoped in for further assessment and will include Step 4.

8.5.4 Methodology for the Assessment of Effects

360 The significance of the potential effects of the Development will be classified by professional consideration of the value of the receptor and the magnitude of the potential effect.

8.5.4.1 Value/Importance of Receptors

361 The value of the baseline conditions, including the importance of environmental features on or near to the Development, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

362 Table 8.1 details the proposed framework for determining the value (or heritage significance) of receptors.

Table 8.1: Framework for Determining Value (Heritage Significance) of Receptors

Value (heritage significance) of Receptor	Definition
Very High	• World Heritage Sites inscribed for their archaeological or built heritage qualities; or • World Heritage Sites inscribed for their historic landscape qualities. Historic landscapes of international importance.
High	• Scheduled Monuments and undesignated assets of schedulable quality and importance; • Listed buildings; • Designated and undesignated historic landscapes of outstanding interest (including Grade I and Grade II* registered parks and gardens); and • Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance and of demonstrable national importance.
Medium	• Local authority designated sites. Previously unknown and undesignated sites that would justify Local Authority designation (i.e., sites of regional importance). Sites with specific and substantial importance to the local community; • Conservation Areas; • Historic buildings that can be shown to have exceptional qualities or historic association. Historic townscapes or

Value (heritage significance) of Receptor	Definition
	built-up area with historic integrity in their buildings or built setting; and • Designated special historic landscapes (including Grade II registered parks and gardens). Undesignated historic landscapes that would justify special historic landscape designation. Landscapes of regional importance. Historic landscapes with specific and substantial importance to the wider community.
Low	• Archaeological assets of limited value, but with potential to contribute to local research objectives; • Locally listed buildings, historic (unlisted) buildings of modest quality in their fabric of historical association; and • Undesignated historic landscapes of local importance. Historic landscape with specific and substantial importance to local interest groups but with limited wider importance.
Negligible	• Sites/features that are so badly damaged that too little now remains to justify their inclusion at a higher grade and with no surviving historic content; • Buildings that are so badly damaged that too little now remains to justify their inclusion at a higher grade and with no surviving historic content; and • Landscapes that are so badly damaged that too little now remains to justify their inclusion in a higher grade and with no surviving historic content.
Unknown	• The importance of the resource cannot be ascertained due to limited existing information; therefore, the value of the resource is classified as ranging from high to low sensitivity; and • Buildings with some hidden (i.e., inaccessible) potential for heritage significance.

8.5.4.2 Magnitude of Change

363 The magnitude of potential change will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

364 The criteria for assessing the magnitude of an effect are presented in Table 8.2.

Table 8.2: Framework for Determining Magnitude of Change

Magnitude of Change		Definition
Very High/High	Negative	• Major physical damage to or significant alteration to a site, building or other feature; • Extensive change (*i.e.,* loss of dominance, intrusion in key view or sightline) to the setting of a scheduled monument, listed building or other feature registered

Magnitude of Change		Definition
		as nationally important which may lead to a major reduction in the contribution of setting to the significance of a heritage asset itself hence a loss of overall significance of the asset; and/or • Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; gross change to air quality; fundamental changes to use of access; resulting in total change to historic landscape character.
	Positive	• Large scale or major improvement of the heritage asset; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Negative	• Damage or alteration to a site, building or other feature. Encroachment on an area considered to have a high archaeological potential; • Change in setting (*e.g.,* intrusion on designed site-lines and vistas) to monuments/buildings and other features, which may lead to a moderate reduction in the contribution of that setting to the significance of the heritage assets, and hence a reduction in the assets' overall significance; and/or • Changes to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; noticeable differences in air quality, considerable changes to use or access; resulting in moderate changes to historic landscape character.
	Positive	• Benefit to, or addition of, key characteristics, features or elements or improvements to a heritage asset
Low	Negative	• Minor damage or alteration to a site, building or other feature. Encroachment on an area where it is considered that low archaeological potential exists; • Minor change in setting (*e.g.,* above historic skylines or in designed vistas) of monuments. Listed buildings, sites and other features which may lead to a small reduction in the contribution the setting makes to the significance of the heritage asset with an appreciable loss in the asset's overall significance; and/or • Change to a few key historic landscape elements, parcels or components; slight visual changes to few key aspects of the historic landscape; limited changes to noise levels or sound quality; limited changes in air quality, slight changes to use or access; resulting in limited changes to historic landscape character.

Magnitude of Change		Definition
	Positive	• Minor benefit to, or addition of key characteristics, features or elements; some beneficial effect on heritage asset or a reduction in the risk of some negative effect occurring.
Negligible	Negative	• Very minor changes to archaeological materials or building elements; • Slight change in setting with very limited change in the contribution that setting makes to the significance of the asset and no loss of overall significance; and/or • Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to air quality, very slight changes to use or access; resulting in very small change to historic landscape character.
	Positive	• Very minor benefit.
No change	Neutral	• No change would be perceptible either positive of negative.

8.5.4.3 Significance of Effect

365 The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects.

366 The assessment of the significance of an effect on a heritage asset is largely a product of the heritage significance of an asset and the magnitude of the effect that might give rise to harm (or perhaps a beneficial change), qualified by the application of professional judgement. An assessment of effects on a heritage asset involves an understanding of the heritage significance of the asset and in the case of an indirect effect, the contribution made by the setting to the heritage significance of the asset. The effect being assessed is whether the asset loses (or gains) significance due to a reduction/other change in the contribution that its setting makes to significance, as a result of development within that setting. Planning policy recommends that the level of detail should be proportionate to the heritage significance of the assets and no more than is sufficient to understand the potential effect of the proposal.

367 The significance of effects of demolition/construction and completion of the Development will be assessed separately, and residual effects will be assessed taking into account mitigation measures where proposed. The overall effects of the Development on any part of the historic environment resource will be assessed as a combination of the effects of construction and operation.

368 Table 8.3 summarises guideline criteria for assessing the significance of effects.

Table 8.3: Framework for Assessment of the Significance of Effects

Magnitude of Effects	Value (Heritage Significance) of Resource or Receptor				
	Very High	**High**	**Medium**	**Low**	**Negligible**
Very High	Major	Major	Moderate	Minor	Not significant
High	Major	Major	Moderate	Minor	Not significant
Medium	Moderate	Moderate	Moderate	Minor	Not significant
Low	Minor	Minor	Minor	Not significant	Not significant
Negligible	Not significant	Not significant	Not significant	Not significant	Not significant

369 Effects predicted to be of major or moderate significance are considered to be **'significant'** in the context of the EIA Regulations and are shaded in light grey in the above table.

370 Effects will be determined with reference to their geographic extent (local level (onsite or neighbouring site), District level (Nottinghamshire), Regional level (Midlands), National level (UK) and International level) and with reference to their duration (short-term (construction and decommissioning) and long-term (operation)).

8.6 ASSESSMENT OF CUMULATIVE EFFECTS

371 The ES chapter will include an assessment of cumulative effects of the Development upon the cultural heritage and archaeological resource in conjunction with other surrounding developments. Presently, the list of cumulative schemes for assessment has not been prepared. Cumulative effects of the Development and other schemes will be undertaken using the methodology outlined above for both direct and indirect effects.

372 The nature of the archaeological resource is such that the vicinity within which cumulative effects could occur is restricted to the immediate environs surrounding the Site. In this instance a cumulative effect could occur where the assets extend beyond the boundary of the Site or are predicted to do so. As such, cumulative schemes within a 500 m radius of the Order Limits will be considered for the cumulative assessment.

373 Cumulative effects to the significance of designated heritage assets arising from change within their setting as a result of the Development and other schemes, could arise through the development on an area of a site within which the interests of the assets are experienced and appreciated. As such, cumulative schemes within a 5 km radius of the Order Limits will be considered for the cumulative assessment. The range is selected based on overlapping visual envelopes which has the potential to cause cumulative effects to the significance of heritage assets through development within

their setting in combination with the Development. The assessment will largely be based upon Zone of Theoretical Visibility (ZTV) analysis (and informed by site visits as appropriate).

8.7 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

374 The aspects described in Table 8.4 below are proposed to be scoped out of the assessment.

Table 8.4: Matters to be Scoped Out of the Assessment

Effects	Justification
Effects to buried archaeological remains during the operational phase.	It is not anticipated that any additional land take or ground removal will be required for any maintenance activities during the operational phase of the Development. As such, there is no potential for damage or destruction of buried archaeological remains to occur to affect the significance of the assets.
Effects during the decommissioning phase.	It is anticipated that all effects will have occurred during the construction phase (direct effects) and operational phase (indirect effects). This is based upon the assumption that no additional land take or ground removal will be required and that all the above ground elements of the Development will be removed, returning the landscape to its former state.
Effects to Grade II designated heritage assets at a distance greater than 2 km from the Order Limits.	It is not anticipated that significant effects to Grade II designated heritage assets will occur to those which lie greater than 2 km distance from the Order Limits. These assets are not considered to derive their significance from the Site and are less sensitive to change than highly designated assets. Due to distance and intervening topography, the heritage significance of these assets is not anticipated to be affected by the Development.
Effects to designated heritage assets beyond a 5 km radius.	Due to distance, the nature of the Development and intervening topography, assets beyond 5 km are unlikely to receive any significant effects to their heritage significance as a result of the Development.
Cumulative effects to buried archaeological remains beyond 500 m	It is not anticipated that sites/deposits or archaeological features associated with those which may be found within the Site, will extend beyond a 500 m radius from the Site. As such there is no likelihood that a cumulative effect to buried archaeological remains could occur as a result of the Development and other developments beyond this radius.
Cumulative effects to designated heritage assets beyond 5 km radius	It is not anticipated that a significant effect to designated heritage assets will occur as a result of the development in combination with other development beyond a 5 km radius.

9 NOISE

9.1 INTRODUCTION

375 This chapter of the Scoping Report relates to the potential effects of the Development on the environment due to noise and vibration during the construction, operation and decommissioning phases. This assessment will be undertaken by Metrica Environmental Consulting Ltd.

376 This chapter includes the following elements:

- Consultation to Date;
- Preliminary Baseline Conditions;
- Likely Environmental Effects;
- Assessment Methodology;
- Assessment of Cumulative Effects; and
- Matters and Aspects Scoped Out.

9.2 CONSULTATION TO DATE

377 No consultation has been undertaken to date. Consultation will be undertaken with the Environmental Health Department of NSDC to agree the noise and vibration assessment methodology and assessment criteria.

9.3 PRELIMINARY BASELINE CONDITIONS

9.3.1 Proposed Study Area/Survey Areas

378 With regards to construction noise, Design Manual for Roads and Bridges (DMRB) Volume 11 (Sections 3.5 – 3.8) provides the following study areas:

- Construction Activities – 300 m;
- Construction Traffic – 50 m either side of the kerb line for public roads; and
- Construction Vibration – 100 m.

379 There are no guidance documents or standards which present study areas for operational noise effects. As such, the assessment of operational effects will include receptors within 300 m of the Order Limits, based on professional judgement and experience on similar projects.

380 The above study areas will be adopted as part of the Environmental Statement (ES).

381 The ES will identify all residential receptors within 300 m of the Order Limits. Consultation will be undertaken with Newark and Sherwood District Council to agree a representative selection of receptors for assessment. In general, where numerous receptors are located in close proximity to each other, the assessed receptor will be that which is closest to the Development, on the basis that should effects be acceptable at the closest receptor, they will be acceptable at locations further from the Development.

9.3.2 Existing Baseline Conditions

382 No information on the existing baseline noise conditions is currently available. It is proposed this information will be determined using data collected during a background noise survey.

383 Numerous noise sensitive residential receptors are located around the current Order Limits.

384 Following a desktop review, it is anticipated that the noise climate around nearby receptors that are within 1 km of the A1 and A616 roads, and East Coast railway line will be dominated by road traffic and rail movements on these routes, and to a lesser extent by road traffic on local roads. Elsewhere, the noise climate around nearby receptors will be dominated by road traffic from local roads, and isolated noise sources such as farm operations.

9.4 LIKELY ENVIRONMENTAL EFFECTS

385 Potential noise effects during construction and decommissioning would typically be due to the undertaking of site preparation works, plant installation and cable laying. The level of noise at nearby receptors due to construction activities would be dependent on the distance to construction works and equipment being used.

386 In addition, potential noise effects would be likely from construction traffic on public roads and haul routes within the Order Limits.

387 Noise effects due to construction activities would be temporary in nature and are unlikely to result in significant effects, however it is not possible to conclude that construction effects would be 'not significant' in all cases; as such, a proportionate assessment of construction noise and vibration will be undertaken to determine the level of effect and identify appropriate mitigation, where it might be required.

388 During the operational phase, noise would be generated by the substations, inverters and transformers associated with the Development. The level of noise at nearby receptors would be dependent on the plant noise emission levels and distance to the receptors. Operational noise levels will be predicted at the nearest residential receptors and assessed to determine the magnitude of any effect.

389 Vibration associated with piling of photovoltaic (PV) mounting structures and compaction of tracks / hardstanding areas have the potential to cause an effect at nearby receptors. All other construction-phase activities, and all operational-phase and decommissioning-phase activities produce negligible levels of vibration, and as such do not require detailed assessment.

9.5 ASSESSMENT METHODOLOGY

9.5.1 Scope of Assessment

390 The key issues for the assessment of potential noise and vibration effects relating to the Development would be:

- Effects arising from noise and vibration emitted by construction plant during the construction phase. These effects would be short-term and reversible; and
- Operational effects from noise generated by substations, inverters and transformers. These effects would be ceased completely when operation of the Development ceases and are therefore long-term and reversible.

9.5.2 Relevant Guidance, Legislation and Information

391 The following guidance, legislation and information sources will be considered when carrying out the Environmental Impact Assessment (EIA):

- Control of Pollution Act 1974[73];
- Environmental Protection Act 1990[74];
- National Policy Statements (NPS) EN1, EN3 and EN5;
- National Planning Policy Framework (NPPF)[75];
- National Planning Policy Guidance (NPPG)[76];
- The Noise Policy Statement for England (NPSE)[77];
- British Standards (BS) 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142:2014)[78];
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233:2014)[79];
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 (Noise)[80];
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites –Part 2 (Vibration)[81];
- Calculation of Road Traffic Noise (CRTN)[82]; and
- Design Manual for Roads and Bridges (DMRB) Volume 11[83].

9.5.3 Baseline Survey Methodology

392 The scope and survey methodology (including number of locations and duration of measurements) will be agreed in consultation with the Environmental Health Department at NSDC.

393 Noise monitoring will be undertaken at locations representative of the assessed noise sensitive receptors to determine the existing daytime and night-time background noise levels. The monitoring will be undertaken in accordance with the methodology described in BS 4142:2014.

394 A logging weather station will be installed onsite during surveys so any periods of adverse weather conditions can be identified and omitted from further analysis, in accordance with BS 4142:2014.

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[73] HMSO (1974): Control of Pollution Act, Part III.
[74] HMSO (1990): Environmental Protection Act, Part III.
[75] Ministry of Housing, Communities and Local Government (MHCLG), now the Department for Levelling Up, Housing and Communities (2021), National Planning Policy Framework (NPPF).
[76] Department for Communities and Local Government, now the Department for Levelling Up, Housing and Communities (2014, updated 2019) - Planning Practice Guidance. [Online] Accessed via https://www.gov.uk/guidance/noise--2 [accessed June 2023]
[77] Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England (NPSE).
[78] British Standards Institute (BSI, 2019), BS 4142 2014-A1 2019: Methods for rating and assessing industrial and commercial sound.
[79] British Standards Institute (BSI, 2014) 8233:2014 Guidance on sound insulation and noise reduction for buildings.
[80] British Standards Institute (BSI, 2014), BS 5228:2009-A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1).
[81] British Standards Institute (BSI, 2014), BS 5228:2009-A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS 5228-2).
[82] HMSO Department of Transport (1988), Calculation of Road Traffic Noise (CRTN).
[83] Highways England (2019): Design Manual for Roads and Bridges (DMRB) – LA111 – Noise and Vibration, Nov 2019.

395 Vibration effects will be predicted using modelling (see Section 9.5.4.3), and this does not require baseline survey.

9.5.4 Methodology for the Assessment of Effects

9.5.4.1 Construction and Decommissioning Noise

396 Noise associated with construction and decommissioning works will be predicted at the assessed receptors using the methodology in BS 5228-1 based on plant noise emission levels, distance to receptors, plant 'on-time' etc. The predicted levels will be assessed against the criteria in Section E.3.3 *Example Method 2: 5 dB(A) Change* of BS 5228-1.

397 Example Method 2 states that noise is potentially significant if the total noise (pre-construction ambient level plus construction or decommissioning noise) exceeds the preconstruction ambient noise by 5 decibels (dB) or more, subject to lower cutoff values of 65 dB, 55 dB and 45 dB $L_{Aeq,t}$ from construction noise alone for daytime, evening and night-time periods respectively, and where construction or decommissioning duration is of one month or more.

398 Table 9.1 presents the criteria for the construction or decommissioning noise magnitude of effect, assuming each activity takes place for one month or more, based on criteria in BS 5228-1. The criteria in Table 9.1 apply where the existing ambient noise at assessment receptors is below 60 dB, 55 dB or 45 dB during daytime, evening and night-time periods respectively. Where the existing ambient noise level is above these levels, the magnitude of effects will be adjusted accordingly.

Table 9.1: Construction and Decommissioning Noise Magnitude of Effect

Magnitude of Effect	Daytime[84]	Evening[85]	Night-time[86]
High	> 75 dB L_{Aeq}	> 65 dB L_{Aeq}	> 55 dB L_{Aeq}
Moderate	> 65 dB L_{Aeq} ≤ 75 dB L_{Aeq}	> 55 dB L_{Aeq} ≤ 65 dB L_{Aeq}	> 45 dB L_{Aeq} ≤ 55 dB L_{Aeq}
Low	> 55 dB L_{Aeq} ≤65 dB L_{Aeq}	> 45 dB L_{Aeq} ≤55 dB L_{Aeq}	> 35 dB L_{Aeq} ≤45 dB L_{Aeq}
Negligible	≤ 55 dB L_{Aeq}	≤ 45 dB L_{Aeq}	≤ 35 dB L_{Aeq}

399 The criteria in Table 9.1 apply where an activity is undertaken for a period of one month or more. For activities less than one month, the magnitude of effect is considered to be Negligible.

9.5.4.2 Construction and Decommissioning Traffic Noise

400 Baseline traffic noise levels will be predicted at assessment receptors based on the methodology in CRTN, utilising baseline traffic flows along the construction traffic route for the proposed year of construction. The percentage increase in all traffic and Heavy Goods Vehicles (HGVs) will be

[84] 0700 – 1900 Monday – Friday, 0700 – 1300 Saturdays
[85] 1900 – 2300 weekdays, 1300 – 2300 Saturdays and 0700 – 2300 Sundays
[86] 2300 – 0700 all days

used to calculate the likely change in traffic noise due to construction traffic during the construction works. Decommissioning traffic noise effects are expected to be lower than construction noise effects, and hence will be assumed to be the same, as a worst-case, and will not be assessed separately.

401 The magnitude of effects for construction traffic noise, as defined in DMRB, are presented in Table 9.2.

Table 9.2: Construction Traffic Noise Magnitude of Effect

	Magnitude of Effect			
	Negligible	**Small**	**Moderate**	**High**
Increase in Traffic Noise Level.	< 1 dB	1 dB – 3 dB	3 dB – 5 dB	>5 dB

9.5.4.3 Construction Vibration

402 The level of vibration at the assessment receptors will be predicted using the method in Table E.1 of BS 5228-2 which is based on the distance to receptor and a scaling factor.

403 Table 9.3 presents the vibration level effect, based on the guidance on effects of vibration levels in Table B.1 of BS 5228-2, along with the subsequent magnitude of effect.

Table 9.3: Construction Vibration Magnitude of Effect

Vibration Level (mm/s)	**Effect**	**Magnitude of Effect**
> 10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	Major
≥ 1.0 to < 10	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Moderate
≥ 0.3 to < 1.0	Vibration might just be perceptible in residential environments.	Minor
< 0.3	Vibration unlikely to be perceptible.	Negligible

9.5.4.4 Operational Noise

404 The assessment of operational noise effects will be undertaken according to the methodology set out in BS 4142:2014.

405 The baseline noise measurements will be used to determine representative daytime and night-time background noise levels at the assessed receptors.

406 Noise from operational plant such as substations, inverters and transformers will be predicted using noise modelling software and plant noise emission data provided by the Applicant.

407 The assessment will consider the level by which the Development's BS 4142 Rating level exceeds the prevailing background sound levels, as well as the

context in which the sound will occur. BS 4142 states that a difference of around +5 dB is likely to be an indication of an adverse effect.

408 Where background and rating levels are low[87], BS 4142:2014 states that the absolute level might be as, or more, relevant than the margin by which the Rating level exceeds the background noise level. As such, it is proposed that noise limits will be a combination of a margin of 5 dB above the representative background level, subject to a fixed lower threshold of 35 dB, which would apply in low background noise situations.

409 Table 9.4 below presents the operational noise magnitude of effect.

Table 9.4: Operational Noise Magnitude of Effect

Magnitude of Effect	Effect
High	Rating level above 35 dB and 10 dB or more above background, depending on context.
Moderate	Rating level is between 6 dB and 10 dB above background, depending on context.
Low	Rating level is between 0 dB and 5 dB above, depending on the context; or rating level does not exceed 35 dB.
Negligible	Rating level is below background, depending on context.

9.5.4.5 Sensitivity of Receptors

410 The sensitivity of potentially affected receptors will be assessed in line with Table 9.5 below.

Table 9.5: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	Residential dwellings, schools and hospitals.
Medium	Offices, internal teaching / training spaces.
Low	Commercial premises.

411 Based on an initial desk-based study, the closest (and therefore worst case) receptors are residential and are therefore of High Sensitivity. As such, providing noise and vibration effects are not significant at the closest receptors, effects at all other receptors will also be not significant, regardless of sensitivity.

9.5.4.6 Significance of Effect

412 The sensitivity of the receptor and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 9.6 summarises guideline criteria for assessing the significance of noise and vibration effects.

[87] BS 4142:1997 states that *'background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low'.*

Table 9.6: Framework for Assessment of the Significance of Effects

Magnitude of Effects	Sensitivity of Resource or Receptor				
	Very High	High	Medium	Low	Negligible
High	**Major**	**Major**	**Moderate**	Minor	Minor
Medium	**Major**	**Moderate**	Minor	Minor	Negligible
Low	**Moderate**	Minor	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

413 Effects predicted to be of major or moderate significance are considered to be **'significant'** in the context of the EIA Regulations and are shaded in light grey with bold font in the above table.

9.6 ASSESSMENT OF CUMULATIVE EFFECTS

414 The assessment will identify any other Solar or Battery Energy Storage System (BESS) developments either operational, consented or currently in planning (at a point three months before submission of the DCO application for the Development; see Section 4.2), which have the potential to result in cumulative effects; i.e., where the study area (see Section 9.3.1) for the other development overlaps with the study areas for the Development. Where required, the potential cumulative noise effects will be assessed according to the assessment criteria agreed with statutory consultees.

9.7 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

415 The aspects described in Table 9.7 below are proposed to be scoped out of the assessment.

Table 9.7: Matters to be Scoped Out of the Assessment

Effects	Justification
Vibration from Construction, Operation and Decommissioning Traffic.	With regards to vibration from traffic sources, DMRB states that normal "use of the building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic"[88]. As such, it is considered there is no realistic likelihood that vibration from traffic sources will result in an adverse effect. It is therefore proposed that vibration from construction, operation and decommissioning traffic can be scoped out of further assessment.
Operation and Decommissioning Vibration	There is no reasonable prospect that any plant installed as part of the Development would produce significant vibration effects.

[88] DMRB Volume 11, Section 3, Part 7. Section 3.32 2011 (withdrawn) Available at https://www.standardsforhighways.co.uk/tses/attachments/164c25b5-5ae5-4a2f-9522-613a30a2720b?inline=true [accessed on 19/06/2023]

Effects	Justification
	No piling or track compaction is proposed during the decommissioning phase, and as a result there is no potential for significant vibration effects. As such, operation and decommissioning vibration will be scoped out of any further assessment.
Operation Traffic Noise	Operation-phase traffic would be limited to occasional maintenance visits only, and as such there is no prospect of a significant effect from operational traffic movements.

10 SOCIO-ECONOMICS, TOURISM, RECREATION AND LAND-USE

416 The Socio-economics, Tourism, Recreation and Land-use Chapter of the Environmental Statement (ES) will bring together these related assessments of the likely socio-economic effects of the Development upon the population, economy and use of the land within and around the Development. This section sets out the proposed approach that will be taken in the assessments, together with a summary of information that has been identified to date.

10.1 SOCIO-ECONOMICS AND TOURISM

10.1.1 Introduction

417 This section will consider the likely socio-economic and tourism effects that could result from the construction and operation of the Development.

10.1.2 Preliminary Baseline Conditions

10.1.2.1 National Policy Statements

418 The Overarching National Policy Statement (NPS) for Energy (EN-1) specifies the importance of evidence-based socio-economic assessment. EN-1 states that the Secretary of State (SoS) should consider any relevant positive provisions and legacy benefits made by the Applicant in relation to socio-economics.

419 An update to the EN-1 (2011) was published in September 2021 and a revised version was published in February 2023[89], although it has not yet been formally adopted. Key updates in the 2023 EN-1 compared to the 2011 publication relate to range of effects to be considered and suggested specific mitigation relating to potential effects during each phase of a development.

420 EN-1 (2011) makes reference to a long list of potential effects to consider including (but not limited to), creation of jobs and training opportunities, contribution to low-carbon industries, provision of additional local services

[89] UK Government Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf [accessed on 31/10/2023].

and improvements to local infrastructure, any indirect beneficial effects for the region, effects on tourism, the effect of a changing influx of workers, and cumulative effects.

421 EN-1 (2023) also makes reference to the need to consider development of accommodation strategies, if appropriate, to address any potential effects during the construction and decommissioning phases. In addition, it also refers to the potential for the SoS to require the approval of an employment and skills plan detailing arrangements to promote local employment and skills development opportunities.

422 National Policy Statement (NPS) for Renewable Energy (EN-3) was published 2011, and a revision was published in September 2023 although it has not yet been adopted. The 2011 adopted version does not explicitly reference solar PV electricity generation. Consideration of solar and the potential for associated socio-economic effects is referenced in the revised EN-3 in respect of the potential for socio-economic benefits of the Development infrastructure being retained after the operational life of solar photovoltaic generation.

10.1.2.2 National Planning Policy Framework

423 The most recent National Planning Policy Framework (NPPF) was published in July 2021. A key focus of the framework is to achieve sustainable development which requires three interdependent objectives that need to be pursued in a mutually supportive way:

- Economic Objective: Ensure that the economy is strong, responsive and competitive to support growth;
- Social Objective: Ensure there is a sufficient supply and range of homes available to meet present and future demand; and
- Environmental Objective: Ensure the natural, built and historic environment is protected including mitigating and adapting to climate change.

10.1.2.3 Levelling Up White Paper

424 The strategy presented by the United Kingdoms (UK) Government's Levelling Up White Paper is underpinned by the fact that, although the UK as a whole is successful when compared to other countries globally, there is great disparity in respect of the shared value of that success within the UK itself and realising each communities' potential. As such, the White Paper sets out a programme to 'Level Up' the UK to transform places and boost local growth, including through, but not limited to, encouraging strong innovation, private sector investment, climate conducive development, and improvement in workers' skill and transport systems. The key missions set by the White Paper are, in summary:

- Boost in productivity, wages, jobs and living standards by investment and growth in the private sector;
- Provide opportunities and improvement in public services;
- Contribute to and encourage a sense of community, local pride and belonging; and
- Empowerment of local leaders and communities.

425 It is important that the needs of an area are reflected in the proposals made, so that the benefits brought by developments should appropriately contribute to, and ultimately result in, true levelling up of the economy, the environment, and society within the United Kingdom (UK).

10.1.2.4 Newark and Sherwood Local Economic Strategy 2021-2026

426 There are several key national, regional and local strategies that shape the Local Economic Strategy of Newark and Sherwood District Council (NSDC). These strategies are:

- Strategic Economic Plan (SEP);
- Local Industrial Strategy (LIS); and
- Nottinghamshire Recovery Action Plan.

427 In late 2018 the Local Enterprise Partnership, D2N2, submitted the SEP with the following vision:

- "By 2030 D2N2 will have a transformed high value economy, prosperous, healthy and inclusive, and one of the most productive in Europe. The spark in the UK's engine."

428 The SEP is a plan for the regional economy of Nottinghamshire and Derbyshire that; directs current and future funding, supports and informs bids for funding, influences approaches to mainstream activities, provides confidence for investment, and provides a framework for delivery for the delivery of the D2N2 Industrial Strategy.

429 In March 2020 D2N2 submitted the Local Industrial Strategy (LIS) to Government with evidence-backed priorities for growth. The LIS contained three guiding principles for the delivery of the vision: productivity; clean growth; and connectivity.

430 Following the LIS submission D2N2 have worked to develop the 'Economic Recovery and Growth Strategy' which has been presented to partners in Autumn 2020 with a vision of "The visionary minds and green heart that will power the UK's recovery, rebuilding and growth."

431 In September 2020 a Nottinghamshire Recovery Action Plan was developed that focused on themes of response, recovery, restore, resilience and renewal.

432 In 2020 the Council reviewed and updated the 2020-2023 Community Plan to reflect the changes that the Covid pandemic had made in the Councils priorities. It identifies seven key objectives, of which three priorities are focused on economic growth:

- Deliver Inclusive and sustainable economic growth;
- Create more and better-quality homes through our role as landlord, developer and planning authority; and
- Create vibrant and self-sufficient local communities where residents look out for each other and actively contribute to their local area.

10.1.2.5 Current Socio-economic Conditions

433 The Development is located in the East Midlands region of the UK, in the county of Nottinghamshire and the local authority area of NSDC. Baseline socio-economic conditions in the Newark and Sherwood Local Authority

Area (NSLAA) and two comparator areas (the East Midlands and England or Great Britain) are provided in this section.

434 A summary of key baseline characteristics of the relevant geographies at this present time is as follows.

Population

435 Between 2011 and 2021 the population of the NSLAA grew by 7.1 %. This compares to a population growth of 7.7 % in the East Midlands and 6.6 % in Great Britain[90].

436 Between the last two censuses, the average (median) age of Newark and Sherwood increased by two years, from 43 to 45 years of age. This area had a higher average (median) age than the East Midlands as a whole in 2021 (41 years), and a higher average (median) age than England (40 years). The fastest growing age group in NSLAA in this time was those aged 65 and over with an increase of 26.7%. This compares to a 20.1% rise in the over 65s across England as a whole.

437 Between 2025 and 2030, the population of NSLAA is projected to increase from 127,850 to 131,356 an increase of 2.75 %. This compares to a likely population growth of 10% in Great Britain by mid-2030[91]. Meanwhile the East Midlands is projected to be the fastest-growing region, increasing population by 7% by mid-2028.

438 Employment

439 Based on data from the Office for National Statistics, as of 2022, 61,500 people were economically active in the NSLAA (79%), compared to 77.4% in the East Midlands and 78.5% in Great Britain.

440 Of Newark and Sherwood residents aged 16 years and over, 54.8% said they were employed in 2021 (rather than economically active; and excluding full-time students)[92]. This is down from a level of 56.6% in 2011.

441 In 2021, just over 1 in 50 people (2.1%) said they were unemployed, compared with 3.2% in 2011. The percentage of retired Newark and Sherwood residents also increased from 24.9% to 26.6%.

442 The decrease in the percentage of people aged 16 years and over (excluding full-time students) who were employed was greater in Newark and Sherwood (1.8%) than across the East Midlands (1.0%, from 56.1% to 55.1%). Across England, the percentage of employed people fell by 0.8%, from 56.5% to 55.7%.

[90] Office of National Statistics (2022). How the population changed in Newark and Sherwood: Census 2021. Available at: https://www.ons.gov.uk/visualisations/censuspopulationchange/E07000175/ [accessed on 17/07/2023].
[91] Office of National Statistics (2022). Census 2021: National Population Projections – 2020-based interim. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2020basedinterim#:~:text=Figure%201%3A%20UK%20population%20projected,71.0%20million%20by%20mid%2D2045 [accessed on 17/07/2023].
[92] Office of National Statistics (2022). How the population changed in Newark and Sherwood: Census 2021. Available at: https://www.ons.gov.uk/visualisations/censuspopulationchange/E07000175/ [accessed on 17/07/2023].

443 It should be noted that the 2021 Census took place during the coronavirus (COVID-19) pandemic, a period of rapid and unparalleled change; the national lockdown, associated guidance and furlough measures will have affected the labour market and our ability to measure it.

444 Table 10.1 shows the sectoral breakdown of employment and how concentrated employment is in that sector in NSLAA relative to the sector in the East Midlands or nationally.

Table 10.1 Employment Sectors (2021)[93]

Employee Jobs (2021)	**Newark and Sherwood Jobs**	**Sherwood and Newark %**	**East Midlands %**	**Great Britain %**
Total Employee Jobs	*49,000*			
Full-time	*32,000*	*65.3*	*66.8*	*68.1*
Part-time	*17,000*	*34.7*	*33.2*	*31.9*
B: Primary Industries (Agriculture, Mining and Utilities)	50	0.1	0.2	0.1
C: Manufacturing	6,000	12.2	12.0	7.6
D: Electricity, Gas, Steam & Air Conditioning Supply	150	0.3	0.8	0.4
E: Water Supply & Waste Management	700	1.4	0.7	0.7
F: Construction	3,000	6.1	4.7	4.9
G: Wholesale and Retail Trade	7,000	14.3	16.3	14.4
H: Transportation and storage	4,000	8.2	6.5	5.1
I: Accommodation and food service activities	6,000	12.2	6.5	7.5
J: Information and communication	2,500	5.1	7.1	8.9
K: Financial and insurance activities	500	1.0	1.9	3.6
L: Real estate activities	600	1.2	1.4	1.8
M: Professional, scientific and technical activities	2,500	5.1	7.1	8.9
N: Administrative and support service activities	3,000	6.1	8.1	8.9

[93] Office of National Statistics (2022). Business Register and Employment. Available at: https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/businessregisterandemploymentsurvey [accessed on 17/07/2023].

Employee Jobs (2021)	Newark and Sherwood Jobs	Sherwood and Newark %	East Midlands %	Great Britain %
O: Public administration and defence	1,500	3.1	4.0	4.6
P: Education	3,000	6.1	8.9	8.8
Q: Human health and social work activities	6,000	12.2	13.8	13.7
R: Arts, entertainment and recreation	1,250	2.6	2.3	2.3
S: Other service activities	1,250	2.6	1.8	1.9

445 The largest employment sectors in Newark and Sherwood, the East Midlands and also Great Britain (GB) are the 'Wholesale and Retail Trade' sector and the 'Human Health' sector. In NSLAA 'Manufacturing' and 'Accommodation and food service activities' also make up a large proportion of the employment.

446 The proportion of workers in the 'Manufacturing' sector and 'Accommodation and food services' within NSLAA are both approximately 1.6 times greater than those of Great Britain, showing that these are very important sectors to the district. Construction employment is also slightly higher in NSLAA relative to Great Britain at 1.25 times the GB average.

Economic Output

447 In 2019 The Newark and Sherwood economy was valued at £2.2bn. The area has experienced increased growth since 1999 with businesses and industry improving.

448 It is believed that Covid-19 will have resulted in the loss of £307m GVA across Newark and Sherwood. 'Accommodation and food' is predicted to be the worst affected sector losing £65m in 2020.

449 Table 10.2 shows the latest available figures for the size of the economy in each geographic area as measured by GVA and employment.

Table 10.2 Employment Figures and Size of the Economy

Geographic Area	GVA (£ million)	Employment (,000)	Unemployed (,000)
Newark and Sherwood Local Authority	2,218[94]	57	2
East Midlands	90,000[95]	2,371[96]	102
United Kingdom	609,839[97]	32,882	841

10.1.2.6 Tourism in Newark and Sherwood

450 According to the Newark and Sherwood District Council Visitor Economy Strategy 2020-203 which utilised Visit England data #STEAM data, "*overall visitor spend in 2019 within NSDC stood at £298.32 million (+6.0% on 2018). This comprised:*

- *Domestic day visitors: £153.50 million (+4.7% on 2018); and*
- *Overnight visitors: £144.83 million (+7.4% on 2018)*".

451 The Strategy states that "*The main reasons for visiting the [NSDC] district were attending arts events/festivals (21%); visiting attractions (17%); and general sightseeing (15%).*

Visitors rated their experiences very highly. 97% would recommend Newark & Sherwood to a friend, with 30% giving their overall visitor experience 10/10 and 40% rating it "better than expected". Sherwood Forest was the attraction with the highest levels of both spontaneous (48%) and prompted (50%) awareness in the district."

452 Apart from the Sherwood Forest Regional Park other key visitor destinations within 2 km of the Order Limits are: Rufford Abbey which also has a Registered Historic Park and Garden (lying c.1.7 km from the Order Limits); and the locally designated Historic Landscape around Laxton approximately 350 m to the north of the Order Limits.

10.1.3 Likely Environmental Effects

453 The assessment will consider the effect of the Development on socio-economic and tourism receptors during the three development phases: construction, operation and decommissioning.

[94] ONS (2023). Regional GVA(I) by local authority in the UK. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgvaibylocalauthorityintheuk [accessed on 31/10/2023]. Latest data (2015) used.
[95] ONS (2021). Regional Gross Value Added. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva/timeseries/tmpz/ragv [accessed on 31/10/2023]. Data for the latest time point, 2014.
[96] ONS (2021). Labour Market Profile – East Midlands. Available at: https://www.nomisweb.co.uk/reports/lmp/gor/2013265924/report.aspx [accessed on 31/10/2023].
[97] ONS (2023). Gross Value Added. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva [accessed on 31/10/2023].

10.1.3.1 Construction Phase

454 During the construction phase, direct effects on socio-economic receptors could arise through:

- Transport and onsite assembly / installation of components: spend on transport and installation could stimulate economic effects in the UK in the form of jobs and GVA supported in this part of the Development's supply chain. The scale and spatial distribution of direct effects and the area over which they materialise will depend on the location of the company (or companies) carrying out this activity and where they source their labour from; and
- Construction of associated infrastructure: Any investment in access tracks and other supporting infrastructure would support jobs and GVA in its supply chain. Again, the scale and spatial distribution of effects will depend on the location of contractors and the area over which they source their labour.

455 In addition to these direct effects there is scope for indirect effects on socio-economic and tourism receptors. These indirect effects will occur in the supply chain of the companies providing goods and services to the Development. It is difficult to predict the likely scale of indirect effects (these depend, to a large extent, on the geography of the direct effects assessed in other technical chapters), but there is likely to be some effect associated with activities which occur on or close to the Development.

456 The construction of the Development could have a variety of physical effects which could give rise to economic effects, including but not limited to:

- Landscape and visual effects;
- Noise effects;
- Effects on traffic and transport; and
- Disruption to recreational resources and public rights of way.

457 The assessment of the significance of these physical effects will cross reference to other relevant chapters of the Environmental Statement (ES). The socio-economic assessment will then consider whether there is scope for these physical effects to have wider effects on socio-economic receptors, such as employment, equality, community cohesion and well-being, particularly with reference to tourism receptors.

10.1.3.2 Operational Phase

458 Once constructed, there will be an ongoing requirement for operation and maintenance which could stimulate effects in a similar way to the construction activities, but to a much lesser extent. These effects are expected to be modest overall and are proposed to be scoped out of the EIA.

459 Potential effects associated with the operation of the Development on tourism receptors could also occur, and these will be considered within the ES.

10.1.3.3 Decommissioning

460 The operational phase of the Development would last 40 years, but when the operational phase ends, the Development would require decommissioning. The cost of this additional activity could generate further direct and indirect

socio-economic effects similar to those of the construction phase. However, there is uncertainty over the nature and costs of this activity, particularly as the sector, engineering approaches and technologies will evolve over the lifetime of the Development, and hence adverse decommissioning effects are assumed to be the same as for the construction phase, whilst beneficial decommissioning effects are assumed to be zero, as a worst-case.

10.1.3.4 Summary of Likely Environmental Effects

461 The Development may generate a range of socio-economic effects, some of which would be temporary, whilst others would be permanent. For the purposes of the ES, due consideration will be given to the following:

- Temporary employment during the construction and decommissioning phases of the Development;
- Gross Value Added during the construction and decommissioning phases of the Development;
- Creation of long-term employment opportunities once the Development is operational including, consideration of any existing employment uses onsite (principally related to agricultural land use); and
- The potential effects on tourism facilities.

462 Both direct and indirect effects will be assessed for both the construction and operation phases of the Development. The operation phase will consider tourism only.

10.1.4 Assessment Methodology

463 There is no legislation relevant to the assessment of socio-economic effects, but national planning and economic development policy are a relevant consideration in scoping the assessment for socio-economic effects.

464 The Legislative and Planning Policy Context Chapter of the ES will set out the planning policy context for the Development at the time of the planning application. Relevant policy will be reviewed at the local, regional and national levels to identify the key issues of relevance to the Development. This will include Local Plans, and any relevant Supplementary Planning Guidance (SPG), National Policy Statements and National Planning Policy Framework measures.

465 The methodology for assessment of socio-economic effects will be undertaken with reference to good practice EIA guidance, such as that published by the Institute of Environmental Management and Assessment (IEMA).

466 A baseline assessment will be undertaken using a range of sources to provide a description of the socio-economic conditions within the Newark and Sherwood Local Authority Area, including employment and the economy. This will be done using established statistical sources such as:

- 2011 and 2021 Census Data;
- Business Register and Employment Survey (BRES);
- Claimant Count Data; and
- Labour Force and Neighbourhood Statistics.

467 Consultation will also be undertaken with NSDC.

468 The socio-economic assessment will consider the extent to which the likely effects set out above in Section 10.1.3.4, will materialise within three primary geographic areas:

- The NSDC Local Authority Area in which the Development is located;
- The East Midlands region; and
- The national area, which is England (or Great Britain or the UK, depending on the source of data available).

469 For tourism receptors, the areas within which effects could potentially occur is limited to facilities within two kilometres of the Order Limits and/or the access route (during construction only).

10.1.4.1 Magnitude of Effect

470 Table 10.3 outlines the methodology that will be used to determine the absolute scale of effects on each receptor during the construction and operation phase.

Table 10.3 Methods for Assessing the Scale of Effect

Receptor		**Indicator**	**Method for Assessing Scale of Effect**
Economy	The size, diversity and prosperity of the local economy	GVA	Absolute effect on GVA and employment calculated using an economic effect model. Key inputs to this will be estimates of direct construction expenditure and assumptions about the pattern of sourcing of key components and services (informed by consultation with the Applicant). Indirect effects modelled using national and derived regional and local multipliers (the selection of these to be informed by consultation with the Applicant).
		Employment	
	People in employment or seeking employment	Skills	The potential effect on unemployment and skills will be assessed in light of the absolute level of direct and indirect employment generated by the Development.
		Unemployment	
Tourism Economy	The visitor economy in NSDC Local Authority Area	The nature and strength of the tourism economy	Review of other relevant technical chapters. Develop list of any significant effects for consideration in the assessment of tourism effects.
		Specific tourism assets and attractions	

Receptor		Indicator	Method for Assessing Scale of Effect
		Volume and Value of Tourism	

471 The magnitude of effect will then be determined with reference to the baseline conditions, using the criteria in Table 10.4.

Table 10.4 Methods for Assessing the Magnitude of Effect

Magnitude of Effect (including positive or negative)	Description
High	Proposals would cause a large change (judged beneficial or adverse) to baseline socio-economic conditions in terms of absolute and/or percentage change.
Medium	Proposals would cause a moderate change (judged as beneficial or adverse) to existing socio-economic conditions in terms of absolute and/or percentage change.
Low	Proposals would cause a slight change (judged as beneficial or adverse) to existing socio-economic conditions in terms of absolute and/or percentage change.
Negligible	No discernible change, either way, in baseline socio-economic conditions.
No Change	No change, either way, in baseline socio-economic conditions.

10.1.4.2 Sensitivity of Receptor

472 The framework for assessing the sensitivity of each socio-economic receptor is outlined in Table 10.5. The assessment requires professional judgment and takes account of the importance attached to each receptor in local and regional economic development, regeneration policy, i.e., where specific socio-economic issues have been prioritised by policy makers (e.g., lack of employment opportunities, growth of a particular employment sector), as well as drawing on analysis within the socio-economic and visitor economy baseline about the scale of these receptors.

Table 10.5 Sensitivity of Receptors

Sensitivity	Criteria	Examples of measures relating to the identified criteria
Very High	Receptor is accorded a very high priority in local, regional and national economic development and regeneration policy.	Identified as a highest ranking thematic (*e.g.,* low levels of wealth creation across an economy) or spatial (*e.g.,* pockets of deprivation in particular localities) socio-economic priority. These priorities may also be informed by the economic potential and/or need to achieve change on a particular socio-economic measure. Evidence of severe socio-economic challenges, under-performance or vulnerability *e.g.,* patterns of deprivation, employment and wealth generation, employment forecasts, exposure to socio-economic threats.
High	Receptor is accorded a high priority in local, regional and national economic development and regeneration policy.	Identified as a key thematic or spatial priority (as a result of economic potential and/or need). Evidence of major socio-economic challenges, under-performance or vulnerability *e.g.,* patterns of deprivation, employment and wealth generation, employment forecasts, exposure to socio-economic threats.
Medium	Receptor is accorded a medium priority in local, regional and national economic development and regeneration policy.	Not identified as a key thematic or spatial priority (as a result of economic potential and/or need). Evidence of significant socio-economic challenges, under-performance or vulnerability.
Low	Receptor is accorded a low priority in local, regional and national economic development and regeneration policy.	Not identified as a key thematic or spatial priority (as a result of economic potential and/or need). Evidence of economic prosperity, buoyancy and resilience *e.g.,* low levels of deprivation, high employment and average wealth per head, relatively strong employment forecasts.

10.1.5 Significance of Effect

473 The significance of any effect upon receptors will be determined through combining assessments of the magnitude of the effect and the sensitivity of the receptor. The significance matrix presented in Table 4.1 of this Scoping Report will be used as part of this process.

10.1.6 Assessment of Cumulative Effects

474 Cumulative effects of other developments will need to be considered as part of the assessment. The cumulative assessment for the socio-economic receptors will consider the effect of these developments on supply chain and labour market capacity and capability in the geographic areas and the extent to which this might interfere with the ability of the developer's ability to source key goods and services from within the geographic areas.

475 For the tourism economy receptors, the cumulative assessment will draw upon the cumulative assessments of the other chapters to consider the overall scale of cumulative effects on the tourism economy.

10.2 RECREATION

10.2.1 Introduction

476 This section will consider the likely effects on recreational receptors that could result from the construction and operation of the Development.

477 Visual effects on users of recreational facilities will be considered in the Landscape and Visual Impact Assessment (see Section 5). Visual effects are one aspect of the overall amenity of users of recreational resources, and the Recreation assessment will consider effects on amenity overall.

10.2.2 Study Area

478 Effects on recreational amenity are considered not to have the potential to be significant at distances of more than 250 m from proposed infrastructure (even though it is possible that visual effects on users of recreational resources may be significant at distances greater than this), and hence a recreational study area of 250 m from the Order Limits is proposed.

10.2.3 Preliminary Baseline Conditions

479 The principal recreational receptors and resources within or in close proximity to the Development are the Public Rights of Way (PRoW), e.g., footpaths and other recreational resources used by walkers, cyclists and horse riders (i.e., Footpaths, Bridleways, Byways and Restricted Byways).

480 A request has been made to Nottingham County Council for the Definitive PRoW data relating to the Development and its surrounding area. Once received this data will be used to identify any PRoWs within or in close proximity to the Order Limits.

481 Preliminary PRoW data from unofficial maps shows that there are a total of 121 PRoWs and one Long Distance Trail (LDT) within, or in close proximity to (within 250 m of), the Order Limits as shown on Figure 10.1. There are no National Cycle Network (NCN) routes within or closer than 1 km from the Order Limits.

482 The Robin Hood Way, a 107-mile LDT, that runs from the centre of Nottingham to the Sherwood Forest Visitor Centre at Edwinstowe, briefly passes through the edges of the Order Limits around the south-eastern extent of the village of Eakring as shown on Figure 10.1.

483 The 121 PRoWs located within 250 m of the Order Limits are listed in Table 10.6. The PRoWs are classified and numbered by Parish.

Table 10.6 Public Rights of Way within 250 m of the Order Limits

Parish	Route Type	Route Number	
Averham	Bridleway (BW)	BW1	
	Footpath (FP)	FP2	FP5
		FP3	FP6
Bathley	Bridleway	BW12	
	Footpath	FP7	FP10
		FP8	FP11
		FP9	
	Restricted Byway (RB)	RB15	RB16
Carlton-On-Trent	Bridleway	BW8	
	Footpath	FP6	FP10
		FP7	FP11
Caunton	Bridleway	BW13	
	Footpath	FP2	FP6A
		FP4	FP11
Cromwell	Footpath	FP3	FP5
Eakring	Byway Open to All Traffic (BOAT)	BOAT20	BOAT21
	Footpath	FP8	FP14
		FP10	FP15
		FP11	FP16
		FP12	FP17
		FP13	FP19
Egmanton	Bridleway	BW5	
Kelham	Bridleway	BW3	
	Footpath	FP1	FP6
		FP2	FP7
		FP4	FP7A
Kersall	Byway Open to All Traffic	BOAT8	
	Bridleway	BW3	
	Footpath	FP1	FP5A
		FP2	FP6
		FP2A	FP6A
		FP4	FP7

Parish	Route Type	Route Number	
		FP5	
Kneesall	Footpath	FP6	
Laxton And Moorhouse	Footpath	FP10	FP13
		FP11	FP14
		FP12	FP15
Maplebeck	Byway Open to All Traffic	BOAT11	
	Bridleway	BW8	
	Footpath	FP1	FP6
		FP1A	FP7
		FP2	FP9
		FP3	FP10
		FP4	FP12
		FP5	
North Muskham	Footpath	FP1	FP14
Norwell	Footpath	FP1	FP11
Ossington	Bridleway	BW4	BW7
		BW5	
	Footpath	FP2	FP10
		FP8	FP11
		FP9	
Rufford	Footpath	FP15	
South Muskham	Footpath	FP1	FP3
		FP1A	FP4
		FP2	FP5
		FP2A	FP6
Staythorpe	Footpath	FP1	FP3
		FP2	
Sutton On Trent	Bridleway	BW14	BW18
		BW17	
	Footpath	FP13	FP21
Weston	Bridleway	BW8	
	Footpath	FP13	FP12
		FP2	FP14
		FP9	FP15

Parish	Route Type	Route Number	
		FP10	FP16
		FP11	FP17
Winkburn	Bridleway	BW9	
	Footpath	FP2	FP4
		FP3	FP5

10.2.4 Likely Environmental Effects

484 During the operational phase, certain PRoWs may have their routes altered as part of the Development, either to facilitate more efficient use of the land for solar PV design, and/or to improve the recreational amenity of the routes compared to the baseline. These changes are likely to be permanent (i.e., extend beyond the operational lifetime of the Development). As far as practicable, such changes would be avoided unless they led to an improvement in the recreational amenity of the PRoW.

485 During the construction and decommissioning phases, certain PRoWs may be temporarily closed or diverted in order to facilitate safe construction of the Development. These changes would be temporary and reversible, unless the same change was also proposed during the operational phase of the Development. As far as practicable, such changes would be avoided.

486 A physical change to a PRoW would be a direct effect and would be assessed in the EIA.

487 Construction and decommissioning activities and views of the Development during its operational phase may have an effect on the recreational amenity of PRoWs and other recreational resources in the area. The potential for the Development to affect users of recreational resources will be assessed in the EIA. This assessment will utilise the findings of the Landscape and Visual Impact Assessment.

10.2.4.1 Embedded Mitigation Measures

488 During the design of the Development, the Applicant will implement appropriate mitigation measures to ensure that no PRoW is significantly affected by the construction, operation or decommissioning of the Development. This will be achieved via careful design, ensuring that appropriate buffers are put in place between the PRoW and the solar panels or infrastructure, with landscape planting and screening undertaken where appropriate. Alternatively, the Applicant may seek to temporarily divert a PRoW during the construction and/or decommissioning phases of the Development. The PRoW would then be re-instated back to its normal course post construction. On rare occasions the Applicant may seek to permanently alter the course of a PRoW, but when doing so they will seek to provide an alternative route that provides an acceptable alternative to recreational users.

489 An Outline PRoW Management Plan will be prepared and included as an Appendix to the ES.

10.2.5 Assessment Methodology

490 Significant effects on recreational receptors are those where the Development would fundamentally change receptors (a high magnitude effect on receptors that are of local, or more, importance) or where it would substantially affect recreational resources that have more than local use or importance (a moderate magnitude effect on receptors of regional or national importance).

491 When assessing significance, consideration is given to the sensitivity (taking into account the national, regional and local importance) of the receptor and its sensitivity to change. The significance of the effect in terms of the EIA Regulations is determined in proportion to the magnitude of effect and the sensitivity of each receptor. This is informed by the desk-based research and consultation and is a qualitative assessment based on professional judgement.

492 It is important to note that the likely effects of the Development on recreation are closely related to public attitudes towards solar photovoltaic development in the landscape and information on this, where available, will be included in the Socio-economics, Tourism, Recreation and Land Use Chapter of the ES.

10.2.6 Assessment of Cumulative Effects

493 An assessment will also be made of likely cumulative effects that may arise from the addition of the Development to a baseline including other, proposed developments. For the purposes of the assessment of recreational cumulative effects, only proposed developments within 5 km of the Order Limits that could affect the same receptors will be considered. Significant visual effects will generally act at much shorter distances than this, and a visual effect is only one component of recreational amenity; significant effects on recreational amenity typically act at much shorter distances than significant visual effects. 5 km is therefore sufficient to include all developments with the potential to lead to significant recreational amenity effects.

10.3 LAND-USE

10.3.1 Introduction

494 This section of the Scoping Report relates to the potential effects of the Development on agricultural assets, in particular on agricultural land, soils and farm businesses. This assessment will be undertaken by Kernon Countryside Consultants Ltd.

10.3.2 Preliminary Baseline Conditions and Information Gathering

495 Agricultural land quality is measured by a system of Agricultural Land Classification (ALC). This system divides land into five grades, from Grade 1 to Grade 5. Grade 3 is subdivided into two subgrades, 3a and 3b.

496 The ALC system classifies land according to long-term physical limitations to agricultural use. The current use, and intensity of use, does not affect ALC grade. See Natural England's Technical Information Note TIN 049 (version 2, 2012).

497 Land in Grades 1, 2 and 3a is defined in the National Planning Policy Framework (2012) as the "best and most versatile" (BMV) agricultural land.

498 Plans are available at 1:250,000 scale showing the "provisional" ALC grading of land from the 1970s, under a previous system, and more recently Natural England has produced 1:250,000 maps showing the likelihood of BMV in an area.

499 In order to determine the ALC grading of the land it is, however, necessary to carry out a field survey. Work has commenced to identify the precise grades of land. Over the coming months, further survey work will be completed to ensure that the distribution of grades across all the land contained within the Order Limits has been mapped.

500 The ALC survey has and will gather data on soil characteristics. These will be used to inform an outline Soil Management Plan (oSMP). The oSMP will set out a methodology to conserve soil functional capacity during the construction, operation and decommissioning phases of the Development.

501 Most of the land within the Order Limits is farmed, with a number of different landowners and operators. Information will be gathered about farming circumstances, to review the nature and scale of the farm businesses occupying the land within the Order Limits, and to provide evidence for the assessment.

10.3.3 Likely Environmental Significant Effects

502 There is land of good and also very good quality within the Order Limits, as well as land of moderate quality. The Development therefore has the potential to affect land of BMV quality. This could permanently or temporarily affect land quality by sealing over the soil (in places) or by affecting the land grade.

503 The installation of solar panels should not affect land quality across most of the Order Limits, but there is the potential to affect soils adversely. The oSMP will be important to minimise the potential effects on soils from the construction, operation, and decommissioning phases of the Development.

504 During the operational phase, the long-term grassland use of what are currently arable soils, combined with potential grazing by sheep, has the potential to actually benefit the soils.

505 The Development also has the potential to disrupt farm businesses, by loss of land or severance. There are also potential benefits from the Development, such as increased labour in order to manage sheep grazing.

10.3.4 Assessment Methodology

506 All ALC data will be gathered by field survey under the ALC methodology (Ministry of Agriculture Fisheries and Food (MAFF, 1988).

507 Within the ES the assessment will consider the agricultural land quality of the land within the Order Limits, and the extent to which the Development will affect the inherent land quality. It will consider the method and activities of the construction phase and the impacts and effects that this would have on soil qualities. It will also consider the decommissioning phase, which will result in the removal of the solar panels and therefore could potentially

reverse any effects. Finally, the assessment will consider the extent to which agricultural use can continue during the 40-year life of the Development.

508 The potential loss of agricultural land will be considered by reference to the guidance in the NPPF (2021), Planning Practice Guidance, the Local Plans, and NPSs including current drafts.

509 MAFF "provisional", Natural England "Likelihood of BMV", soil survey and available ALC results maps will be studied and used as part of the assessment.

10.3.5 Methodology for the Assessment of Effects

510 The assessment will draw on the IEMA Guide " A New Perspective on Land and Soil in Environmental Impact Assessment", IEMA (February 2022). Land of Grades 1 and 2 will be defined as of very high sensitivity, and land of Subgrade 3a of high sensitivity.

511 The magnitude criteria set by IEMA will be used, with greater than 20 hectares (ha) considered a major magnitude effect and less than 5 ha a minor magnitude effect.

512 Soil sensitivity will be based on Table 4 of the IEMA Guide. Farm impact assessments will be based on historic thresholds widely used in EIA.

513 The assessment will focus on the irreversible loss caused by sealing-over or downgrading of agricultural land. The assessment will not focus on land-use and food production considerations, as these are not part of the ALC methodology.

514 However, as required in the NPPF (2021) and draft National Policy Statement EN-3 (2023), the economic and other benefits of BMV land will be considered.

10.3.6 Assessment of Cumulative Effects

515 Cumulative effects resulting from other sites and developments at a range of geographic scales will be considered.

11 TRAFFIC AND ACCESS

11.1 INTRODUCTION

516 This chapter of the Scoping Report relates to the potential effects of the Development in relation to Traffic and Access. This assessment will be undertaken by SYSTRA Ltd.

517 The purpose of this assessment will be to identify and characterise any relevant traffic and access infrastructure in order to consider the nature and scale of potential effects arising from the Development. This chapter will also detail how significant effects will be mitigated through the implementation of suitable measures to ultimately ensure that the proposals are acceptable in environmental terms, with respect to traffic, access and effect on highways.

518 The nature of solar farms is such that there are few significant effects in relation to traffic and access during the operational phase. During this period, there are anticipated to be only minimal visits to the Development per

month by vehicles for maintenance purposes. Therefore, the focus of the Traffic and Access Chapter of the Environmental Statement (ES) will be on the potential environmental effects associated with any increased traffic levels during the temporary construction phase.

519 It is expected that the effects of the temporary decommissioning phase will be equivalent to, or less than, those of the construction phase, and effects during this phase will be assumed to be the same as during the construction phase, which is expected to be a worst-case approach. A separate assessment of effects during decommissioning is not proposed, therefore.

520 A Transport Scoping Note including the access strategy will also be prepared in due course, which will set out the proposed scope specific to the future Transport Assessment (TA) that will accompany the DCO application (note that the TA is not part of the EIA so does not require scoping here). Nottinghamshire County Council (NCC) and National Highways will be consulted on the Transport Scoping Note to determine, and seek agreement on, the scope and approach of the TA.

521 This chapter includes the following elements:

- Consultation to Date;
- Preliminary Baseline Conditions;
- Likely Environmental Effects;
- Assessment Methodology;
- Assessment of Cumulative Effects; and
- Matters and Aspects Scoped Out.

11.2 CONSULTATION TO DATE

522 At this stage, detailed consultation has not taken place in relation to traffic and access. However, it is expected that as a minimum, the following bodies will be consulted through the EIA process:

- Nottinghamshire County Council;
- National Highways;
- Network Rail; and
- Canals and Rivers Trust.

11.3 PRELIMINARY BASELINE CONDITIONS

11.3.1 Proposed Study and Survey Areas

523 The study area for the Traffic and Access Chapter of the ES will follow the proposed construction traffic routes to the Development as indicated on Figure 11.1. It encompasses all areas of the Local Road Network from the Strategic Road Network to the Development, that would be required to facilitate traffic movements associated with the construction (and decommissioning) phases of the Development, as well as any improvements or changes required to facilitate construction traffic and works required for restoration purposes. The Study Area also includes sensitive receptors (as described in Section 11.3.2 below).

11.3.2 Baseline Conditions

524 A full overview of the land within the Order Limits and its context will be set out in the Traffic and Access Chapter of the ES. This will also include a summary of non-motorised and public transport provisions in the proposed study area.

11.3.2.1 Local and Strategic Highways Network

525 As shown in Figure 11.1, the Order Limits are bound by "A" class roads including:

- The A1 to the East, between Tuxford and Newark-on-Trent;
- The A617 to the south, between Kirklington and Newark-on-Trent; and
- The A616 which runs through the Development Site from Kneesall to South Muskham.

526 Access points and access routes to the Development are still under review at this early stage in the Development design. However, due to the size of the Development, several access points would be required. Wherever possible it is proposed to utilise existing access roads and access points. The current understanding of the proposed access routes and access locations is indicated in Figure 11.1.

527 Many of the potential access routes to the Development are single carriageway roads with a single lane in each direction. Speed limits on the routes vary from 30 mph to 40 mph where they pass through residential areas, up to the national speed limit (60 mph) outside of towns and villages.

Construction Vehicle Accesses

528 During the temporary construction phase, the construction access points that are anticipated to be required are shown on Figure 11.1 (although these maybe subject to change as the design develops).

Construction Vehicle Routing

529 The majority of the access routes to be used for the temporary construction phase of the Development would likely be via the A1 to the east, although routes may be subject to change as the design develops. Figure 11.1 also shows the anticipated access routes to the Development.

530 Where appropriate, unsurfaced access tracks that run through the Development will also be utilised in preference to the installation of new access tracks, to minimise land disturbance and environmental effects.

11.3.2.2 Walking, Cycling and Equestrian Network

531 There are several Public Rights of Way (PRoW) and bridleways for equestrian use that intersect the study area (see Figure 10.1).

532 During the operational phase of the Development, these would be maintained wherever possible or diverted if necessary. During the construction phase however, it may be necessary to temporarily divert these provisions or introduce measures to protect users.

11.3.2.3 Sensitive Receptors

533 The study area and access routes have been reviewed to identify sensitive receptors which should be considered within the assessment. The locations presented in Table 11.1 have been identified as possible sensitive receptors.

Table 11.1: Sensitive Receptors

ID	Type	Location/Name
1	School	Norwell Church of England (C of E) Primary
2	School	Dean Hole C of E Primary
3	Residential	Averham
4	Residential	Little Carlton
6	Settlement	Bathley
7	Settlement	North Muskham
8	Settlement	Norwell
9	Settlement	Caunton
6	Residential	Maplebeck
10	Settlement	Cromwell
11	Settlement	Kelham
12	Residential	Moorhouse
13	School	Muskham Primary
14	Settlement	Ossington
15	Settlement	Kneesall
16	School	Kneesall C of E Primary

534 The locations of proposed sensitive receptors are indicatively shown on Figure 11.1.

11.3.2.4 Initial Traffic Data

535 There are permanent Automatic Traffic Counter sites (ATCs) located on the nearby “A” class roads and several of the more minor class roads within the Study Area. Table 11.2 below provides a summary of the average weekday two-way traffic count for several of the main roads within the vicinity of the Development.

Table 11.2: Baseline Traffic Flows Average Weekday (24hr) Two Way

Link	Location ID	Latest Survey Year	Total Vehicles	% HGV
A1	36086	2019	48342	17%
A614	17302	2021	18492	6%
A616	7357	2018	6784	5%
Norwell Lane	806470	2021	427	2%
Newark Road	807623	2019	1042	1%
Ossington Road	802506	2019	140	1%

11.3.2.5 Other Baseline Data Sources

536 Other baseline data sources that will inform the Traffic and Access Chapter of the ES are:

- Traffic count and speed surveys (in addition to those stated above);
- Personal injury collision data;
- Highway boundary information;
- Ordnance Survey (OS) Mapping;
- Topographical surveys; and
- Activity surveys of any PRoWs and bridleways that intersect construction traffic routes.

11.4 LIKELY ENVIRONMENTAL EFFECTS

537 The nature of the Development is such that the greatest effects are likely to occur during the construction and decommissioning phases and this will be the focus of the assessment of transport effects presented in the ES.

538 The main considerations and potential effects due to the Development during the construction and decommissioning phases are:

- Increase in Heavy Goods Vehicle (HGV) movements;
- Abnormal loads;
- Travel to and from site by construction employees;
- Increase in delay to vehicles, pedestrians, cyclists and equestrians due to increase in HGV movements; and
- Change in route connections and amenity for pedestrians, cyclists and equestrians due to the Development.

11.5 ASSESSMENT METHODOLOGY

11.5.1 Scope of Assessment

539 The key issues for the assessment of potential traffic and access effects relating to the Development are likely to be:

- Short-term effects arising from the construction phase such as changes in the existing conditions for motorised and non-motorised users; and
- Permanent or long-term effects, including those that last throughout the operational phase, such as the re-routing of a PRoW.

11.5.2 Relevant Guidance, Legislation and Information

540 The following guidance, legislation and information sources will be considered when carrying out the EIA:

- Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement (GEATM) (2023)[98] (the 'IEMA Guidelines');
- Guidance on Transport Assessments, prepared by the Department for Transport (DfT) in March 2007 (which is now archived but still considered relevant) (the 'DfT 2007 Guidance');

[98] IEMA (2023). New IEMA Guidance: Environmental Assessment of Traffic and Movement - July 2023. Available at: https://www.iema.net/resources/blog/2023/07/12/new-iema-guidance-environmental-assessment-of-traffic-and-movement [accessed on 24/07/2023].

- The Government's Planning Practice Guidance: Travel Plans, Transport Assessments and Statements (2014);
- Design Manual for Roads and Bridges (DMRB), National Highways; and
- Nottinghamshire Local Transport Plan 2011-2026.

11.5.3 Baseline Survey Methodology

541 Traffic flows will be gathered using ATCs these will be placed across the road at specified locations to capture traffic movements by size of vehicle and by direction of travel. ATC counters are also able to capture speed data for consideration of access design and road safety.

542 Traffic surveys are proposed to be undertaken on the following roads, which form part of the key construction access routes:

- Main Street, to the West of Ossington;
- Ossington Road, to the West of the A1;
- Ollerton Road, North of Kellham;
- Broadgate Lane, North of the junction with the A617;
- Caunton Road, North of Hockerton;
- Maplebeck Road, to the East of Maplebeck; and
- Development access locations.

543 Road collision data and highway boundary information will be obtained from the local highway authority or other relevant organisation.

544 The PRoW and Bridleways that intersect the access routes will require surveying to establish their level of usage. The proposed scope of PRoWs to be surveyed will be agreed with statutory consultees (see also Section 10.2).

11.5.4 Methodology for the Assessment of Effects

545 The significance of the potential effects of the Development will be classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

546 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Development or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

547 The assessment methodology is set out below. The assessment methodology has been prepared accordance with the DfT Guidance, the IEMA Guidelines and the Design Manual for Roads and Bridges (DMRB), produced by National Highways in conjunction with the governments of Wales, Scotland and Northern Ireland.

548 The likely transport and access effects that will be considered (and assessed where thresholds are exceeded), for the construction phase of the Development and reported within the Traffic and Access Chapter of the ES are as follows:

- Accidents and Safety;
- Severance;
- Driver Delay;
- Non-Motorised User Delay;
- Hazardous Loads; and

- Pedestrian Amenity (including Fear and Intimidation).

549 These will all be assessed in line with the IEMA Guidelines.

11.5.4.1 Traffic Flows

550 The IEMA Guidelines set out two rules in identifying potential links for analysis:

- Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%); and
- Rule 2: include any other specifically sensitive areas (*e.g.,* accident black spots, conservation areas, hospitals, links with high pedestrian flows etc) where traffic flows increase by 10% or more.

551 Based on this, links will be assessed where traffic flows are expected to increase by 30% or more during the peak hours of the peak construction phase (2026). However, links will not be assessed where there is expected to be a less than 30% increase in traffic flows as a result of the Development, unless any specifically sensitive areas are identified as set out in Rule 2 above.

11.5.4.2 Management and Embedded Mitigation Measures

552 An outline Construction Traffic Management Plan (oCTMP) will be prepared and form an appendix to the full Traffic and Access Chapter of the ES. The outline CTMP will provide a framework for the management of construction vehicle movements to and from the Development Site (including the cable route), to ensure that the effects of the temporary construction phase on the local highway network are minimised. The outline CTMP will set out construction access arrangements, construction vehicle routing, construction vehicle trip generation, and the management/mitigation measures.

553 These will likely include, but will not be limited to the following:

- A commitment to avoid network peak hours for deliveries, as well as school drop off and pick up times;
- A commitment to seek to coordinate deliveries with other developments in the area;
- Vehicles carrying waste material offsite to be sheeted;
- Banksmen to be provided where required to manage conflict points;
- The contact details of the Site Manager to be provided on notice boards for the local communities;
- The provision of wheel washing facilities where required;
- The agreement to undertake a pre and post highway condition survey around key junctions;
- Signage to direct construction vehicles;
- The provision of Site Compounds will be set up, including an appropriate number of parking spaces;
- A requirement for engines to be switched off onsite when not in use;
- Spraying of areas with water as and when conditions dictate to prevent the spread of dust; and
- Use of a road sweeper where required to ensure the public road is kept free of dust and dirt.

554 In light of this, all Traffic and Access effects for the decommissioning phase will be the same, or less, than those for the construction phase. Any effects

will also be temporary and mitigation during the decommissioning phase will broadly follow what is set out for the construction phase.

11.5.4.3 Sensitivity of Receptors

555 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Development or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

556 Table 11.3 details the proposed framework for determining the sensitivity of receptors.

Table 11.3: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	**Definition**
High	Receptors of greatest sensitivity to traffic flows, such as schools, playgrounds, accident blackspots, retirement homes, areas with no footways with high pedestrian footfall, congested areas.
Medium	Receptors with some sensitivity to traffic flow, such as conservation areas, listed buildings, tourist attractions, and certain residential areas.
Low	Receptors with low sensitivity to traffic flows, and those distant from affected roads. A strategic vehicular route in a rural setting with pedestrian/cycle facilities.
Negligible	Receptors with no material sensitivity to traffic flows, such as rural roads with no pedestrian/cycle facilities provided.

11.5.4.4 Magnitude of Effect

557 The magnitude of potential effects will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

558 The criteria for assessing the magnitude of an effect are presented in Table 11.4.

Table 11.4: Framework for Determining Magnitude of Effects

Magnitude of Effects	**Definition**
High	A considerable effect (by extent, duration or magnitude) of more than local significance, or in breach of recognised acceptability, legislation, policy or standards.
Medium	A limited effect (by extent, duration or magnitude) which may be considered significant.
Low	A slight, very short, or highly localised effect of no significant consequence.
Negligible	Very little change approximating to a no change situation.

559 It should be emphasised that irrespective of the proportional increase in traffic flows, an increase of fewer than 30 additional vehicle trips per hour during each of the Development peak hours is to be categorised as a very low magnitude of effect. This threshold has been determined based on professional judgement and previous experience including DCO applications and solar farm projects, as it is considered that an increase of less than one vehicle every two minutes would not result in any significant effects. It is also considered likely that this could lead to over representation of significance of effects when presented against a lower traffic flow baseline outside of the network peak hours, as the construction staff are expected to arrive and depart outside of the network peak hours.

560 The magnitude of change and receptor sensitivity have been compared to determine the overall significance of effects. This is shown in Table 11.5.

561 There are five categories demonstrating the significance of the effect. These can be adverse or beneficial:

- Neutral – No change from baseline conditions;
- Negligible – Very little change from baseline conditions;
- Minor – A minor shift away from baseline conditions;
- Moderate – A material shift away from the baseline conditions; and
- Major –Substantial alteration to baseline conditions.

11.5.4.5 Significance of Effect

562 The sensitivity of the road link and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 11.5 summarises guideline criteria for assessing the significance of effects.

Table 11.5: Framework for Assessment of the Significance of Effects

Magnitude of Effects	**Sensitivity of Resource or Receptor**			
	High	**Medium**	**Low**	**Negligible**
High	**Major**	**Moderate**	**Moderate**	Minor
Medium	**Moderate**	**Moderate**	Minor	Negligible
Low	**Moderate**	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

563 Effects predicted to be of major or moderate significance are considered to be ‘significant’ in the context of the EIA Regulations and are shaded in light grey with bold font in the above table.

564 It is considered that only moderate and major effects are significant for the purpose of assessment.

565 The effects can be permanent or reversible and short-, medium- or long-term in duration. The definitions of these are as follows:

- A short-term effect – an effect that will be experienced for 0-5 years;

- A medium-term effect – an effect that will be experienced for 5-15 years; and
- A long-term effect – an effect that will be experienced for 15 years or longer but is reversible.

11.6 ASSESSMENT OF CUMULATIVE EFFECTS

566 Identification of other developments that may give rise to cumulative effects for the temporary construction phase will be agreed with the relevant statutory bodies. Such developments will be those that are forecast to influence traffic volumes within the study area, and any cumulative effects arising from them will be considered and described within the ES.

567 Identification of any transport effects in-combination with other effects and/or from combined phases of work on the Development will also be considered and described. Where there are no in-combination effects, this will also be stated.

11.7 MATTERS AND ASPECTS TO BE SCOPED OUT OF THE ASSESSMENT

568 The aspects described in Table 11.6 below are proposed to be scoped out of the assessment.

569 Given the nature of the Development, the operational phase is expected to only generate a very small number of vehicular trips. Whilst more traffic will be generated during the decommissioning phase, both effects during the operational and decommissioning phases will be less than construction phase. It is proposed that that the operational phase and decommissioning phase be assessed on this basis, with details of the number of trips provided in the Traffic and Access ES Chapter to support this position.

Table 11.6: Matters to be Scoped Out of the Assessment

Effects	Justification
PRoW outside of the adopted highway, during construction phase.	Construction effects on these PRoW will be assessed as part of the Socio-economics, Tourism, Recreation and Land Use Chapter of the Environmental Statement (ES).

12 CLIMATE CHANGE IMPACT ASSESSMENT

570 Climate Change Impact Assessment (CCIA) is required by the amended European Commission (EC) Directive 2014/52/EU, as transposed into UK law by the EIA Regulations. As part of the CCIA, the following factors are considered in terms of the Development:

- The vulnerability of the Development to climate change;
- The influence of the Development on climate change; and
- Changes to the future baseline of other environmental aspects as a result of climate change.

571 The first two points above will be assessed within the CCIA Chapter of the Environmental Statement (ES), whilst the third point will be addressed within the relevant technical chapters of the ES, as appropriate.

572 This next section sets out the proposed approach that will be undertaken in the assessment. The CCIA will follow Institute of Environmental Management and Assessment (IEMA) guidance 'IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaption' (2020) and 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (2017).

573 The following steps will be included in the assessment:

- Assessment of the Development's effects on climate change (calculation of carbon footprint) to include calculation of greenhouse gas emissions relating to construction, operation, decommissioning and the production of electricity;
- Assessment of the Development's vulnerabilities and resilience in the context of climate change by identifying appropriate climate change projections and climate change effects; and
- Assessment of the Development's effects upon identified environmental receptors in the context of the emerging baseline.

574 Climate projections have identified the following relevant climatic trends as a result of climate change:

- Increased temperature;
- Changes in the frequency, intensity and distribution of rainfall events (*e.g.,* an increase in the contribution to winter rainfall from heavy precipitation events and decreases in summer rainfall);
- Increased windstorms; and
- Sea level rise.

575 The Development is inherently designed to reduce adverse climate change effects by offsetting the carbon dioxide produced by generating electricity by burning fossil fuels through use of renewable sources for generating electricity.

576 The CCIA Chapter will consider the current electricity generation mix and present the level of carbon dioxide (CO_2) savings that could potentially be made, depending on the source of electricity generation the Development is displacing at any given time. This information will provide the baseline information against which to assess the contribution of the Development to reducing greenhouse gas emissions and identifying any potential for significant effects to arise.

13 MISCELLANEOUS ISSUES

577 The Miscellaneous Issues Chapter of the ES will assess the likely significant effects of the Development upon receptors which are not covered elsewhere in the EIA. This current section sets out the proposed approach in respect of additional environmental assessments that are required in order to provide a comprehensive assessment of the likely environmental effects of the Development together with a summary of information that is currently available.

13.1 GLINT AND GLARE

13.1.1 Introduction

578 This section of the Scoping Report relates to the potential effects of the Development in relation to Glint and Glare. The assessment will be undertaken by Neo Environmental.

579 A glint and glare assessment will be undertaken as part of the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) to assess the likely effect of solar reflection on receptors within the Development's surrounding environment. The report will provide an assessment of the Development's effects on residential, road, rail and aviation receptors. The full results will be provided as a Technical Appendix to the ES, rather than as a stand-alone report. A summary will however be provided within the Miscellaneous Issues Chapter of the ES.

13.1.2 Preliminary Environmental Effects

580 Solar panels are designed to absorb as much light as possible and not to reflect it. However, glint can be produced as a reflection of the sun from the surface of the solar PV panel. This can also be described as a momentary flash.

581 Glare is significantly less intense in comparison to glint and can be described as a continuous source of bright light, relative to diffused lighting. This is not a direct reflection of the sun, but a reflection of the sky around the sun. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor. Glint and glare in this context is the effect of reflected sunlight causing harm or discomfort to a sensitive receptor. Other reflection effects also occur from windows, glasshouses, car windscreens and waterbodies, including the large rivers.

582 The assessment will describe and identify the potential level of effects arising as a result of the Development in relation to:

- Road users: specifically, drivers of motor vehicles;
- Occupants of surrounding dwellings;
- Railway operations and infrastructure; and
- Aviation activity.

583 There are a number of aviation assets within 30 km of the current Order Limits. Five of these aviation assets: Knapthorne Lodge Airfield; Rectory Farm; Grassthorpe Grange Airfield; Darlton Airfield; and Royal Air Force (RAF) Syerston will require detailed assessments to determine the effect if any, that Glint and Glare has on the operation of these aviation assets.

584 There are a large number of residential receptors located within 1 km of the Order Limits, including the villages and towns of Weston, Carlton-on-Trent, Ossington, Cromwell, Norwell, Kersall, Eakring, Maplebeck, Bathley, North Muskham, South Muskham, Little Carlton and Kelham. Where there are a number of residential receptors within close proximity, a representative dwelling or dwellings is/are chosen for the glint and glare analysis as the impacts will not vary to any significant degree and a residential area will be designated around the group of receptors. This will reduce the number of residential receptors identified in the final report. A search of planning

applications will be conducted, and any planned residential dwellings will be included among the identified receptors.

585 Effects will also be considered in relation to the nearby road and rail receptors such as the A1 and North-eastern Railway Line, including a sequential assessment as receptors move along these routes. Roads and railway lines within the 1 km study zone will have receptors placed along them at 200 m intervals.

586 The receptors for each category (Residential, Road and Rail) will be split into two subgroups, Glare Possible and Glare Not Possible, once the non-reflection zones have been established, which can only be done when the panel boundaries are created. This will allow an informed decision on which receptors require further investigation through geometric analysis and a visibility assessment. An initial review showed no major concerns, and it is not anticipated that glint and glare will have a significant effect on nearby receptors.

587 There are also a number of other solar farms either built or consented or within planning, within the area surrounding the Development. These will be considered within the cumulative effects assessment of the Glint and Glare section of the ES.

13.1.3 Potential Impacts upon Ground Based Receptors

588 Glint is most likely to impact upon a ground-based receptor close to dusk and dawn when the sun is at its lowest in the sky. Therefore, any effect would likely occur early in the day or late in the day, reflected to the west at dawn and east at dusk. Areas to the south and north of a solar farm can be discounted due to the relative location of the sun when reflections are close to ground level.

589 There are a number of residential receptors in close proximity to the Order Limits. However, consideration will still be given to the effects on residential receptors whilst undertaking the landscape assessment and subsequent planting plan, to mitigate glint and glare further and where possible, negate its effects. Effects are unlikely to be significant and can be sufficiently mitigated where necessary.

590 Public roads within the vicinity of the Order Limits seem to be well screened with some open into the Order Limits. However, roads within 1 km will be assessed, but it is not anticipated that glint and glare will have a significant effect on road safety.

591 The East Coast Main (railway) Line seems to be well screened with some open views into the Order Limits. The railway line within 1 km of the Order Limits will be assessed, but it is not anticipated that glint and glare will have a significant effect on rail safety.

13.1.4 Potential Impacts upon Aviation Assets

592 There are a number of aerodromes within 30 km of the Order Limits, with Knapthorne Lodge Airfield, Rectory Farm, Grassthorpe Grange Airfield, Darlton Airfield and RAF Syerston requiring detailed assessment. However, due to their orientation in relation to the Order Limits no significant potential effects are anticipated. Knapthorne Lodge Airfield has the greatest potential to receive significant effects, however any significant effects may be

lessened by utilising standard mitigation methods used by pilots flying in the direction of the sun.

13.1.5 Iterative Design Process

593 Mitigation measures will be recommended in order to screen any High or Medium impacts upon ground-based receptors. The recommended mitigation measures will be included in the design of the Order Limits. Should there be any High or Medium impacts which are unable to be mitigated to an acceptable level, it may be recommended to remove areas of solar panels. The design of the Development will be updated to take account of the recommendations.

13.1.6 Assessment Methodology

13.1.6.1 Relevant Legislation, Guidelines and Policy

594 This chapter will be undertaken in compliance with the relevant EIA legislation/guidelines, national and local policy documents, and professional guidance documents (NPPG on Renewable and Low Carbon Energy/Civil Aviation Authority/Federal Aviation Authority).

595 The currently adopted National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) (2011) does not refer to solar development, and hence does not refer to glint and glare effects. The revised, but not yet adopted, NPS EN-3 (2023) identifies how solar panels may reflect the sun's rays, causing glint and glare. The statement goes on to identify how *"In some instances, it may be necessary to seek a glint and glare assessment as part of the application"*.

596 There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a technical perspective, there is no maximum distance for potential reflections. However, the significance of a solar reflection decreases with distance. This is because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. In most instances. terrain and shielding by vegetation are also more likely to obstruct an observer's view at greater distances.

597 From the above parameters along with extensive professional experience a 1 km buffer is considered appropriate for glint and glare effects on local dwellings, road users, railway operations and infrastructure. Aerodromes within 30 km of the Order Limits will be identified with small aerodromes within 5 km, military aerodromes within 10 km and large international aerodromes within 20 km being selected for assessment.

13.1.6.2 Assessment Methodology

598 A geometric assessment will be undertaken to identify the potential for solar reflections to affect sensitive receptors. The revised, but not yet adopted, NPS EN-3 (2023) (para 3.10.96) states the approach *"...may need to account for 'tracking' panels if they are proposed as these may cause differential diurnal and/or seasonal impacts. The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm."*

599 Sensitive receptors are considered to be aviation receptors, such as control towers and aircraft, residential receptors and ground-based transport receptors, such as drivers and passengers in cars and trains.

600 The proposed assessment methodology will adhere to the following sequence:

- Identify the receptors of concern;
- Choose appropriate receptor locations based on the above;
- Define the proposed solar farm area and choose an appropriate assessment resolution;
- Undertake geometric calculations to determine whether a solar reflection may occur, and if so, when it will occur;
- If a reflection can occur, determine whether the reflecting panels will be visible from the identified receptor locations. If the panels are not visible from the receptor, then no reflection can occur;
- If it is calculated that a reflection will occur, consider the location of the solar reflection with respect to the location of the sun in the sky, its angle above the horizontal and the time of day at which a reflection could occur;
- Consider both the solar reflection from the proposed solar farm and the location of the direct sun light with respect to the receptor's position;
- Consider the solar reflection with respect to the published studies;
- Determine whether the solar reflection is likely to be a significant nuisance or a hazard to safety; and
- Propose mitigation in the event that a 'significant' effect is identified, such as non-reflective coating on the solar panels.

13.1.7 Assessment of Cumulative Effects

601 There are also a number of other solar farms either built or consented or in planning, within the area surrounding the Development. These will need to be considered within a cumulative assessment, for instance, the existing Egmanton Solar Park which is located within 1 km of the Order Limits.

602 The cumulative effect of glint and glare from all the combined developments mentioned above, will also need to be assessed as part of the Environmental Impact Assessment (EIA). Any solar development located within 2 km of the Order Limits will be assessed for cumulative effects.

13.2 HUMAN HEALTH INCLUDING ELECTROMAGNETIC FIELDS

603 A Human Health Impact Assessment (HHIA) will be included within the Miscellaneous Issues Chapter of the ES. Limited interactions with human health are possible, and consideration will be given to the findings of the following information provided elsewhere in the ES and other submitted documents:

- Traffic and Access;
- Noise;
- Residential Amenity;
- Security;
- Health and Safety at Work;
- Electric, Magnetic and Electromagnetic Fields; and

- The Outline Battery Safety Management Plan (oBSMP; see Section 2.5.3.9).

604 Properly designed and maintained solar farms are a safe technology. The Development design and inbuilt buffers from sensitive receptors will minimise any risk to human health resulting from the operation of the Development. Risks associated with electrical infrastructure such as from lightning strikes are removed or reduced through inbuilt control systems and are therefore proposed to be scoped out of the assessment. Risks associated with battery storage, principally from fire, will be controlled as documented in an oBSMP, as set out in Section 2.5.3.9 of this Scoping Report.

13.2.1 Electric, Magnetic and Electromagnetic Fields

605 Electromagnetic fields (EMFs) arise from generation, transmission, distribution and use of electricity and occur around power lines and electric cables and around domestic, office or industrial equipment that uses electricity. Electric fields are the result of voltages applied to electrical conductors and equipment. Most materials do not readily block magnetic fields. The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source.

606 Electric fields depend on the operating voltage of the equipment. Magnetic fields depend on the electrical currents flowing and are not significantly limited by most common materials. Typically, ground-level magnetic fields from underground cables fall much more rapidly with distance than those from a corresponding overhead line but can be higher at small distances from the cable.

607 There is no direct statutory provision in the planning system relating to protection from EMFs. Guidance[99] published by the Department for Energy and Climate Change (DECC – since renamed the Department for Energy Security and Net Zero) in 2012 suggests that guidelines for both public and occupational exposure published by the International Commission on Non – Ionizing Radiation Protection (ICNIRP) in 1998 should be taken into account.

608 The DECC guidance states that *'overhead power lines at voltages up to and including 132 kV, underground cables at voltages up to and including 132 kV and substations at and beyond the publicly accessible perimeter'* are not capable of exceeding the ICNIRP exposure guidelines and therefore no assessment is required for these nor other types of infrastructure listed on the Energy Networks Association website.

609 Therefore, the scope of the assessment of EMFs in the ES will be limited to consideration of any cables associated with the Development which exceed 132 kV. The only part of the Development likely to exceed this voltage is the underground export cable between the BESS/400 kV compound areas and the existing National Grid Staythorpe Substation, which will be a 400 kV cable.

[99] DECC (2012). Power Lines: Demonstrating compliance with EMF public exposure guidelines – A voluntary Code of Practice. Available at: https://assets.publishing.service.gov.uk/media/5a796799ed915d07d35b5397/1256-code-practice-emf-public-exp-guidelines.pdf [accessed on 01/11/2023].

610 The assessment will follow the approach set out in the DECC guidance. This will comprise a calculation or measurement of the maximum fields (i.e., directly under the line, or directly above the cable). If this maximum value is less than the ICNIRP guideline levels, it may be assumed that all fields and exposures from that source will be compliant. If this maximum value exceeds the ICNIRP guideline levels, then it is also necessary to provide a calculation or measurement of the field at the location of the closest property at which the public exposure guidelines apply.

611 The ES will detail any design measures that have been taken to avoid any potential for EMF effects on receptors.

13.3 TELECOMMUNICATIONS, TELEVISION RECEPTION AND UTILITIES

612 Solar parks have the potential to affect existing utility infrastructure below ground. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of solar development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate.

613 Information obtained from this consultation will be used to inform the detailed Development design, to avoid potential effects.

13.4 WASTE

614 Article 1(d) of Schedule 4 of the EIA Regulations requires an ES to consider the quantities and types of waste to be produced during the construction and operational phases of a development. In addition, as the Development is proposed to have a limited (40-year) operational lifetime, waste will be generated during the decommissioning phase. The potential for significant environmental effects associated with waste as a result of the Development will be assessed in the EIA.

615 At this stage, the exact quantities and types of waste likely to be generated during construction and decommissioning of the Development are unknown, however, it is expected that waste streams could include:

- Welfare facility waste;
- Waste chemicals, fuels and oils;
- Waste metals;
- Waste water from dewatering of excavations;
- Waste water from cleaning activities (e.g., wheel washing);
- Packaging; and
- General construction waste (paper, cardboard, wood, etc.).

616 In addition, waste during the decommissioning phase would include the elements of infrastructure that are removed from the site.

617 An outline Site Waste Management Plan (oSWMP) will detail how waste streams are to be managed during construction, following the Waste Hierarchy of prevention, reuse, recycle, recover and as a last resort, disposal to landfill.

618 All waste transported off the Development Site will be to the appropriate licenced receivers of such materials. The number of vehicles associated with the removal of waste material associated with construction and

decommissioning of the Development will be considered within the Traffic and Access Chapter of the ES.

619 Given that operators receiving any waste materials resulting from the Development will be subject to their own consenting procedures, there is no potential for significant environmental effects associated with those operations, and it will not be assessed in the EIA (beyond the volume of any traffic generated during the construction phase).

620 Waste during construction and decommissioning would be recycled in line with good practice and market conditions. The ES will provide a proportionate assessment of the likely effect of component replacement and outline what measures, if any, will be put in place to ensure that these components are able to be diverted from the waste chain. An Outline Decommissioning Plan would support the ES.

621 The production of waste during the operational phase of the Development will be minimal and is proposed to be entirely scoped out of the EIA. The ES will include a description of the operational facilities and the treatment of any waste streams, such as from welfare facilities.

13.5 AIR QUALITY

622 Potential effects on air quality arise from the use of vehicles and the generation of dust, from disturbance and movement of soil. The potential for significant effects would arise if there was a risk of exceeding the National Air Quality Objectives[100], or if effective control measures for the generation of airborne dust are not implemented[101].

13.5.1 Baseline Air Quality

623 Baseline air quality in the vicinity of the Development Site is good, with low levels of common air quality pollutants, as is typical of rural England.

624 Baseline annual mean concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) were obtained from the Defra pollutant maps[102] for a location approximately in the centre of the Development site (grid reference 476500, 361500), which is expected to be typical of the area. Table 13.1 shows typical annual mean concentrations (in micrograms per metre cubed, $\mu g/m^3$) found in the vicinity of the Development site during the 2023 baseline year and for the likely first whole year of construction, 2027.

[100] DEFRA (2023). National air quality objectives and European Directive limit and target values for the protection of human health. Available at: https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update_20230403.pdf [accessed on 24/07/2023].
[101] Institute of Air Quality Management (IAQM) (2014). Guidance on the Assessment of Dust from Demolition and Construction. Available at: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf [accessed on 24/07/2023]
[102] DEFRA (2023). Background Mapping data for local authorities – 2018. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 [accessed on 24/07/2023].

Table 13.1: Background Air Pollutant Concentrations

Pollutant	Year	Annual Average Concentration (µg/m^3)	National Air Quality Objective Value (µg/m^3)
NO_2	2023	6.73	40
	2027	6.06	40
PM_{10}	2023	15.3	40
	2027	15.0	40

625 Newark and Sherwood District Council has declared no Air Quality Management Areas (AQMAs), which it is required to do where it anticipates exceedances of a National Air Quality Objective[103].

13.5.2 Potential Effects on Air Quality

13.5.2.1 Operational Phase

626 During operation, the Development will lead to increased levels of air pollution from maintenance and servicing vehicles only, and the levels of such traffic generation will be very low (as set out in Section 11). These emissions would replace emissions from farm machinery that would have occurred in the absence of the Development, and the baseline would also have included dust generation from farming activities: ploughing (etc.), harvesting and soil on roads from tractors. Air quality effects during the operational phase are expected to be slightly positive, compared to the baseline, but negligible and are proposed to be scoped out of the EIA.

13.5.2.2 Construction and Decommissioning Phases

627 During construction and decommissioning, the Development has the potential to lead to increased levels of air pollution from two sources:

- Dust from vehicle and plant activities on unsurfaced tracks and ground; and
- Construction delivery vehicle and plant emissions.

13.5.2.3 Construction and Decommissioning Dust

628 The potential effects from dust emissions arising from activities during the construction and decommissioning phases will be assessed using the Institute of Air Quality Management's (IAQM) guidance[104] for assessing effects from such activities. Good practice mitigation measures, including those outlined in the above guidance, where relevant, will be identified and incorporated into the outline Construction Environment Management Plan (CEMP). Following application of these mitigation measures, no significant effects from dust generation are anticipated.

[103] Newark and Sherwood District Council (2022). 2022 Air Quality Annual Status Report. Available at: https://www.newark-sherwooddc.gov.uk/media/nsdc-redesign/documents-and-images/your-business/environmental-health/pollution/air-pollution/ASR_NSDC_England_2022_v1.0.pdf [accessed on 24/07/2023].

[104] Institute of Air Quality Management (IAQM) (2014). Guidance on the Assessment of Dust from Demolition and Construction. Available at: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf [accessed on 24/07/2023]

13.5.2.4 Construction and Decommissioning Vehicles and Plant

629 Construction and decommissioning related delivery vehicle and plant emissions are anticipated to represent a small source of emissions relative to ambient local conditions in the vicinity of the Site based on the scale of construction that will occur in any given location and the number of plant vehicles that will be required. The anticipated number of vehicles that will be in operation during the construction and decommissioning phases of the Scheme have been considered in the context of the guidance published by Environmental Protection UK (EPUK) / IAQM (2017)[105] and EPUK (2010)[106], which describes the need for an air quality assessment for the construction phase of a development as being "*Large, long-term construction sites that would generate large HGV flows (>200 movements per day) over a period of a year or more.*" At the Development, construction or decommissioning activities would take place at different times across the Development Site, according to a phasing plan with each phase being typically 6 to 12 months (see Section 2.6.1). Each phase comprises a low intensity of construction activity across a wide area, such that construction would occur in any one field for only a short period of time (typically c. six weeks). Thus, whilst the Development would require a large number of construction vehicles, these would be distributed across the very wide Development Site, using different access routes. Given that the baseline levels of air pollution are low, the risk of exceedance of National Air Quality Objectives is negligible, and there is no potential for significant effects on air quality from the operation of vehicles and plant associated with the construction and decommissioning phases.

630 In another solar DCO application, the Cleve Hill Solar Park ES included a quantitative assessment of the effect on air quality of vehicle emissions associated with its construction phase[107]. Cleve Hill Solar Park, with a solar electrical generation capacity of c. 350 MW, is slightly larger than each of the four phases of the Development. All of the Cleve Hill construction traffic was modelled as using a single road for access, where each phase of the Development will be accessed by more than one route, leading to lower concentrations of pollutant emissions for the Development than for Cleve Hill. The baseline air quality in the vicinity of the Cleve Hill access route was also typical of rural England and slightly worse than the values set out in Table 13.1. The air quality effects of the Cleve Hill Solar Park would therefore be greater (i.e., worse) than those of the Development. In the air quality impact assessment for Cleve Hill, the increase in pollutant concentrations was predicted to be negligible; increases in concentrations from construction traffic were predicted to be c. 2.5% of the baseline pollutant concentrations, and 0.5% of the National Air Quality Objectives, based on conservative assumptions.

[105] IAQM / Environmental Protection UK (2017). Land-Use Planning & Development Control: Planning For Air Quality. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [accessed on 24/07/2023].
[106] EPUK (2010). Development Control: Planning for Air Quality (2010 Update). Available at: http://www.iaqm.co.uk/text/guidance/epuk/aq_guidance.pdf [accessed on 24/07/2023].
[107] Cleve Hill Solar Park (2018). Environmental Statement Chapter 16, Air Quality. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010085/EN010085-000225-6.1.16%20Air%20Quality.pdf [accessed on 24/07/2023].

631 Subsequent DCO applications for solar parks have found the same conclusions: with no mitigation provided, effects on air quality from construction and decommissioning vehicles and plant have been assessed as being negligible (Longfield Solar Park) or scoped out of detailed assessment because of the lack of potential for significant effects (Little Crow, Cottam, Gate Burton and others). The latter were scoped out of assessment on the basis that predicted flows of HGV were less than 200 one-way movements per day on any route, in accordance with guidance published by Environmental Protection UK (EPUK) / IAQM (2017)[108] and IAQM (2014)[109]. The number of HGV movements on any given road has not yet been evaluated for the Development and would be subject to change given the ongoing design process. However, given the dispersed layout of the Development and multiple local access routes, HGV traffic is expected to be no higher than for other DCO solar developments.

632 Effects on air quality from emissions from construction and decommissioning vehicles and plant from the Development are anticipated to be negligible, therefore, and their assessment is proposed to be scoped out of the EIA.

633 Notwithstanding this, suitable mitigation measures for plant and motorised equipment will be recommended based on advice prescribed in in the IAQM (2014) guidance and incorporated into the oCEMP.

13.6 MAJOR ACCIDENTS OR DISASTERS

634 Article 8 of Schedule 4 of the EIA Regulations requires an ES to consider the vulnerability of a development to the risk of major accidents and/or disasters.

635 'Accidents' are considered to be an occurrence resulting from uncontrolled developments in the course of construction and operation of a development (*e.g.,* a major emission, fire or explosion).

636 'Disasters' are considered to be naturally occurring extreme weather events or ground related hazard events (*e.g.,* subsidence, landslide, earthquake).

637 The nature, scale and location of the Development is not considered likely to give rise to, significant effects in relation to the risk of Major Accidents and Disasters. However, the ES will include a proportionate description and assessment of the potential effects resulting from potential accidents or disasters applicable to the scheme during construction, operation and decommissioning if this is considered necessary by the Planning Inspectorate and statutory consultees.

638 Table 13.2 (below) presents a short list of major accidents or disasters that are considered possible and may need further consideration as the Development design progresses. Where the major accidents and disasters identified are not already being considered within the scope of existing technical assessments, they will continue to be reviewed by the design team to ensure that the risks are understood and addressed throughout the Development design as necessary.

[108] Institute of Air Quality Management (2017). Land-Use Planning & Development Control: Planning For Air Quality.
[109] Institute of Air Quality Management (2014). Guidance on the assessment of dust from demolition and construction.

Table 13.2: Major Accidents or Disasters considered Possible at this stage of the Development Design

Major Accident or Disaster	Potential Receptor	Comment
Flood	Property and people in areas of increased flood risk.	The vulnerability of the Development to flooding, and its potential to exacerbate flooding, will be covered in the Flood Risk Assessment, and also reported in the ES. It will cover any flood risk to the Development and any increased flood risk caused by the Development.
Fire	Local residents, habitats and species.	There is a known, small risk of fire associated with Battery Energy Storage Systems (BESS). However, the BESS will include monitoring and control systems, cooling systems and fire suppression systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. A qualified fire engineer will advise on the design of the BESS to ensure it meets best practice at the time the design is fixed. Flexibility may be sought in the DCO application to allow for future developments in both battery technology and fire risk reduction. Battery units will be located a sufficient distance apart so as to prevent any fire spreading from one battery to the next. As set out in Section 2.5.3.9, an outline Battery Safety Management Plan (oBSMP) will be developed in consultation with the local fire and rescue service, which will ensure that fire risk is minimised, and control measures are suitable to ensure that risks are acceptable.
Road Accidents	Road users and aquatic environment.	The risk of road collisions and accidents will be addressed in the Traffic and Access Chapter of the ES. The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning will be considered in the hydrology chapter of the ES. The potential for glint and glare to affect road users will be considered within a Technical Appendix to the ES. If any risks are identified, then mitigation will be considered

Major Accident or Disaster	Potential Receptor	Comment
		and, where necessary, incorporated into the Development design.
Rail Accident	Rail users	The Development is located adjacent to the East Coast Main Line. The potential for glint and glare to affect trains will be considered within a Technical Appendix to the ES. If any risks are identified, mitigation will be considered and, where necessary, incorporated into the Development design.
Aircraft Disaster	Pilots and Aircraft	The potential for glint and glare to affect aircraft will be considered within a Technical Appendix to the ES. If any risks are identified, mitigation will be considered and, where necessary, incorporated into the Development design.
Flood Defence Failure	Employees	This will be covered in the Flood Risk Assessment and will also be reported in the ES. It will cover any risk to the Development and any increased risk caused by the Development.
Utilities Failure (*e.g.,* gas, electricity, water, sewage, oil, communications)	Employees and local residents.	The Development has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. It is known that there are overhead electricity lines located within the Order Limits.
Mining/Extractive Industry	Employees	There may be the potential for current or past quarrying activity in the vicinity of the Development which could lead to lead to unstable ground conditions, with potential risks if the ground were to move at a substation or BESS location. However, the risk will be considered as part of the geotechnical design, ensuring that any risk is designed out.
Plant Disease	Habitats and species	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases, due to climate change. The planting design will take account of biosecurity risks through its mix and choice of species.

639 It is considered highly likely that as the design of the Development evolves and addresses these risks, it will become clear that there is no real risk or serious possibility of an event occurring or interacting with the Development.

640 During all phases of the Development (*e.g.,* construction, operation and decommissioning), the Applicant would implement measures which are in accordance with the relevant health and safety legislation, regulations, and industry guidance. This would ensure that risks are suitably controlled and managed, for instance in relation to working near to overhead power lines or electrical infrastructure, or the risk of fire from electrical equipment.

641 An Outline Construction Methodology would be provided be within the Outline Construction and Environmental Management Plan (oCEMP) which would be provided as part of the ES. Appropriate measures and controls in line with relevant legislation and guidance will minimise risks to human and environmental receptors.

642 Where further design mitigation is unable to remove the potential interaction between a major accident or disaster and a particular technical topic, the relevant ES chapter will identify the potential consequence for receptors covered by the topic and give a qualitative evaluation of the potential for the significance of the reported effect to be increased as result of a major accident or disaster.

643 A section in the Miscellaneous Issues chapter of the ES will summarise the mitigation measures and residual risks of major accidents and disasters relating to the Development.

14 INTERRELATIONSHIPS

14.1 INTRODUCTION

644 Two types of effect arising from more than one source will be assessed within the ES:

1. Cumulative effects; and
2. Interaction, or interrelationship, effects.

645 Cumulative effects (1. above), are the effects of the Development on a receptor relative to a baseline that includes other proposed and consented (but not built) developments. They will be considered and assessed in each of the technical chapters of the ES and are therefore not considered further in this section.

646 Conversely, Interrelationships (2. above), may occur where two or more effects arise that have the potential to affect the same receptor during construction, operation or decommissioning. An effect taken in isolation may not have a significant effect on a receptor, but where several effects are considered in an interrelated manner, the resultant effect could then be considered significant.

647 Certain technical chapters of the ES such as:

- Ecology;
- Ornithology;
- Cultural heritage and archaeology; and
- Recreation (as part of the socio-economic assessment),

will already have considered interrelationship effects on those receptors as part of the main body of assessment, e.g., effects such as noise, dust, water

pollution, traffic, lighting on habitats or designations or the visual setting of a heritage asset *etc*. Interrelationships with the potential to cause effects to those particular topic-specific receptors will therefore be considered directly in those technical chapters of the ES and will not be repeated in the Interrelationships Chapter.

648 The types of receptors not exclusively considered by the technical chapters are humans, either as road users, residents or school pupils/employees. It is these human receptors that will be the sole focus of the Interrelationships Chapter. An example of such an interrelationship effect would be a resident, living close to Development construction activity, that is subject to noise, visual effects, traffic effects and temporary closures to or diversions of local Public Rights of Way; these separate effects all affect the resident.

14.1.1 Development Parameters to be Assessed

649 The Rochdale Envelope parameters for the Development will be considered with respect to any potential effects considered in the ES. The worst-case values/scenarios for this will be captured by the candidate design and will be set out in the Development Description Chapter of the ES. The Interrelationships Chapter will report the assessment of effects associated with the same candidate design and will therefore be worst case.

14.1.2 Consultation

650 The production of this Scoping Report provides an opportunity for consultees to comment on the proposed approach to interrelationship effects prior to any assessment being undertaken for the Preliminary Environmental Assessment Report (PEIR) or the ES.

14.2 ASSESSMENT METHODOLOGY

14.2.1 Legislation and Guidance

651 The EIA Regulations make explicit reference to the requirement for an assessment of the interrelationships between types of effect, and states that the EIA should contain a ***"....****description of the aspects of the environment likely to be significantly affected by the Development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors"*.

652 However, no further guidance or requirement beyond the need for it is provided.

653 The European Commission (EC) has produced guidelines that, amongst other things, covers the interaction of effects[110]. It recommends combining expert opinion with consultation to inform the assessment, with expert opinion being applied to evaluate the interacting effects. It recommends using matrices to assist with the identification of the interaction of effects. It notes the importance of avoiding double-counting. The proposed methods

[110] EC (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Available at: http://ec.europa.eu/environment/archives/eia/eia-studies-and-reports/pdf/guidel.pdf [accessed on 24/07/2023].

that will be applied in the Interrelationships Chapter of the ES are consistent with these EC guidelines.

14.2.2 Identification of Effects

654 The assessment will be undertaken on a qualitative basis using the results of each individual technical assessment, informed by professional judgement.

655 Potential sources of environmental effect will not be specifically identified in the Interrelationships Chapter; this chapter will instead rely on the other technical chapters of the ES for the identification of receptors, potential effects and their assessment. Mitigation, where proposed in the other technical chapters, will be assumed to be implemented before consideration of the effects in this chapter, *i.e.,* only mitigated residual effects will be considered. Similarly, the Interrelationships Chapter of the ES will draw from the other technical chapters for descriptions of aspects of the baseline environment, where this is required.

656 Effects with a magnitude assessed as *"negligible"* (described generally as *"no detectable or material change"*, or *"a barely discernible change"*) in other chapters will be considered not to have the potential to contribute to interrelationship effects and will not be considered in this chapter. For the avoidance of doubt, all effects not explicitly assessed elsewhere in the ES will be considered to be of '*negligible*' magnitude and therefore will not be assessed. Effects will only be considered where they have been identified and assessed in other chapters of the ES.

657 Only receptors that are predicted to be the subject of more than one potential effect will be included in the assessment. Receptors predicted to be the subject of only a single effect will be excluded because there is considered to be no potential for a cumulative interrelationship effect to take place.

658 A matrix will be used to detail which potential effects from different sources are predicted to affect each of the included receptors. The rationale for receptor inclusion or exclusion is explicitly detailed in Section 14.3.

659 It should be noted that uncertainty in the assessment of effects, for most of the technical chapters in the ES, will be dealt with by making conservative, or worst-case, assumptions. As the Interrelationships chapter considers the ***"in-combination"*** effects of multiple individual effects, it will be based on multiple worst-case scenarios, which is therefore likely to be overly conservative and potentially an exaggeration of the likely effects in reality. Professional judgement will be used to moderate and interpret this.

14.2.3 Assessment of Significance

660 A description of the interrelationships will be undertaken for each receptor and a conclusion drawn, using experience and professional judgement, as to whether any receptor will be subject to 'significant' effects as a result, in terms of the EIA Regulations.

661 The interrelationship effect is the effect over and above the individual effects assessed in other chapters and is described as the difference between the change caused to a receptor from one effect alone and the change caused to the receptor from all effects combined.

662 Significance will be determined by qualitative consideration of the sensitivity of receptors and the magnitude of effects using the following general criteria in accordance with the Environmental Impact Assessment Chapter of the ES:

- Negligible – no detectable or material change to a location, environment or receptor;
- Minor – a detectable but non-material change to a location, environment or receptor;
- Moderate – a material, but non-fundamental change to a location, environment or receptor; or
- Major – a fundamental change to a location, environment or species.

663 Effects assessed as Moderate or Major will be treated as being significant in terms of the EIA Regulations.

14.3 PROPOSED 'EFFECT INTERRELATIONSHIP MATRIX'

664 A matrix will be used to detail which potential residual effects are predicted to affect each of the included receptors. Receptors will be grouped at this stage to provide focus, and only receptor groups that have effects from more than one chapter will be listed.

665 Where recreational receptors (*e.g.,* users of Public Rights of Way) are included in the assessment of interrelationships it is because there may be secondary effects on local residents.

666 It is acknowledged that while cultural heritage assets are protected, and effects on them assessed, in their own right, individual people having relationships with those heritage assets (*e.g.,* listed buildings or conservation areas) may experience appreciation effects associated with changes to these assets. Non-negligible effects on heritage receptors will therefore be included in the matrix, where the people experiencing the effect are local residents.

667 It is noted that noise effects stated in the Noise Chapter of the ES, will not be sub-categorised into Negligible, Minor, Moderate and Major, and hence "not significant" effects could potentially contribute to interrelationship effects, and those assessed as requiring mitigation will therefore also be included in the proposed matrix.

668 Table 14.1 shows a proposed matrix to identify potential interrelationship effects that would require specific assessment.

Table 14.1 Proposed Matrix of Non-Negligible Magnitude Effects Arising in Two or More Chapters

Chapter / Effect Type	Receptor Group		
	Residents	**School**	**Road Users**
5: Landscape and visual			
8: Cultural heritage			
9: Noise			
10.2: Recreation			
11: Traffic and access			
14: Miscellaneous			

669 Specific receptors in each of these six chapters (above) will then be detailed in additional Tables. Table 14.2 provides an example table for construction phase effects and Table 14.3 provides an example for operational phase effects. Decommissioning effects are expected and assumed to be similar to, though of lesser magnitude than, construction phase effects, and will not therefore be explicitly assessed within the Interrelationships Chapter.

670 The information sources for inclusion in Tables 14.2 and 14.3 will be included within the ES either within the technical chapters or as Technical Appendices.

Table 14.2 Example Table presenting Non-Negligible Magnitude Construction Phase Effects Arising in Two or More Chapters

Chapter/ Effect Type	Receptor	Magnitude
5: Visual		
9: Noise		
13: Recreation		
14: Traffic		

Table 14.3 Example Table presenting Non-Negligible Magnitude Operation Phase Effects Arising in Two or More Chapters

Chapter / Effect Type	Receptor	Magnitude
5: Visual		
8: Cultural Heritage		
9: Noise		
10.2: Recreation		
14: Glint and Glare		

671 The above effects will then be set out for each individual receptor in an additional table, summarising the overall combined effects on that receptor during each of the construction and operation phases. A simple fictional example of which is provided in Table 14.4.

Table 14.4 Example (Fictional) Table presenting Non-Negligible Interrelationship Effects by Receptor

Receptor	Construction Phase Effects	Operation Phase Effects
Users of the Church of St Mary's (fictional).	Visual (cumulative) – slight.	Visual (cumulative) – slight.
	Traffic delay – minor.	
River View House (fictional).	None.	Visual – moderate up to year 5, then slight.
		Glint and Glare – possible.
The Three Horseshoes Inn (fictional).	Visual – moderate.	Visual – moderate up to year 10, then slight.
	Traffic delay – minor.	
Residents of Kent Street (fictional).	Traffic delay – minor. Community severance – minor.	Church of St Mary's Conservation Area appreciation – low. Listed building appreciation – low.

14.4 ASSESSMENT OF EFFECTS

672 This section of text will then consider the effects of the interrelationship between the individual effects identified in Tables 14.4 for each receptor or receptor group.

673 Moderate and Major effects, which are considered significant in terms of the EIA Regulations, will be highlighted in bold.

14.5 MITIGATION MEASURES AND RESIDUAL EFFECTS

674 The effects assessed in Section 14.4 will be, as noted in Section 14.2.2, based on the post-mitigation residual effects identified in the other chapters. Further mitigation for any interrelationship effects identified in this chapter could be achieved by applying further mitigation of individual effects in the relevant technical chapters.

675 A list of any receptors assessed as being likely to receive significant effects during the construction phase or operation phase, as a result of the interrelationships between individual assessments made in other chapters in this ES, will be provided. The design of the Development should minimise the number of significant effects on individual receptors.

14.6 CUMULATIVE EFFECTS ASSESSMENT

676 The assessment detailed above (in Section 14.4) will include consideration of non-negligible cumulative effects identified in the other technical chapters of this ES, consequently the potential effects associated with the cumulative

developments identified in the Environmental Impact Assessment will already have been considered.

15 ITEMS SCOPED OUT OF THE EIA

677 Table 15.1 is a summary of aspects proposed to be scoped out of the EIA.

Table 15.1: Effects to be Scoped Out of the EIA

Potential Effect	Phase of the Development	Justification
LVIA		
Effects on landscape and visual receptors beyond 5 km from the Solar Areas.	All Phases	Due to the lack of potential for visual effects.
The Residential Visual Amenity Assessment excludes properties beyond 100 m from the Solar Areas and other above ground elements.	All Phases	Due to the lack of potential for visual effects.
ECOLOGY		
International Sites		
Birklands and Bilhaugh Special Area of Conservation (SAC)	All Phases	There are no clear ecological pathways between the Development and the Birklands and Bilhaugh SAC. The qualifying features and integrity of the SAC are extremely unlikely to be dependent on ecological features within the Order Limits. Furthermore, there are no direct hydrological links and the intervening distance and agricultural landscape preclude direct and indirect effect pathways. The Order Limits are not situated within the SSSI IRZ for the SAC. Consequently, it is proposed that the Birklands and Bilhaugh SAC should be scoped out of the assessment.
National Sites		
All National Sites with the exception of: • Eakring and Maplebeck Meadows Special Site of	All Phases	Most of the SSSIs identified within this scoping chapter are notified for their habitats and plants, although these may support other valuable species. The LNRs are designated in large part for their amenity value and

Potential Effect	Phase of the Development	Justification
Scientific Interest (SSSI) • Mather Wood SSSI • Laxton Sykes SSSI; and • Redgate Woods and Mansey Common SSSI		whilst they support valuable ecological features, they are not recognised as the most ecologically sensitive sites. Most nationally designated sites are also separated from the Development by relatively large distances, extensive agricultural landscape, and also lack hydrological connectivity. Consequently, it is extremely unlikely that the integrity of the National Sites depends on ecological features within the Order Limits and there are no clear effect pathways. For the National Sites scoped out, the Order Limits are not within a SSSI IRZ associated them or the Development is not of a type (*i.e.,* 'Wind and Solar Energy') that triggers consultation with Natural England.
HYDROLOGY		
Any effect on Besthorpe Warren and Besthorpe Meadows SSSIs.	Construction and Operation	Both SSSIs are hydrologically disconnected from the Development Site by the River Trent.
Farndon Ponds and Devon Park Pastures LNRs.	Construction and Operation	Both Local Nature Reserves (LNRs) are hydrologically disconnected from the Development Site by the River Trent and are hydrologically upstream of the Development Site.
Transfer of sediment to surface water resources.	Operation	Establishment of onsite vegetation cover within the Development Site, which will reduce sediment mobilisation.
Transfer of chemicals to surface water resources during operation.	Operation	Only occasional maintenance visits limiting the presence of chemicals / hydrocarbons onsite.
Chemical pollution from damaged PV arrays / leakages from the PV arrays.	Operation	Due to the composition of the surface of the photovoltaic (PV) Modules, they are likely to remain intact both at the surface and underside near the racking system, even in the event of damage / impact and not leak.

Potential Effect	Phase of the Development	Justification
CULTURAL HERITAGE		
Effects to buried archaeological remains.	Operation	It is not anticipated that any additional land take or ground removal will be required for any maintenance activities during the operational phase of the Development. As such there is no potential for damage or destruction of buried archaeological remains to occur to affect the significance of the assets.
All Effects	Decommissioning	It is anticipated that all effects will have occurred during the construction phase (direct effects) and operational phase (indirect effects). This is based upon the assumption that no additional land take or ground removal will be required and that all the above ground elements of the Development will be removed, returning the landscape to its former state.
Effects to Grade II designated heritage assets at a distance greater than 2 km from the Order Limits.	All Phases	It is not anticipated that significant effects to Grade II designated heritage assets will occur to those which lie greater than a 2 km distance from the Order Limits. These assets are not considered to derive their significance from the Order Limits and are less sensitive to change than highly designated assets. Due to distance and intervening topography, the heritage significance of these assets is not anticipated to be affected by the Development.
Effects to designated heritage assets beyond a 5 km radius.	All Phases	Due to distance, the nature of the Development and intervening topography, assets beyond 5 km are unlikely to receive any significant effects to their heritage significance as a result of the Development.
NOISE		
Traffic Vibration	Construction and Operation	With regards to vibration from traffic sources, Design Manual for Road and Bridges (DMRB) states that normal "*use of the building such as closing*

Potential Effect	Phase of the Development	Justification
		doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic." As such, it is considered there is no realistic chance that vibration from traffic sources will result in an adverse effect. It is therefore proposed that both construction and operational traffic vibration can be scoped out of further assessment.
Vibration	Operation	There is no reasonable prospect that any plant installed as part of the Development would produce significant vibration effects, and as such operational vibration will be scoped out of any further assessment.
Traffic Noise	Operation	Operational traffic would be limited to occasional maintenance visits only, and as such there is no prospect of a significant effect from operational traffic movements.
SOCIO-ECONOMICS		
Socio-economic Effects	Operation	Socio-economic effects from the Development are expected to be modest during the operation phase and much less than those of the construction phase.
TRAFFIC AND ACCESS		
Public Rights of Way (PRoW) outside of the adopted Highway.	Construction	Construction effects on these PRoW will be assessed as part of the Socio-economics, Tourism, Recreation and Land Use Chapter of the Environmental Statement (ES).
Vehicle Trips	Operation	Given the nature of the Development, the operational phase is expected to only generate a very small number of vehicular trips. However, details of the number of trips will be provided in the Traffic and Access ES Chapter to support this position.

Potential Effect	Phase of the Development	Justification
Vehicle Trips	Decommissioning	Similar to the operational phase, the decommissioning phase should be scoped out of the assessment as the effect will be less than the construction phase. Again, details of the predicted number of trips will be provided in the Traffic and Access Chapter of the ES to support this position.
MISCELLANEOUS ISSUES		
Human Health: Effects on human health from electrical infrastructure.	Operation	Properly designed and maintained solar farms are considered to be a safe technology. The Development design and inbuilt buffers from sensitive receptors will minimise any risk to human health resulting from the operation of the Development. Risks associated with electrical infrastructure such as from lightning strikes are removed or reduced through inbuilt control systems.
Waste	Operation	The production of waste during the operational phase of the Development will be minimal.
Air Quality – pollution from emissions of vehicles and plant	Construction and Decommissioning	Given the baseline low levels of pollution, the dispersed and time-limited nature of construction traffic, together with the anticipated levels of traffic increase, evidence from previous studies suggests that increases in air pollution will be negligible.
Air Quality – pollution from emissions of vehicles and plant	Operation	During operation, the Development will result in minimal alteration to the baseline in respect of air quality (*i.e.,* under arable cultivation the land is worked by machinery, and exists in vegetated and unvegetated states at different times of year).

16 ES SUPPLEMENTARY DOCUMENTS

678 The following outline plans will supplement the technical chapters of the ES and will be provided as Technical Appendices:

- Outline Construction Environmental Management Plan (oCEMP);
- Outline Landscape and Biodiversity Management Plan (oLBMP);
- Outline Construction Traffic Management Plan (oCTMP);
- Outline Code of Construction Practice (oCoCP);
- Outline Watercourse Crossing Methodologies;
- Outline Decommissioning Plan;
- Outline Public Rights of Way Management Plan;
- Outline Soil Management Plan (oSMP);
- Outline Battery Safety Management Plan (oBSMP); and
- Outline Site Waste Management Plan (oSWMP).

17 GLOSSARY

Table 17.1 Glossary and Abbreviations

Abbreviation	Term	Definition
2D	Two-dimensional	A flat representation, without vertical elements being represented.
AADT	Annual Average Daily Traffic	Traffic data obtained by calculating daily traffic flows in both directions of travel and then calculating the annual average.
AC	Alternating Current	An electric current that reverses its direction many times a second at regular intervals, typically used in power supplies.
AEP	Annual Exceedance Probability	The probability that a location will flood in any given year.
agl	Above Ground Level	A height above the ground level at that location
AIA	Arboriculture Impact Assessment	The process through which the potential effects to trees arising from a project are identified, quantified, and assessed.
ALC	Agricultural Land Classification	Agricultural Land Classification (ALC) is a system used in England and Wales to assess the quality of land for agricultural use. Its assessment is based on physical limitations of the land, such as climate, site characteristics (for example gradient) and soil. The assessment gives an indication of the versatility and

Abbreviation	Term	Definition
		expected yield of the land. The system classifies agricultural land in 5 grades. The best and most versatile land is classified as 1, 2 and 3a. The Agricultural Land Classification was developed by the former Ministry of Agriculture, Fisheries and Food (MAFF) in 1988 and revised in 1996. ALC is used to inform planning decisions affecting greenfield sites.
	Amenity	The ability of people to achieve enjoyment and/or quality of life.
AOD	Above Ordnance Datum	Absolute levels have been given by reference to a national datum and are quoted as a level Above Ordnance Datum (AOD). The use of a common national datum means that the local ground level (the relative level) does not affect the AOD level that a constraint may be set at.
	Archaeological Interest	There will be archaeological interest in a heritage asset if it holds, or potentially holds, evidence of past human activity worthy of expert investigation at some point.
ATC	Automatic Traffic Count	Tubes installed on a road to collect traffic speed, vehicle classification volumes.
	Baseline Conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Development, together with any known or foreseeable future changes that will take place before completion of the Development.
BCT	Bat Conservation Trust	A “non-governmental organisation in the United Kingdom solely devoted to the conservation of bats and the landscapes on which they rely” (from the BCT’s website).
BESS	Battery Energy Storage System	The battery energy storage system is designed to provide peak generation and grid balancing services to the electricity grid. It will do this primarily by allowing excess electricity generated

Abbreviation	Term	Definition
		from the solar PV panels to be stored in batteries and dispatched when required. It may also import surplus energy from the electricity grid.
BGS	British Geological Survey	
	Biodiversity	The variety of life in a defined area.
BMV	Best and Most Versatile	Refers to agricultural land with an Agricultural Land Classification of 1, 2 or 3a.
BOAT	Byway Open to All Traffic	
BNG	Biodiversity Net Gain	A strategy to contribute to the recovery of nature while developing land, ensuring that wildlife is in a better state than it was before development.
BRES	Business Register and Employment Survey	
BS	British Standards	
CCIA	Climate Change Impact Assessment	
CCTV	Closed Circuit Television	
CEMP	Construction Environmental Management Plan	A document specifying measures to control construction activities so as to limit and reduce their potential environmental effect.
CIEEM	Chartered Institute for Ecology and Environmental Management	
CIfA	Chartered Institute for Archaeologists	
CIRIA	The Construction Industry Research and Information Association	
CO_2	Carbon Dioxide	
CoCP	Code of Construction Practice	
	Conservation (for heritage policy)	The process of maintaining and managing change to a heritage asset in

Abbreviation	Term	Definition
		a way that sustains and, where appropriate, enhances significance.
CRTN	Calculation of Road Traffic Noise	
CTMP	Construction Traffic Management Plan	A specific plan developed to ensure that appropriate traffic management measures are followed during the construction phase of the Development.
	Cumulative Effects	Effects upon the environment that result from the incremental impact of an action when added to other past, present or reasonably foreseeable actions. The cumulative effect is the additional, combined effect, not the effect of the Development alone. So, for example, the Development may have significant effects and not significant cumulative effects, or vice versa.
DAS	Discretionary Advice Service	A paid-for service sometimes offered to developers by Natural England.
dB	Decibel	The decibel is the basic unit of noise measurement. It relates to the cyclical changes in pressure created by the sound and operates on a logarithmic scale, ranging upwards from 0 dB. 0 dB is equivalent to the normal threshold of hearing at a frequency of 1000 Hertz (Hz). Each increase of 3 dB on the scale represents a doubling of the Sound Pressure and is typically the minimum noticeable change in sound level under typical listening conditions.
dB(A)	A-weighted Decibel	Environmental noise levels are usually discussed in terms of dB(A). This is known as the A weighted sound pressure level, and indicates that a correction factor has been applied, which corresponds to the human ear's response to sound across the range of audible frequencies. The ear is most sensitive in the middle range of frequencies (around 1000-3000 Hz), and less sensitive at lower and higher frequencies. The A weighted noise level is derived by analysing the level of

Abbreviation	Term	Definition
		a sound at a range of frequencies and applying a specific correction factor for each frequency before calculating the overall level. In practice this is carried out automatically within noise measuring equipment by the use of electronic filters, which adjust the frequency response of the instrument to mimic that of the ear.
DC	Direct Current	Direct current (DC) is an electric current that is uni-directional, so the flow of charge is always in the same direction. As opposed to alternating current, the direction and amperage of direct currents do not change. It is used in many household electronics and in all devices that use batteries.
DCO	Development Consent Order	Under the Planning Act, a Development Consent Order (DCO) is the means of obtaining permission to construct and maintain developments categorised as Nationally Significant Infrastructure Projects (NSIPs). This includes energy, transport, water and waste projects. A Development Consent Order (DCO) is a statutory instrument and should follow statutory drafting conventions. The DCO must also comply with all the requirements set out in the Planning Act 2008 and associated legislation.
DECC	Department for Energy and Climate Change	
DEFRA	Department for Environment, Food & Rural Affairs	
	Designated Heritage Asset	A World Heritage Site, scheduled monument, listed building, protected wreck site, registered park and garden, registered battlefield or conservation area designated under the relevant legislation.
	Designated Site	A defined feature or area of land or water that is protected through legislation or policy.
DfT	Department for Transport	

Abbreviation	Term	Definition
DMRB	Design Manual for Roads and Bridges	A series of 15 volumes authored by Highways England that provide standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads, including motorways in the United Kingdom, and, with some amendments, the Republic of Ireland.
	Driver Delay	An increase in journey time for a motorised user due to congested traffic conditions or traffic flow controls.
DTM	Digital Terrain Model	
EA	Environment Agency	
EC	European Commission	
	Ecology	The study of organisms and how they interact with each other and the environment.
EcIA	Ecological Impact Assessment	The process through which the potential impacts to ecological features arising from a project are identified, quantified, and assessed.
	Ecosystem	The organisms in an area and the processes through which they interact with each other and the environment.
eDNA	environmental DNA	Traces of Deoxyribo Nucleic Acid (DNA) found in the environment that can indicate the presence of a species, typically used as a test for great crested newts in water bodies.
	Environmental Effect	The consequence of an action upon the environment.
EIA	Environmental Impact Assessment	A process by which information about the environmental effects of a proposed development is collected, assessed and used to inform decision making.
	EIA Regulations[111]	Regulations that give planning authorities a means of ensuring that they can take account of the environmental, economic and social implications of individual developments

[111] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. UK Statutory Instruments 2017 No. 572. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents [accessed on 24/07/2023].

Abbreviation	Term	Definition
		in their decisions on planning applications.
EMF	Electromagnetic fields	Electric and magnetic fields together are referred to as electromagnetic fields, or EMFs. The electric and magnetic forces in EMFs are caused by the action of electromagnetic fields on substances that can conduct electricity.
EPUK	Environmental Protection UK	A UK environmental non-governmental organisation (NGO) working to improve the quality of the local environment - specialising in the subjects of air quality, noise management and land quality.
ES	Environmental Statement	has the meaning given by regulation 14 of the EIA Regulations. A document produced in accordance with the EIA Regulations to report the results of an EIA. An ES sets out the assessment of the likely environmental effects of a proposed development.
EU	European Union	
FRA	Flood Risk Assessment	
GB	Great Britain	
GCN	Great Crested Newt	A European Protected Species.
GEATM	Guidelines on the Environmental Assessment of Traffic and Movement	Published by IEMA.
GIS	Geographical Information System	Computer software to aid the representation and analysis of spatial data and prepare maps.
GNR	Great North Road Solar Park	Generally referred to in this document as “The Development”.
GVA	Gross Value Added	
GW	GigaWatt	A unit of power, typically electrical power. A GigaWatt is equal to one billion Watts. Gigawatts measure the capacity of large power plants or of many power plants.

Abbreviation	Term	Definition
Ha	Hectares	The hectare is a unit of area equal to a square with 100-metre sides, or 10,000 m², and is primarily used in the measurement of land. One hectare is equivalent to approximately 2.5 acres.
HDD	Horizontal Directional Drilling	A technique to make a tunnel, such as for ducting for electricity cables, without digging a trench through the surface of the ground.
HER	Historic Environment Record	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use.
HGV	Heavy Goods Vehicles	
HHIA	Human Health Impact Assessment	
HRA	Habitats Regulation Assessment	An assessment under the Habitats Regulations to test if a plan or project proposal could significantly harm the designated features of a European site.
	Heritage Asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing).
	Historic Environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged and landscaped and planted or managed flora.
his	Habitat Suitability Index	A measure of whether a habitat is suitable for supporting a given species. Typically used to describe the suitability of ponds to support great crested newts.

Abbreviation	Term	Definition
IAQM	Institute for Air Quality Management	
ICNIRP	International Commission on Non-Ionizing Radiation Protection	
IDB	Internal Drainage Board	"A public body that manages water levels in an area, known as an internal drainage district, where there is a special need for drainage. IDBs undertake works to reduce flood risk to people and property and manage water levels for agricultural and environmental needs within their district."
IEF	Important Ecological Feature	A species, habitat or designated site which is considered to be both of sufficient value and potentially affected by a project, such that it is included in the assessment.
IEMA	Institute of Environmental Management and Assessment	
	Inverter	A power inverter is a power electronic device or circuitry that changes direct current (DC) to alternating current (AC). Inverters are required to convert the DC electricity produced by the PV modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid.
ISO	International Organisation for Standardisation	
IRZ	Impact Risk Zone	A zone specified by Natural England that sets out the area within which consultation with Natural England is required, for certain types of proposed development.
	Key Characteristics	Those combinations of elements which are important to the current character of the landscape and help to give an area its particularly distinctive sense of place.

Abbreviation	Term	Definition
Km	Kilometres	1000 metres
kV	Kilovolt	1000 Volts
$L_{Aeq,t}$	Ambient Sound Level	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, t.
L_{A90}	Background sound level	The background noise level is the underlying level of noise present at a particular location for the majority (usually 90%) of a period of time.
L_{Ar}	Rating Level	Specific sound level from a source plus any adjustment for the characteristic features of the sound.
LBMP	Landscape and Biodiversity Management Plan	A document that describes proposed actions to mitigate or enhance the landscape and/or biodiversity, including both implementation, monitoring and maintenance.
LCA	Landscape Character Area	An area of broadly consistent landscape character, as described typically by a landscape character assessment. Note than an LCA is not a designation and does not confer any protection, rather it is just a description.
LDT	Long Distance Trails	
LIS	Local Industrial Strategy	A Newark and Sherwood District Council document.
LLFA	Lead Local Flood Authority	
L_p	Sound pressure level	Sound pressure measured on the decibel scale, relative to a sound pressure of 2 x 10-5 Pa.
LNR	Local Nature Reserve	
	Landscape Character	The distinct and recognisable pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
	Landscape Character Areas	These are single unique areas which are the discrete geographical areas of a particular landscape type.

Abbreviation	Term	Definition
	Landscape Character Types	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
	Landscape Effects	Effects on the landscape as a resource in its own right.
	Landscape Fabric	Individual components which make up the landscape such as trees and hedges.
	Landscape Receptor	Defined aspects of the landscape resource that may be affected by a proposal.
	Landscape Value	The relative value or importance attached to different landscapes by society on account of their landscape qualities.
LPA	Local Planning Authority	Such as Newark and Sherwood District Council.
LVIA	Landscape and Visual Impact Assessment	
LWS	Local Wildlife Site	
m	Metres	
MAFF	Ministry of Agriculture Fisheries and Food	
mm	Millimetres	
mph	Miles Per Hour	
MW	MegaWatts	A unit of power, typically electrical power. A MegaWatt is equal to one million Watts. Megawatts measure the capacity of medium to large power plants and renewable energy generation facilities.
NBGRC	Nottinghamshire Biological and Geological Record Centre	

Abbreviation	Term	Definition
NBN	National Biodiversity Network	
NCA	National Character Areas	An area of broadly consistent landscape character at the national level, as described typically by a national landscape character assessment. Note than an NCA is not a designation and does not confer any protection, rather it is just a description.
NCC	Nottinghamshire County Council	
NCN	National Cycle Network	
NE	North-east	
NERC	Natural Environment and Rural Communities	
NETS	National Electricity Transmission System	National Grid Electricity Transmission System is the high voltage electricity network in England and Wales The onshore and offshore transmission system broadly comprises circuits operating at 400, 275 and 132 kV.
NGET	National Grid Electricity Transmission	National Grid Electricity transmission is responsible for owning and maintaining the high voltage electricity network in England and Wales.
NHLE	National Heritage List for England	
NMP	National Mapping Programme	
NNR	National Nature Reserve	
NPPF	National Planning Policy Framework	
NPPG	National Planning Policy Guidance	
NPS	National Policy Statement	
NPSE	Noise Policy Statement for England	
NRHE	National Record of the Historic Environment	
NSDC	Newark and Sherwood District Council	The district within which the Development is situated.

Abbreviation	Term	Definition
NSIP	Nationally Significant Infrastructure Project	
NSLAA	Newark and Sherwood Local Authority Area	
NW	North-west	
NNW	North-north-west	
oBSMP	Outline Battery Safety Management Plan	
oCEMP	Outline Construction Environmental Management Plan	
oCTMP	Outline Construction Traffic Management Plan	
oLBMP	Outline Landscape and Biodiversity Management Plan	
ONS	Office for National Statistics	
	Order Limits	The boundary of the development proposed in the DCO application.
OS	Ordnance Survey	
oSMP	Outline Soil Management Plan	
oSWMP	Outline Site Waste Management Plan	
P	Sound Pressure	The fluctuations in pressure relative to atmospheric pressure, measured in Pascals (Pa).
Pa	Pascals	A unit of pressure.
	Pedestrian Amenity	The relative pleasantness of a journey for a pedestrian.
	Pedestrian Delay	An increase in journey time for a pedestrian to cross a road, typically due to traffic levels.
PEA	Preliminary Ecological Appraisal	A method to provide an initial overview of ecological constraints and opportunities.

Abbreviation	Term	Definition
PEIR	Preliminary Environmental Impact Report	A document required for public consultation prior to finalisation of the design and submission of the application for a DCO.
	Photowire	A visualisation which superimposes a simple wireline of a proposed development upon a photograph or series of photographs.
	Photomontage	A visualisation which shows a rendered image of a proposed development set within a photograph or series of photographs edited to show screening by intervening features.
PINS	Planning Inspectorate	Appointed by the SoS to examine and report on DCO applications.
PoC	Point of Connection	The location at which a generating station is formally connected to the existing electrical grid.
PPG	Planning Practice Guidance	
PPGs	Pollution Prevention Guidelines	
	Priority Habitat/Species	Habitats and species of Principal Importance listed in Section 41 of the NERC Act.
	Protected and Notable Species	Non-avian species that are specially legally protected (or controlled) or assigned a higher level of conservation status.
PRoW	Public Rights of Way	Including footpaths, bridleways and Byways Open to All Traffic (BOATs)
PWS	Private Water Supplies	
PuWS	Public Water Supplies	
PV	Photovoltaic	Photovoltaics is the conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect, a phenomenon studied in physics, photochemistry, and electrochemistry. The photoelectric effect causes a material to absorb photons of light and release electrons.
PWS	Private Water Supply	

Abbreviation	Term	Definition
PWSRA	Private Water Supplies Risk Assessment	
RAF	Royal Air Force	
RIGS	Regionally Important Geological/Geomorphological Site(s)	
RLCA	Regional Landscape Character Areas	An area of broadly consistent landscape character at the regional level, as described typically by a regional landscape character assessment. Note than an RLCA is not a designation and does not confer any protection, rather it is just a description.
RSuDS	Rural Sustainable Drainage Systems	
RVAA	Residential Visual Amenity Assessment	
SAC	Special Areas of Conservation	
SE	South-east	
SEP	Strategic Economic Plan	
	Setting	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
	Severance	The perceived division that can occur within a community when it becomes separated by a major traffic artery.
SFRA	Strategic Flood Risk Assessment	
	Significance (for heritage policy)	The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage assets' physical presence but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement

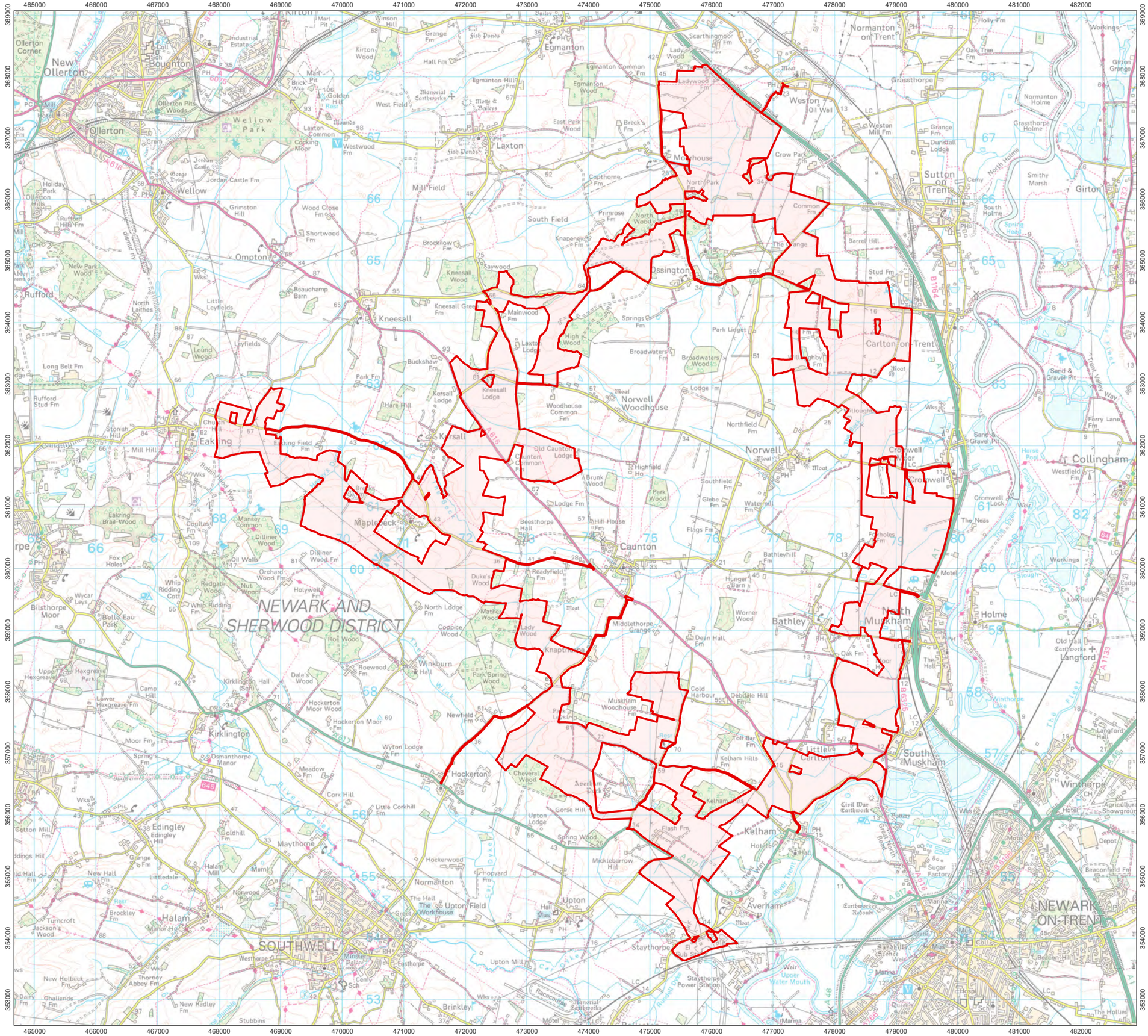
Abbreviation	Term	Definition
		of Outstanding Universal Value forms part of its significance.
SMP	Soil Management Plan	
SoCC	Species of Conservation Concern	Bird species that are specially legally protected or assigned a higher level of conservation status.
SoS	Secretary of State	
SPA	Special Protection Area	
	Specific Level (Noise)	In terms of BS4142 methodology, the specific level is the sound level produced by a source, without corrections for acoustic features.
SPG	Supplementary Planning Guidance	
SSSI	Site of Special Scientific Interest	
	Substation	Substations contain the specialist equipment that allows the voltage of electricity to be transformed (or 'switched'). The voltage is stepped up or down through pieces of equipment called transformers, which sit within a substation's site.
SuDS	Sustainable Drainage System	
	Switchgear	In an electric power system, a switchgear is composed of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to de-energize equipment to allow work to be done and to clear faults downstream
SW	South-west	
SWMP	Site Waste Management Plan	
TA	Transport Assessment	
TCPA	Town and Country Planning Act	
TGN	Technical Guidance Note	

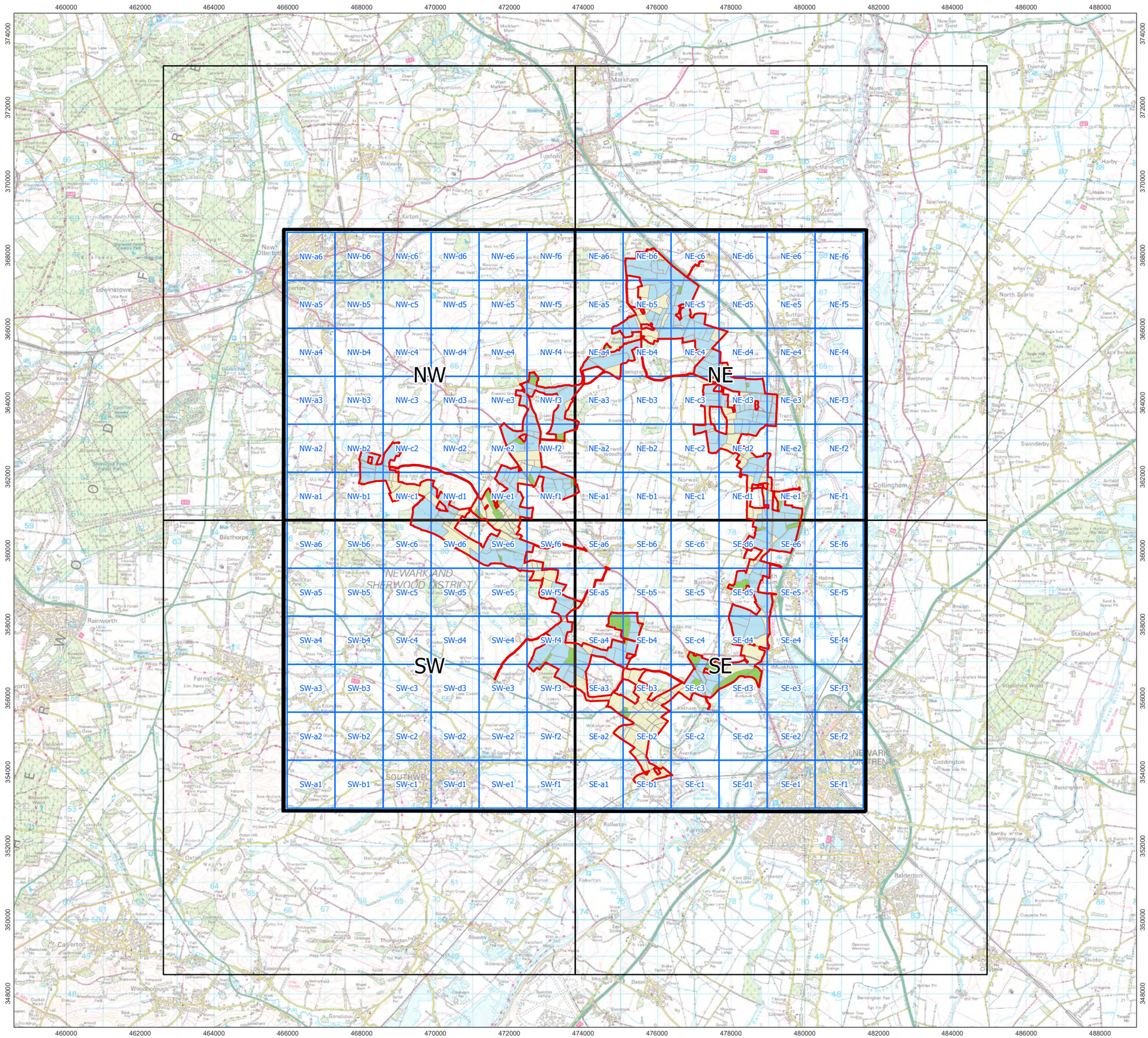
Abbreviation	Term	Definition
	Transformer	A transformer is a passive component that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits. Transformers are required to step up the voltage of the electricity generated across the Development site before it reaches the substation.
TVIDB	Trent Valley Internal Drainage Board	
UK	United Kingdom	
	Visual Amenity	Value of a particular place in terms of what is seen by visual receptors taking account of all available views and the total visual experience.
	Visual Effect	Effects on specific views and on the general visual amenity experienced by people.
	Visual Receptors	Individuals and/or defined groups of people who may be affected by a proposal.
	Visualisation	Computer simulation, photomontage or other technique to illustrate the appearance of a development.
	Wireframe or Wireline	A computer-generated line drawing of the DTM (Digital Terrain Model) and the proposed development from a known location.
WFD	Water Framework Assessment	
WSSA	Water Supplies Study Area	
ZoI	Zone of Influence	The area over which an ecological feature may be subject to significant effects from a project.
ZTV	Zone of Theoretical Visibility	Area within which a proposed development may have an influence or an effect on visual amenity.

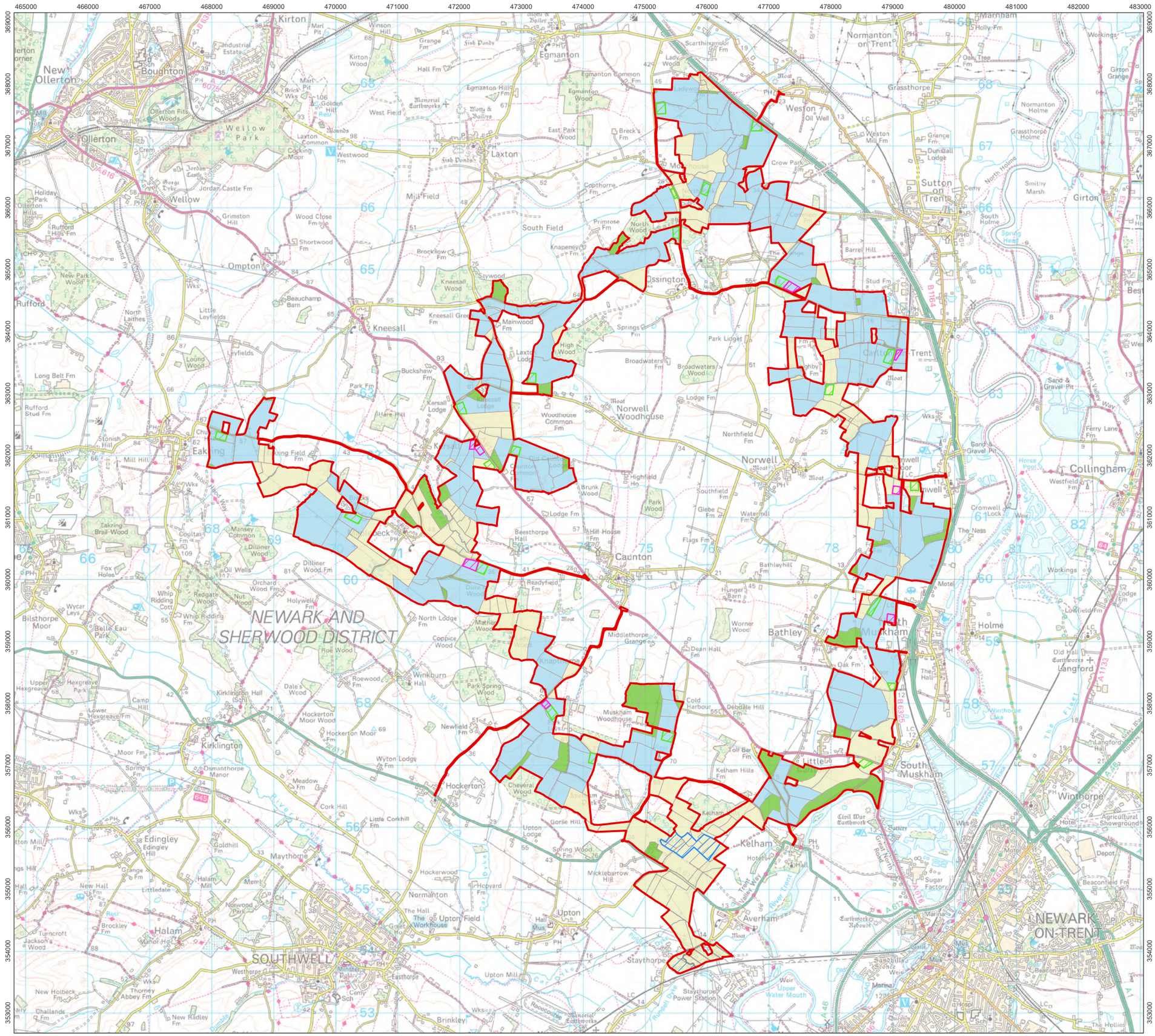
APPENDIX A: FIGURES

679 The following figures are included with this Scoping Report:

- Figure 1.1 Development Location
- Figure 2.1 Figure Referencing
- Figure 2.2 Indicative Developable Areas
- Figure 2.3 Planning and Environmental Designations (30 km)
- Figure 2.4 Planning and Environmental Designations (2 km)
- Figure 5.1 Solar Areas – ZTV Study (A3 size)
- Figure 5.2 Solar Areas – ZTV Study (A1 size)
- Figure 5.3 BESS/400kV Compound – ZTV Study
- Figure 5.4 Substations – ZTV Study
- Figure 6.1 Statutory Designated Sites
- Figure 7.1 Flood Zones 2 and 3
- Figure 8.1 Designated Heritage Assets (overview)
- Figures 8.2-12 Designated Heritage Assets (detail)
- Figure 10.1 Public Rights of Way
- Figure 10.2 Provisional Agricultural Land Classification
- Figure 11.1 Traffic and Access







- Order Limits
- Staythorpe National Grid Substation
- BESS 400kV Compound
- Substation Areas
- Construction Compound Areas

Development Areas

- Cable Area
- Other Area
- Solar Area

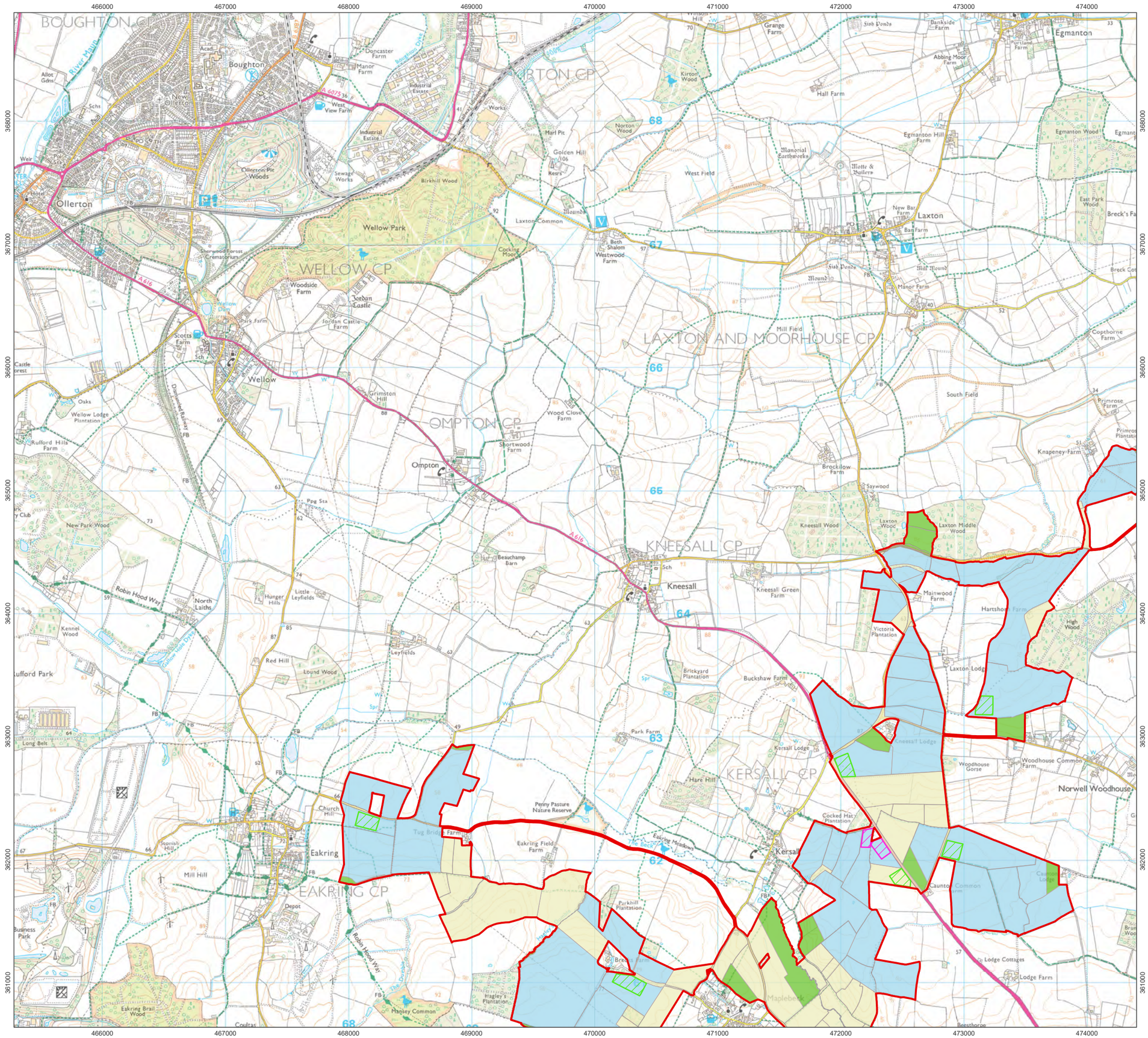
1:60,000 Scale @ A3

0 0.5 1 2 km

Ref:	Date: 07/11/2023

Indicative Developable Areas
Figure 2.2 - Overview

Great North Road Solar Park
Scoping Report



Order Limits

Staythorpe National Grid Substation

BESS 400kV Compound

Substation Areas

Construction Compound Areas

Development Areas

Cable Area

Other Area

Solar Area

1:30,000 Scale @ A3

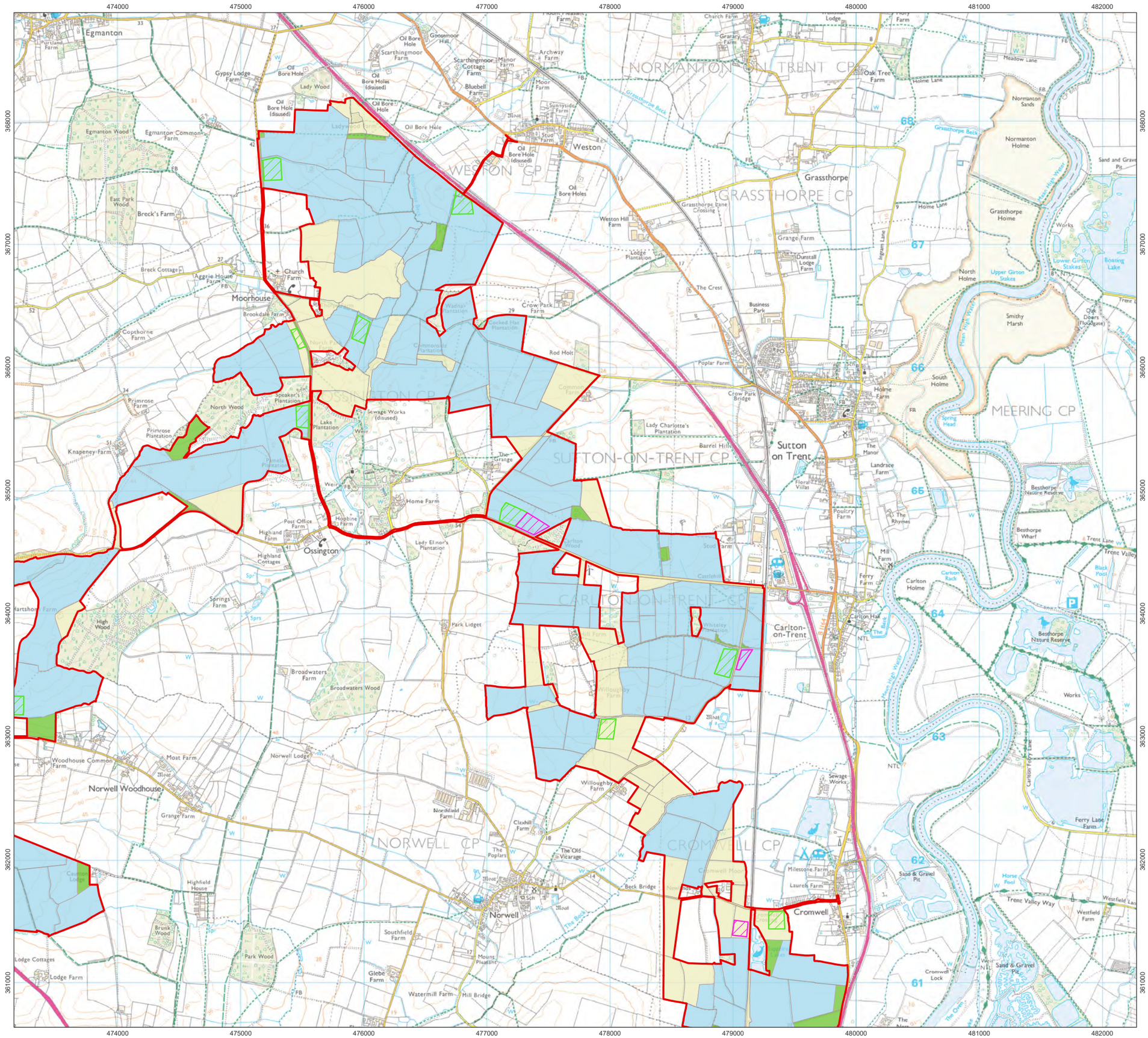
0 0.25 0.5 1 km

Ref:

Date: 07/11/2023

Indicative Developable Areas Figure 2.2 - NW

Great North Road Solar Park Scoping Report



Order Limits

Staythorpe National Grid Substation

BESS 400kV Compound

Substation Areas

Construction Compound Areas

Development Areas

Cable Area

Other Area

Solar Area

1:30,000 Scale @ A3

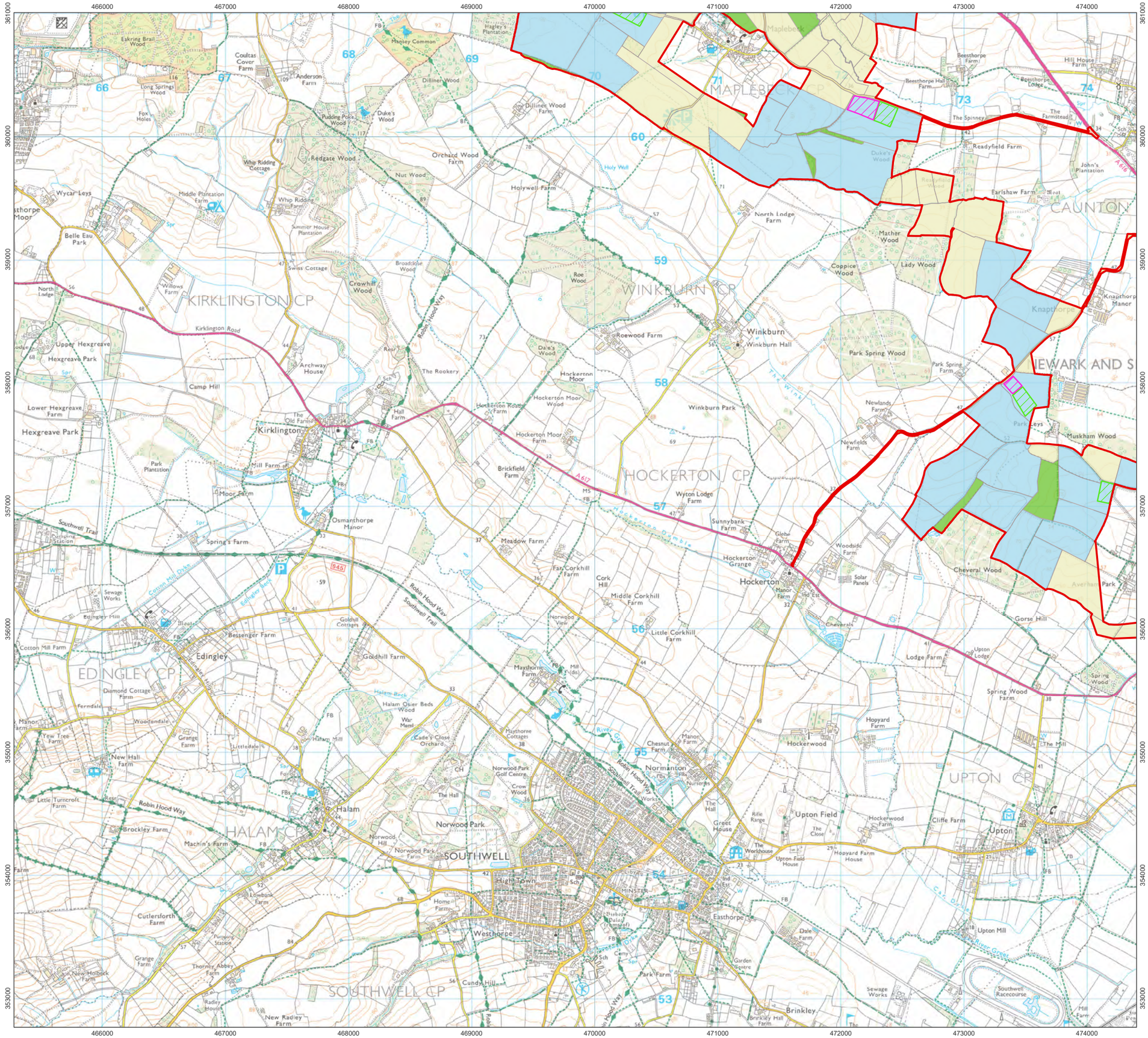
0 0.25 0.5 1 km

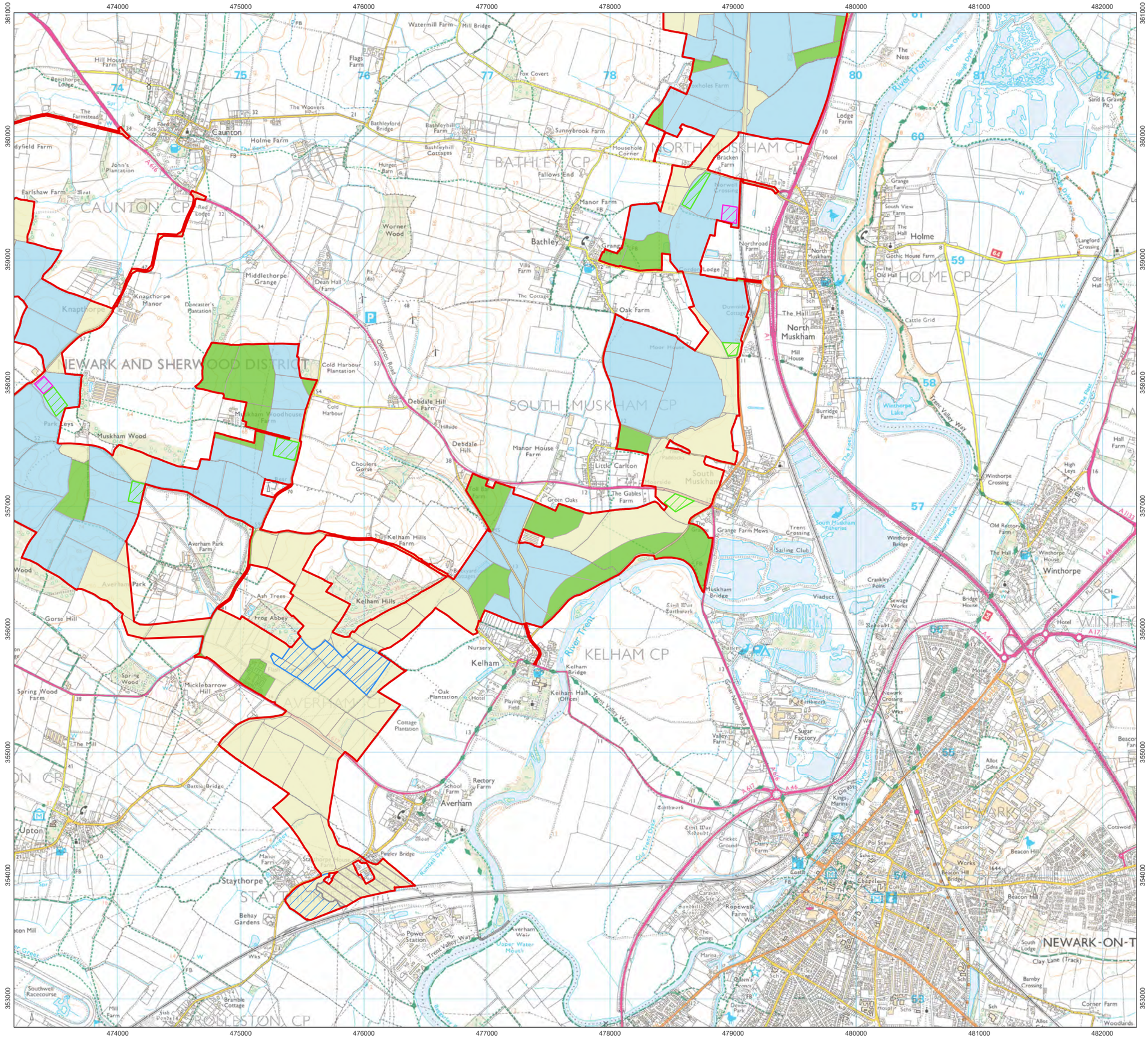
Ref:

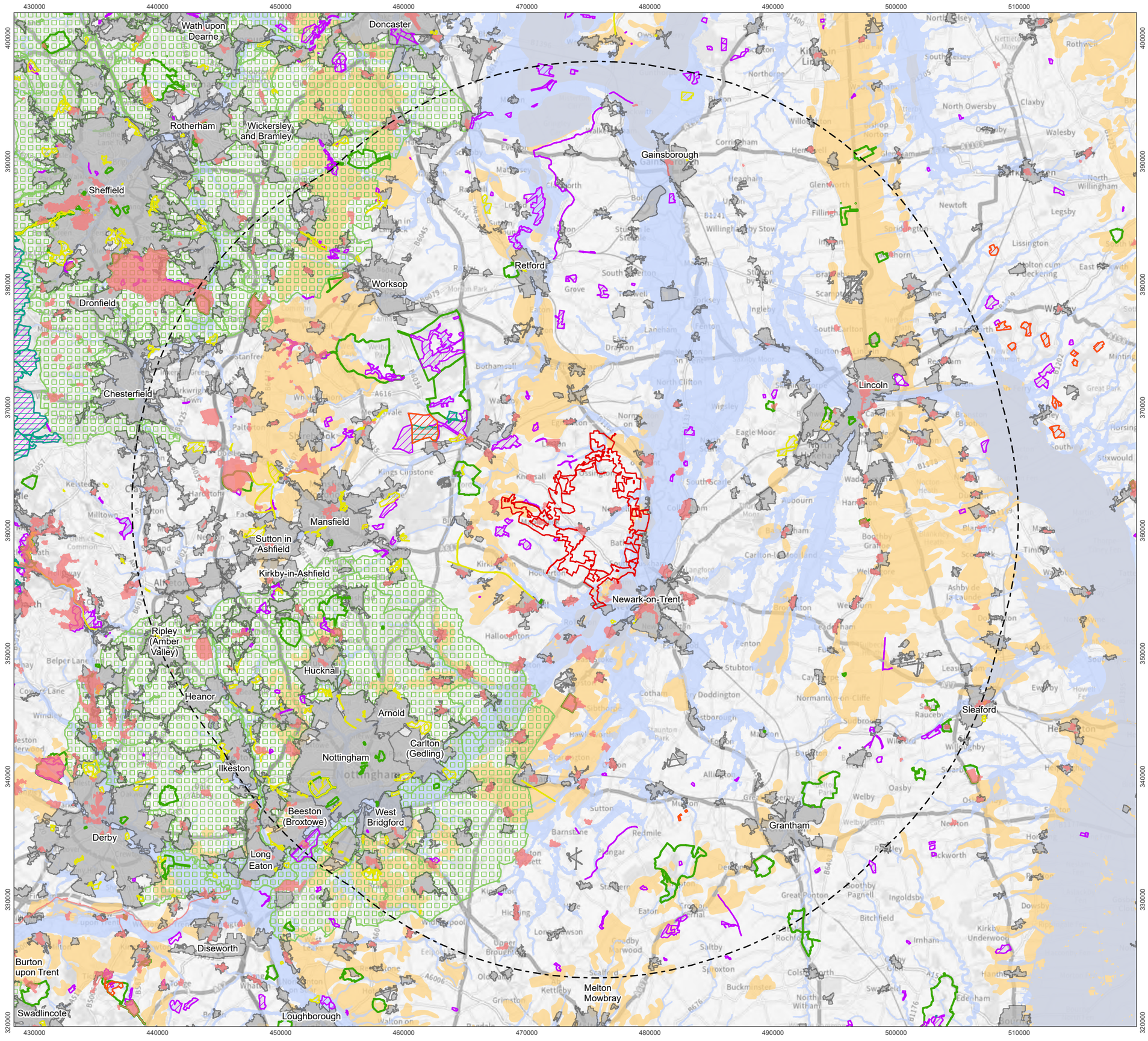
Date: 07/11/2023

Indicative Developable Areas Figure 2.2 - NE

Great North Road Solar Park Scoping Report







Order Limits

30 km buffer of Order Limits

Settlements

Conservation Area

NNR

LNR

SAC

SSSI

Registered Parks and Gardens

Green Belt

ALC Grade 1 and 2 Land

Flood Zone 2

1:300,000 Scale @ A3

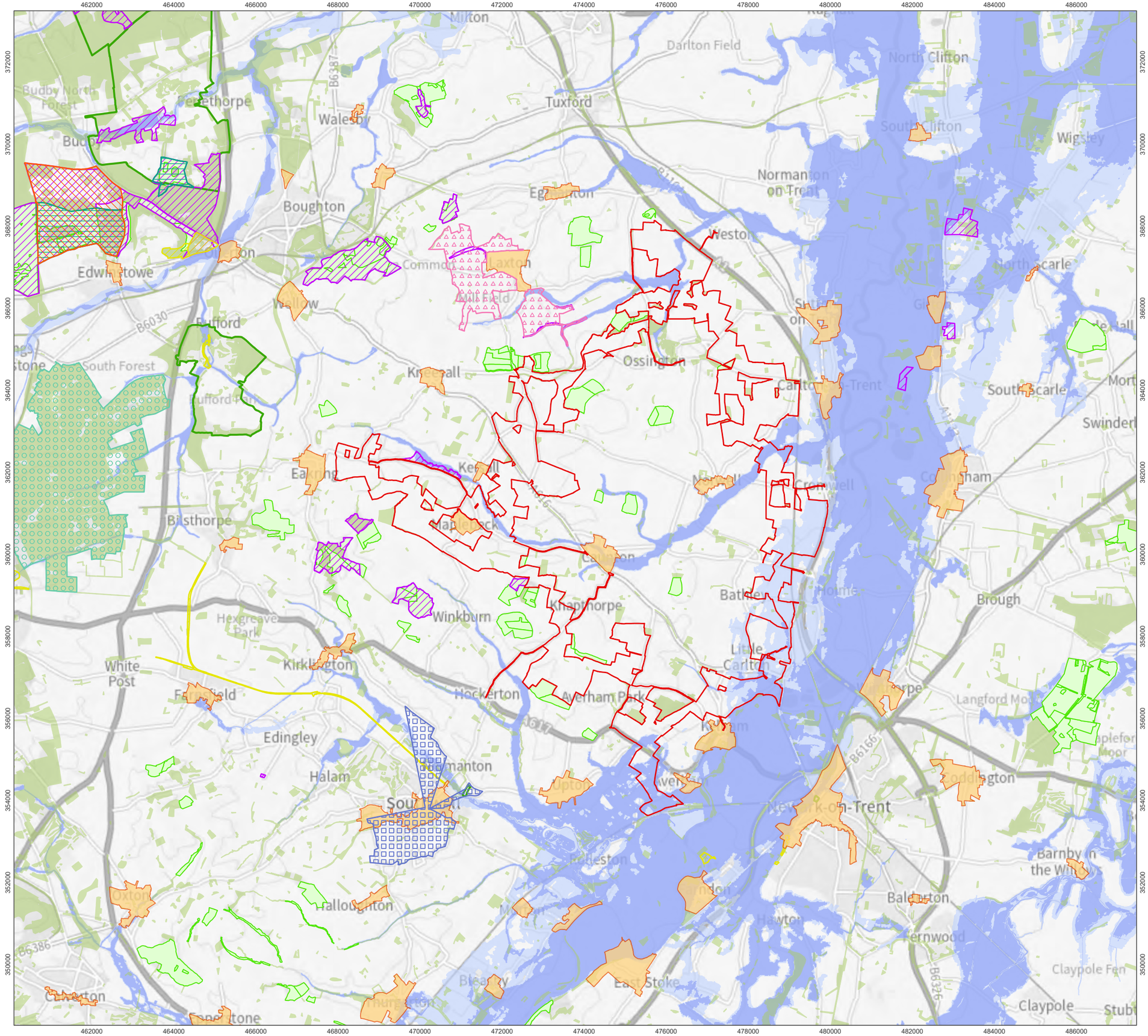
0 2.5 5 10 km

Ref: 007-001-112	Date: 02/11/2023

Planning and Environmental Designations
Figure 2.3

Great North Road Solar Farm
Scoping Report

C:\Users\Stuart Clay\OneDrive - sc-gi.co.uk\Documents\SCGI\Projects\007 Elements Green\007-001 GNR Plans\007-001 GNR Plans.aprx\007-001-112 Fig2.3 Planning and Environmental Designations



Order Limits
Historic Landscape Around Laxton
Sherwood Forest SINC
Southwell Protected Views
Conservation Area
NNR
LNR
SAC
SSSI
Registered Parks and Gardens
Flood Zone 2
Flood Zone 3
Ancient Woodland
Woodland

1:90,000 Scale @ A3

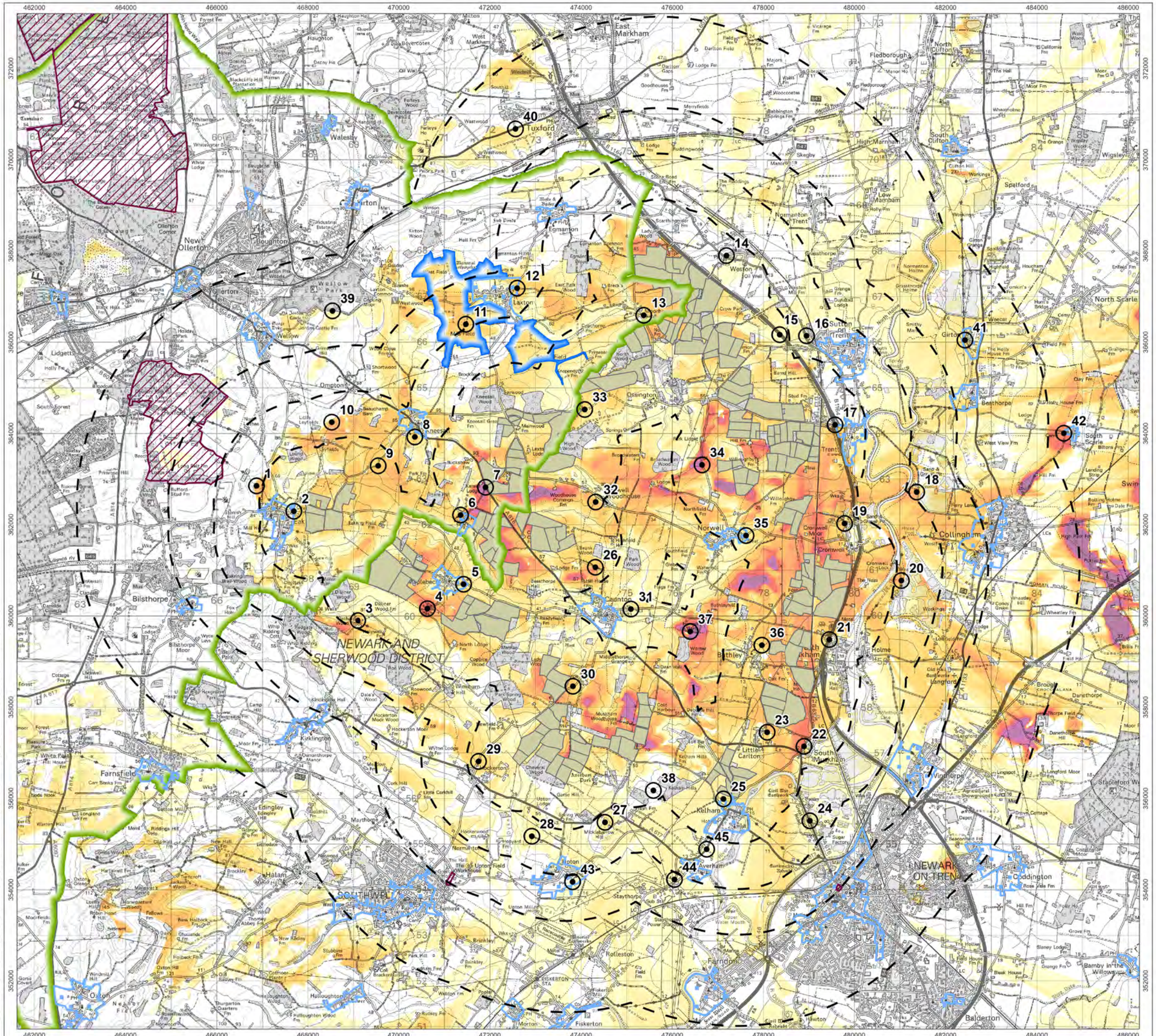
0 0.75 1.5 3 km

Ref: 007-001-113 | Date: 06/11/2023

Planning and Environmental Designations
Figure 2.4

Great North Road Solar Farm
Scoping Report

C:\Users\Stuart Clay\OneDrive - sc-gi.co.uk\Documents\SCGI\Projects\007 Elements Green\007-001 GNR Plans\007-001 GNR Plans.aprx\007-001-113 Fig2.4 Planning and Environmental Designations



- Solar PV Areas
- Distance from Solar PV Areas (1,2,3,5km)
- Proposed Viewpoints
- Sherwood Forest Regional Park
- Historic Landscape around Laxton
- Conservation Areas
- Registered Historic Parks and Gardens

Zone of Theoretical Visibility (% of solar areas visible)

up to 29%

> 0%

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

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The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

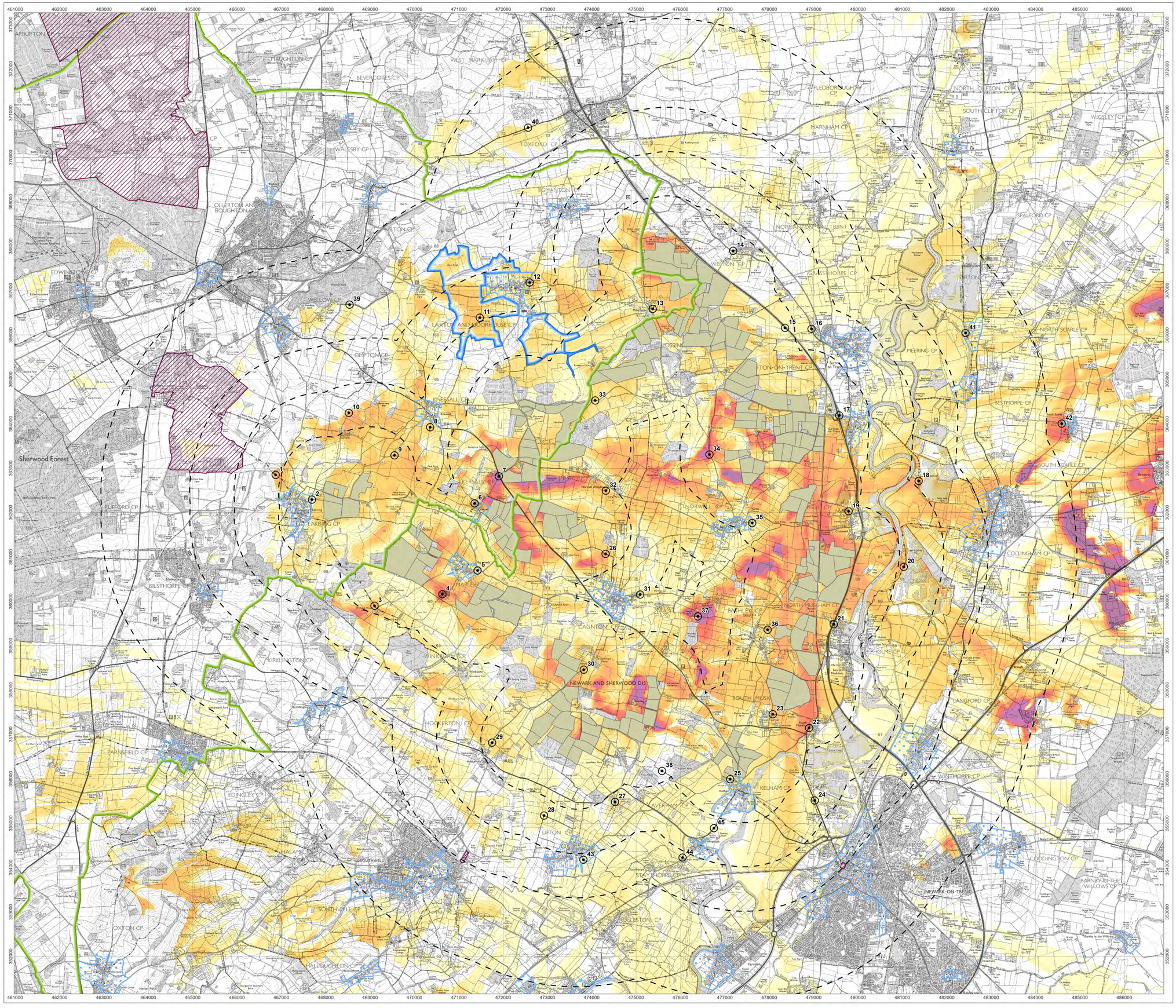
1:81,000 Scale @ A3

0 1 2 4 km

Produced By: MF	Ref:
Checked By: ME	Date: 01/11/2023

Solar Areas - ZTV Study
Figure 5.1

Great North Road
Scoping Report



Solar PV Areas
Distance from Solar PV Areas (1,2,3,5km)
Proposed Viewpoints
Sherwood Forest Regional Park
Historic Landscape around Laxton
Conservation Areas
Registered Historic Parks and Gardens

Zone of Theoretical Visibility (% of solar areas visible)
up to 29%
> 0%

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

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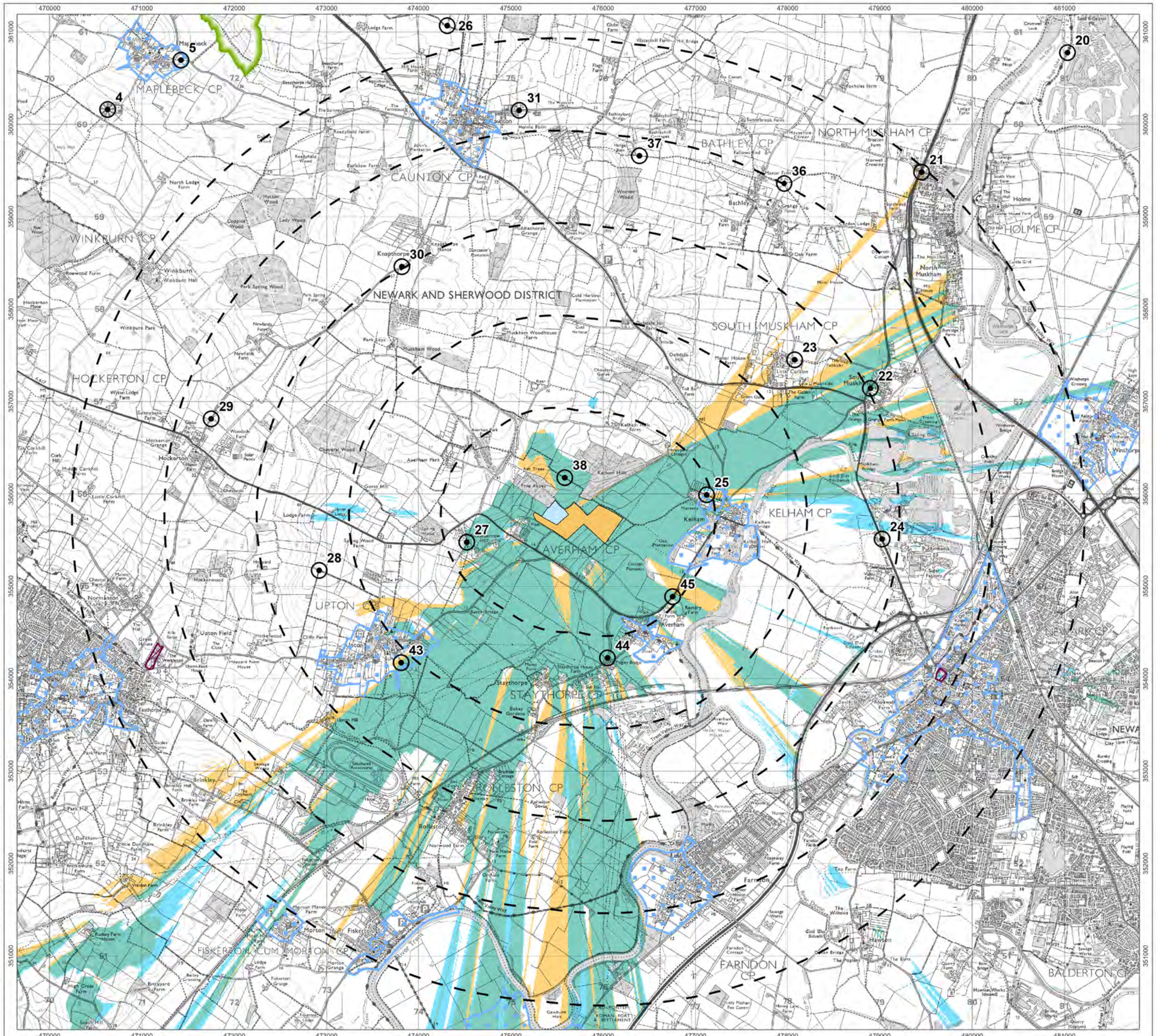
1:40,000 Scale @ A1
0 0.75 1.5 3 km

Produced By: MF	Ref:
Checked By: ME	Date: 01/11/2023

Solar Areas - ZTV Study
Figure 5.2

Great North Road
Scoping Report



400kV substation

BESS

Distance from BESS/400kV Compound (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Conservation Areas

Registered Historic Parks and Gardens

Zone of Theoretical Visibility

400kV substation may be visible (13m max. height)

BESS may be visible (3.5m max. height)

400kV substation & BESS may be visible

NOTES:

This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

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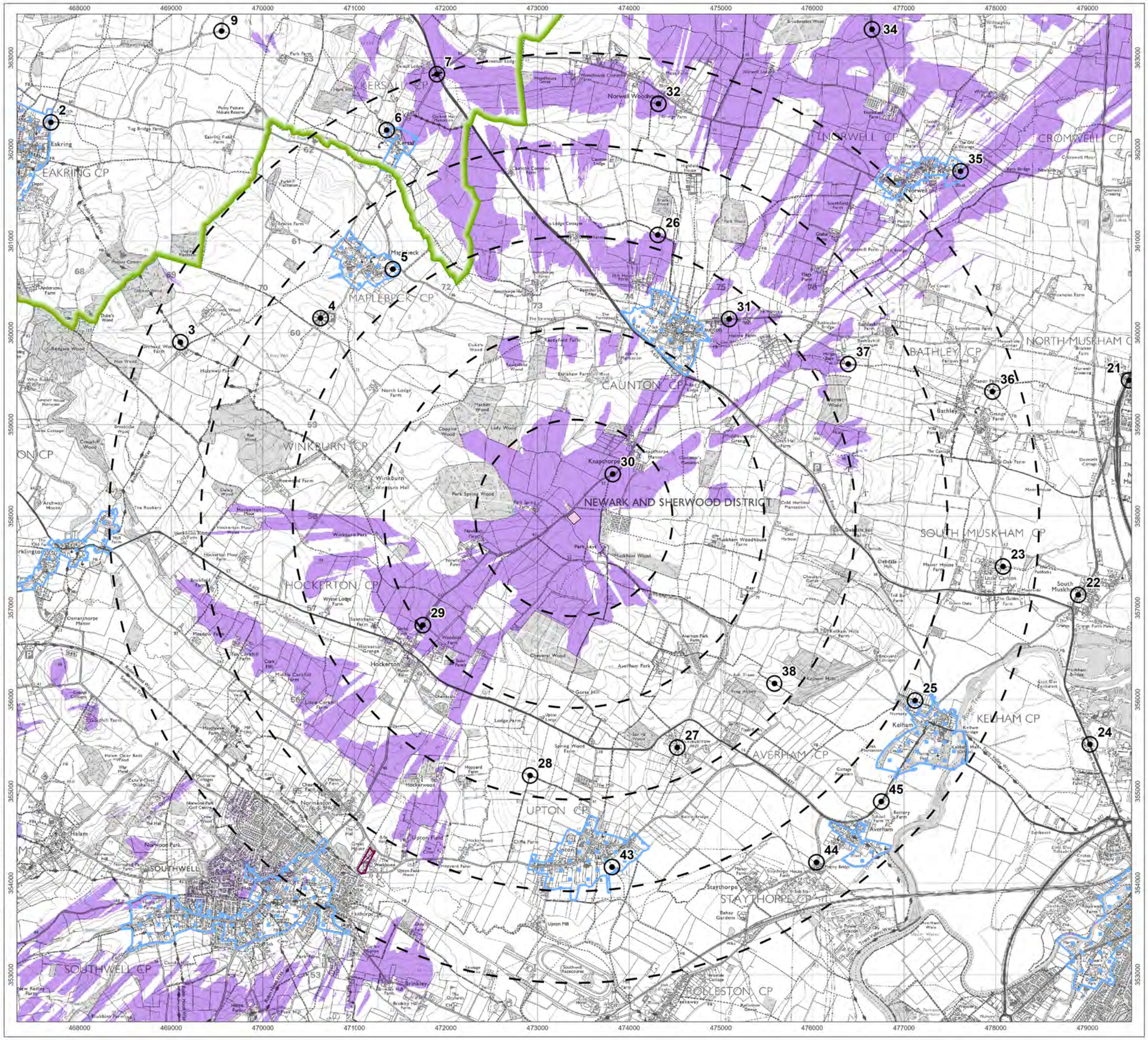
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

BESS/400kV Compound - ZTV Study
Figure 5.3

Great North Road
Scoping Report



Substation Area A

Distance from Substation Area (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Conservation Areas

Registered Historic Parks and Gardens

Zone of Theoretical Visibility

Substation A may be visible (12m max. height)

NOTES:
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A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

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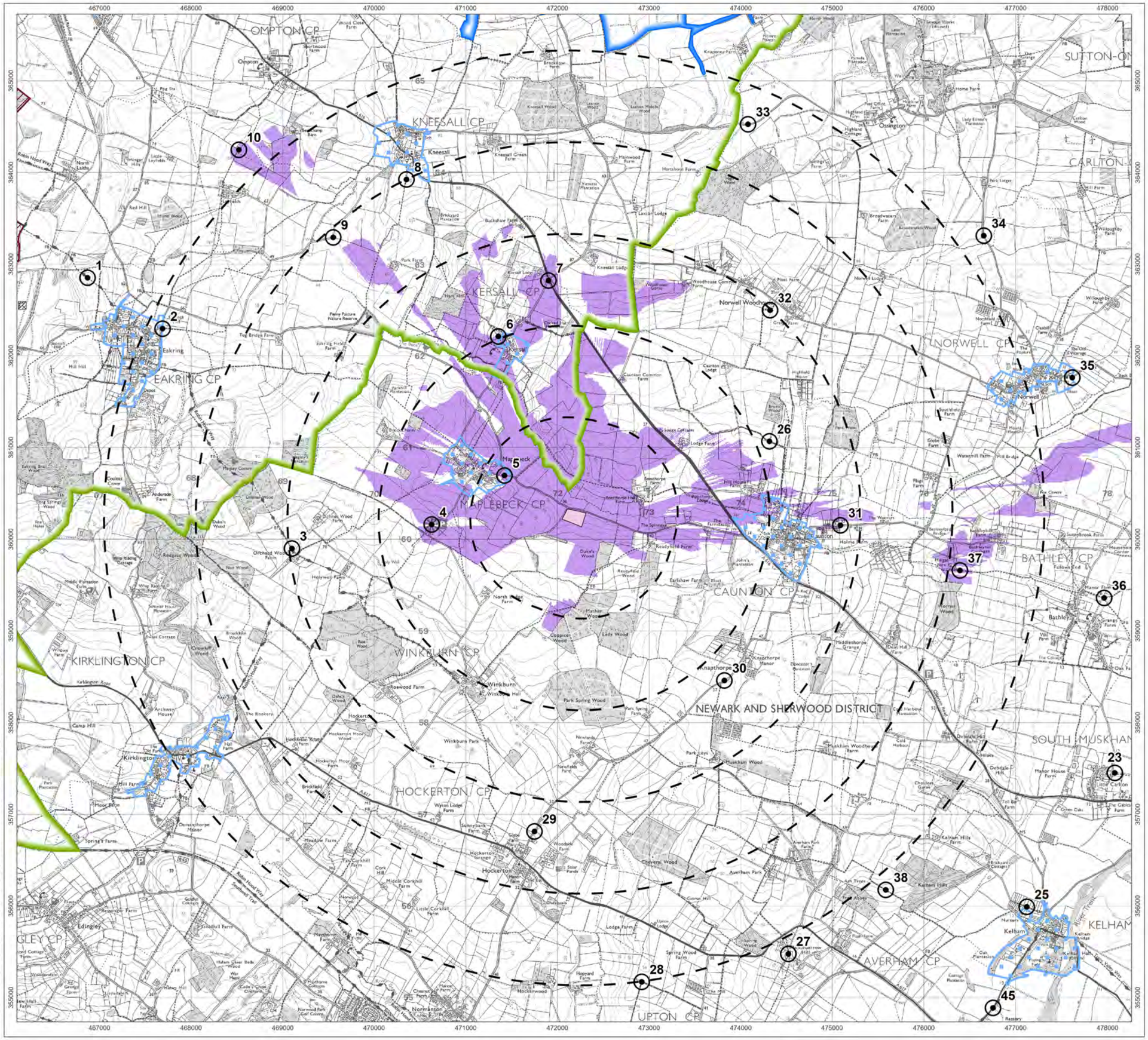
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4a

Great North Road
Scoping Report



Substation Area B

Distance from Substation Area (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Historic Landscape around Laxton

Conservation Areas

Zone of Theoretical Visibility

Substation B may be visible (12m max. height)

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

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The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

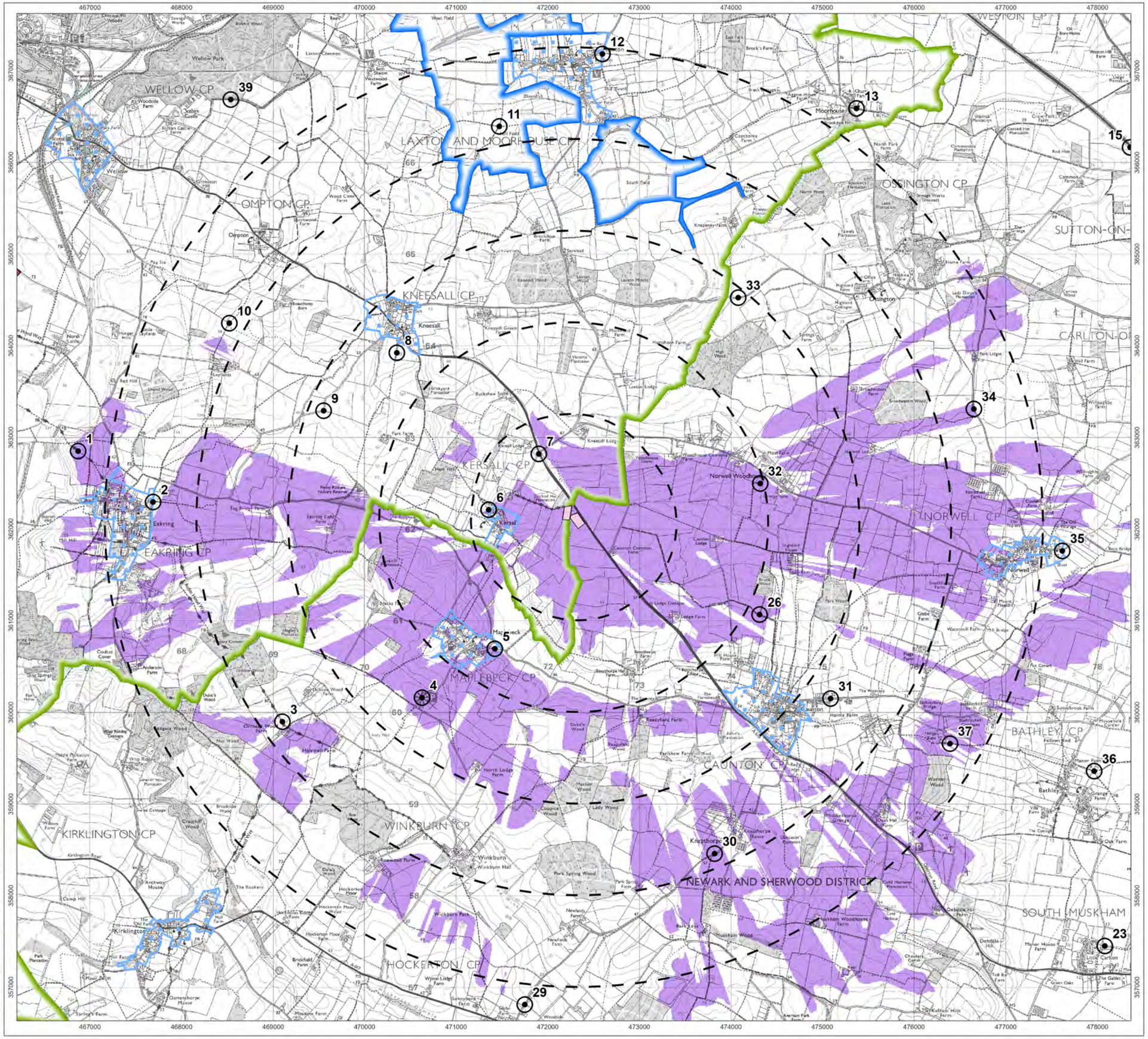
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4b

Great North Road
Scoping Report



Substation Area C

Distance from Substation Area (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Historic Landscape around Laxton

Conservation Areas

Zone of Theoretical Visibility

Substation C may be visible (12m max. height)

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

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The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

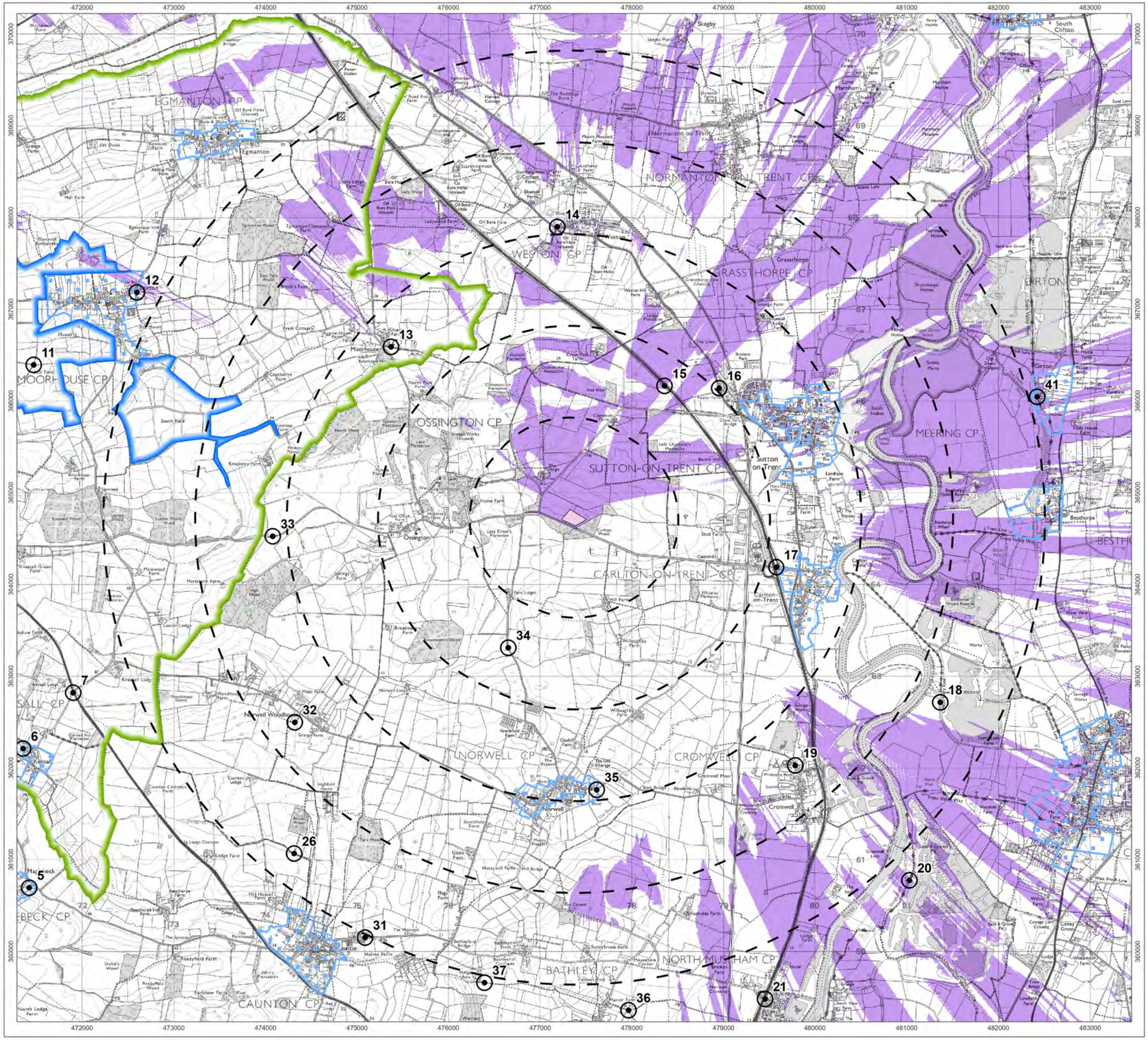
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4c

Great North Road
Scoping Report



Substation Area D

Distance from Substation Area (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Historic Landscape around Laxton

Conservation Areas

Zone of Theoretical Visibility

Substation D may be visible (12m max. height)

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

The model does not take into account some localised features such as small copses, hedgerows or individual trees and therefore still gives an exaggerated impression of the extent of visibility. The actual extent of visibility on the ground will be less than that suggested by this plan.

The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

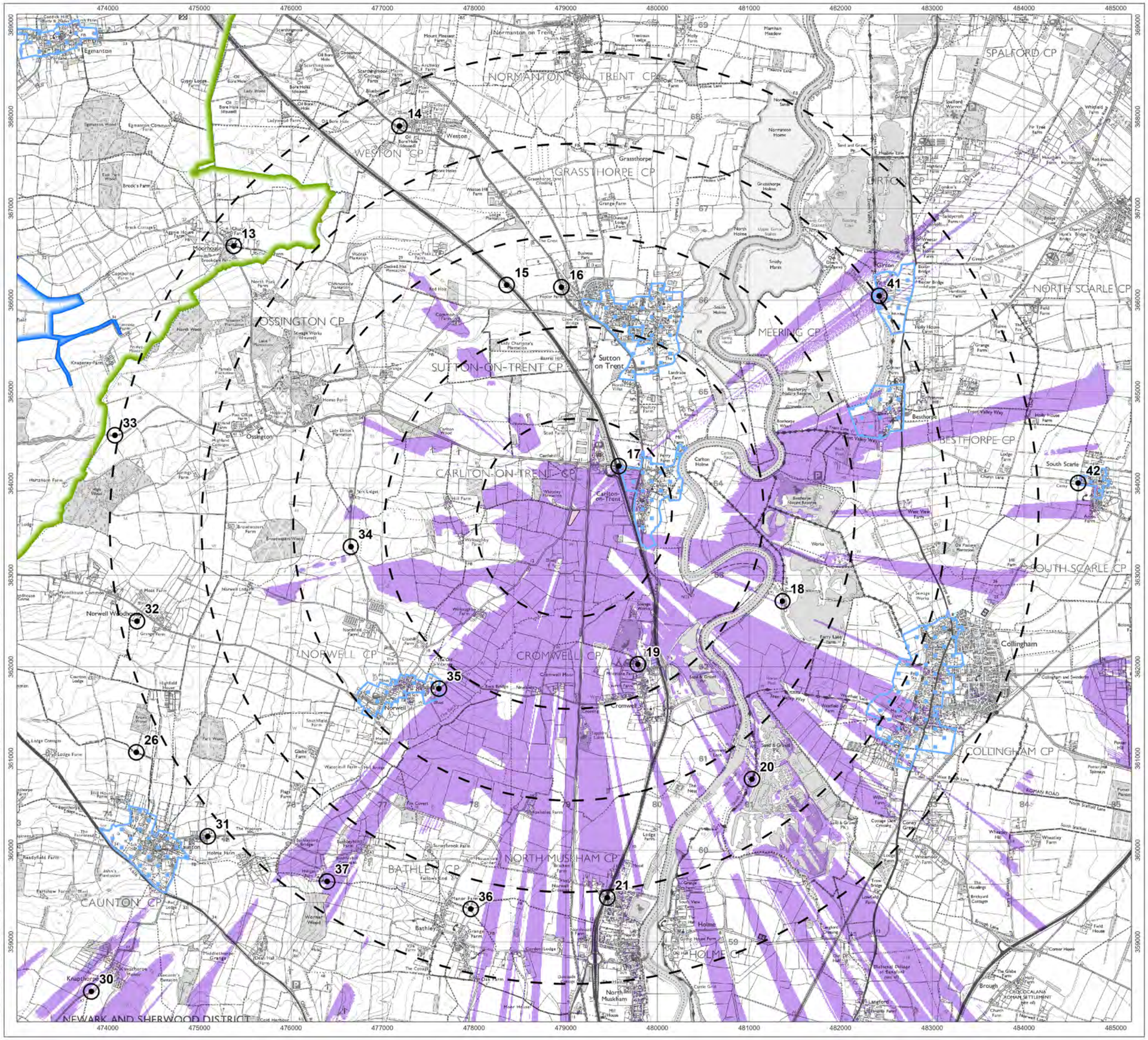
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4d

Great North Road
Scoping Report



Substation Area E

Distance from Substation Area (1,2,3,4,5km)

Proposed Viewpoints

Sherwood Forest Regional Park

Historic Landscape around Laxton

Conservation Areas

Zone of Theoretical Visibility

Substation E may be visible (12m max. height)

NOTES:
This drawing is based upon computer generated Zone of Theoretical Visibility (ZTV) studies produced using the Viewshed routine in the Visibility Analysis plugin for QGIS. The areas shown are the maximum theoretical visibility, taking into account topography, principal woodlands and buildings.

A digital surface model (DSM) has been derived from 10m LIDAR height data with the locations of woodland and buildings taken from the OS Open Map Local dataset. Buildings have been modelled with an assumed height of 7.5m and woodland an assumed height of 15m, representing a conservative estimate of average heights within the study area.

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The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

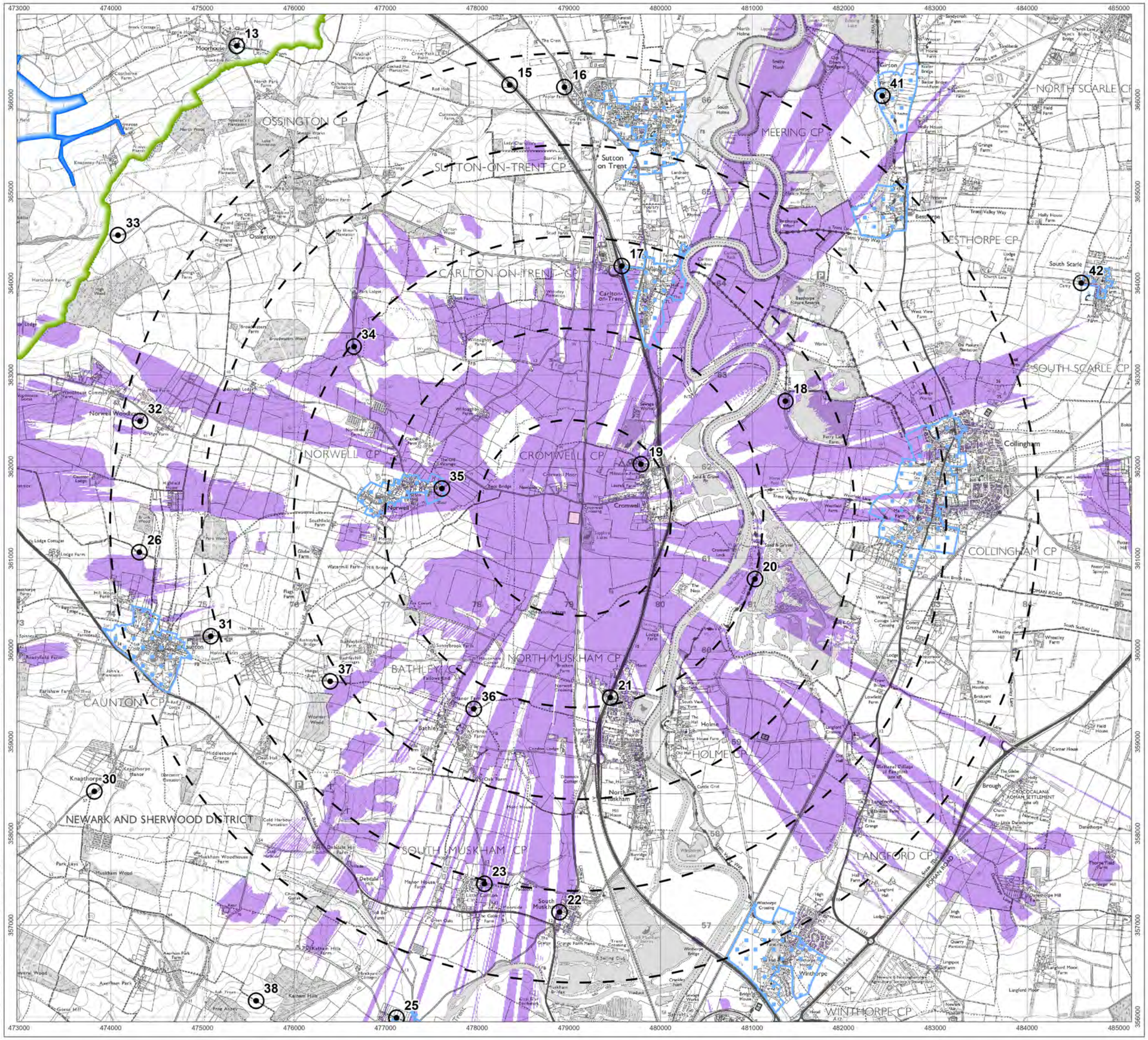
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4e

Great North Road
Scoping Report



- Substation Area F
- Distance from Substation Area (1,2,3,4,5km)
- Proposed Viewpoints
- Sherwood Forest Regional Park
- Historic Landscape around Laxton
- Conservation Areas

Zone of Theoretical Visibility

- Substation F may be visible (12m max. height)

NOTES:
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The ZTV includes an adjustment that allows for Earth's curvature and light refraction. It is based on a derived DSM and has a 10m resolution.

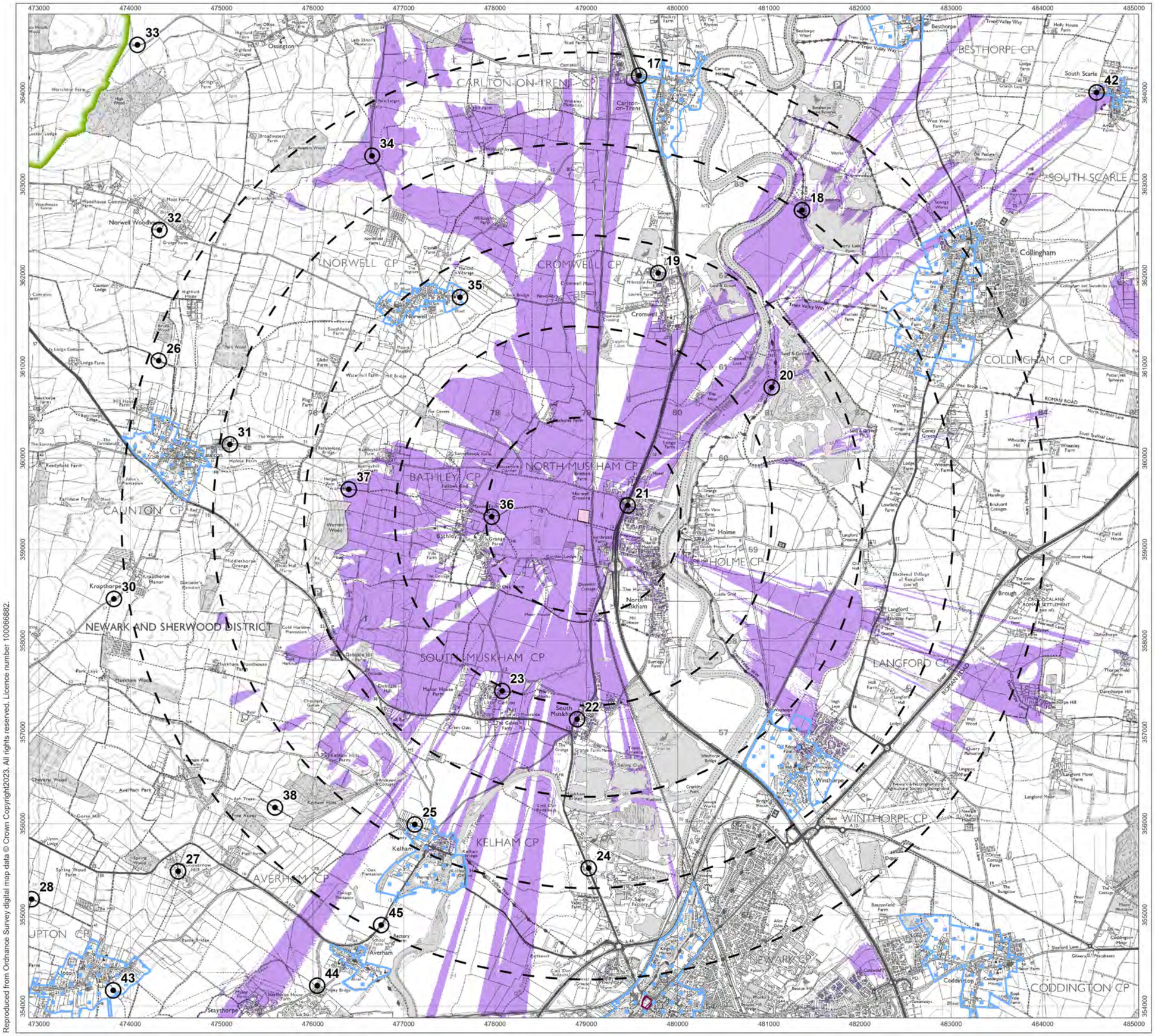
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4f

Great North Road
Scoping Report



- Substation Area G
- Distance from Substation Area (1,2,3,4,5km)
- Proposed Viewpoints
- Sherwood Forest Regional Park
- Conservation Areas

Zone of Theoretical Visibility

- Substation G may be visible (12m max. height)

NOTES:
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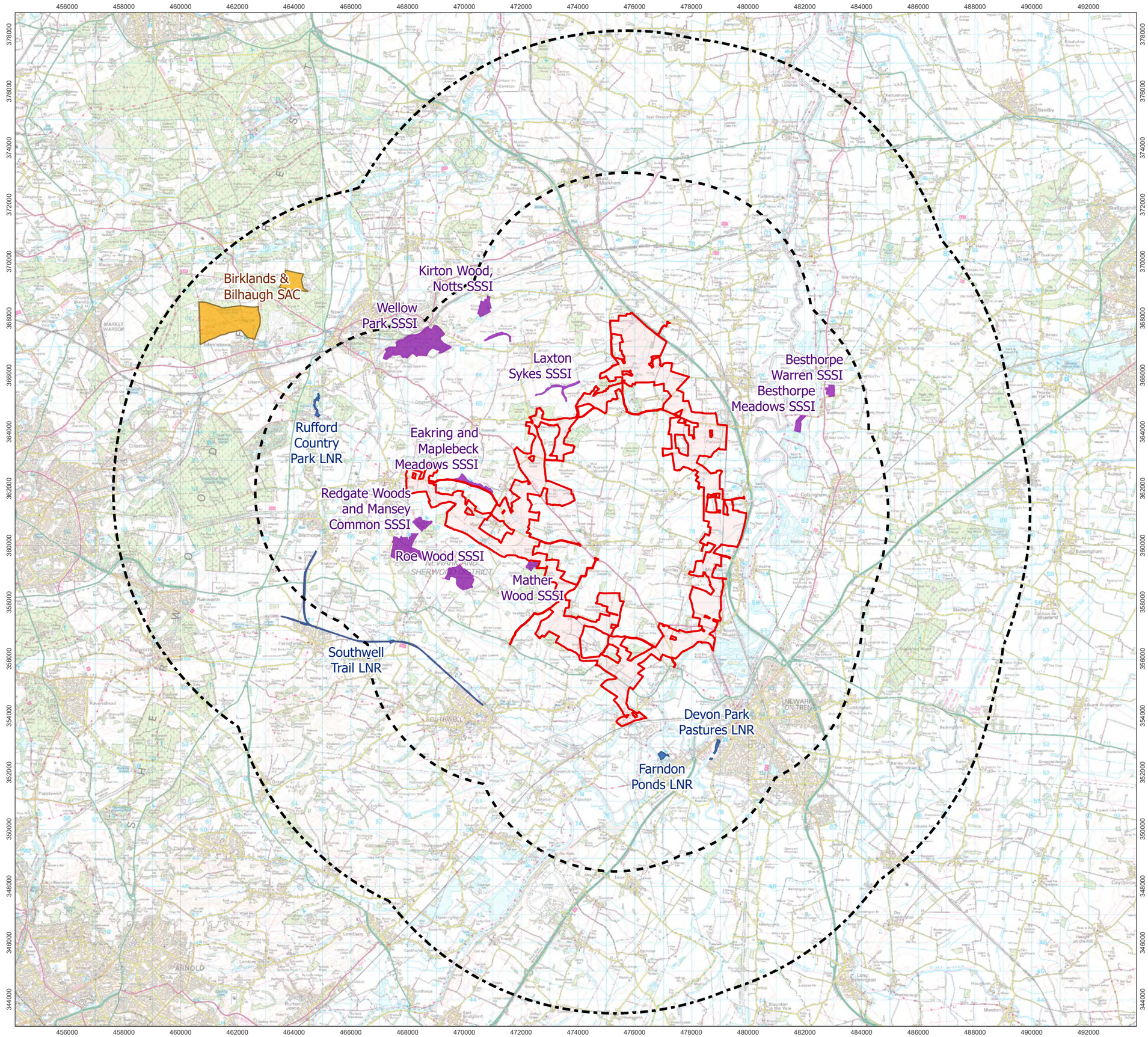
1:40,000 Scale @ A3

0 0.5 1 2 km

Produced By: ME	Ref:
Checked By: MF	Date: 01/11/2023

Substations - ZTV Study
Figure 5.4g

Great North Road
Scoping Report



Order Limits

5 km Buffer of Order Limits

10 km Buffer of Order Limits

Special Area of Conservation (SAC)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

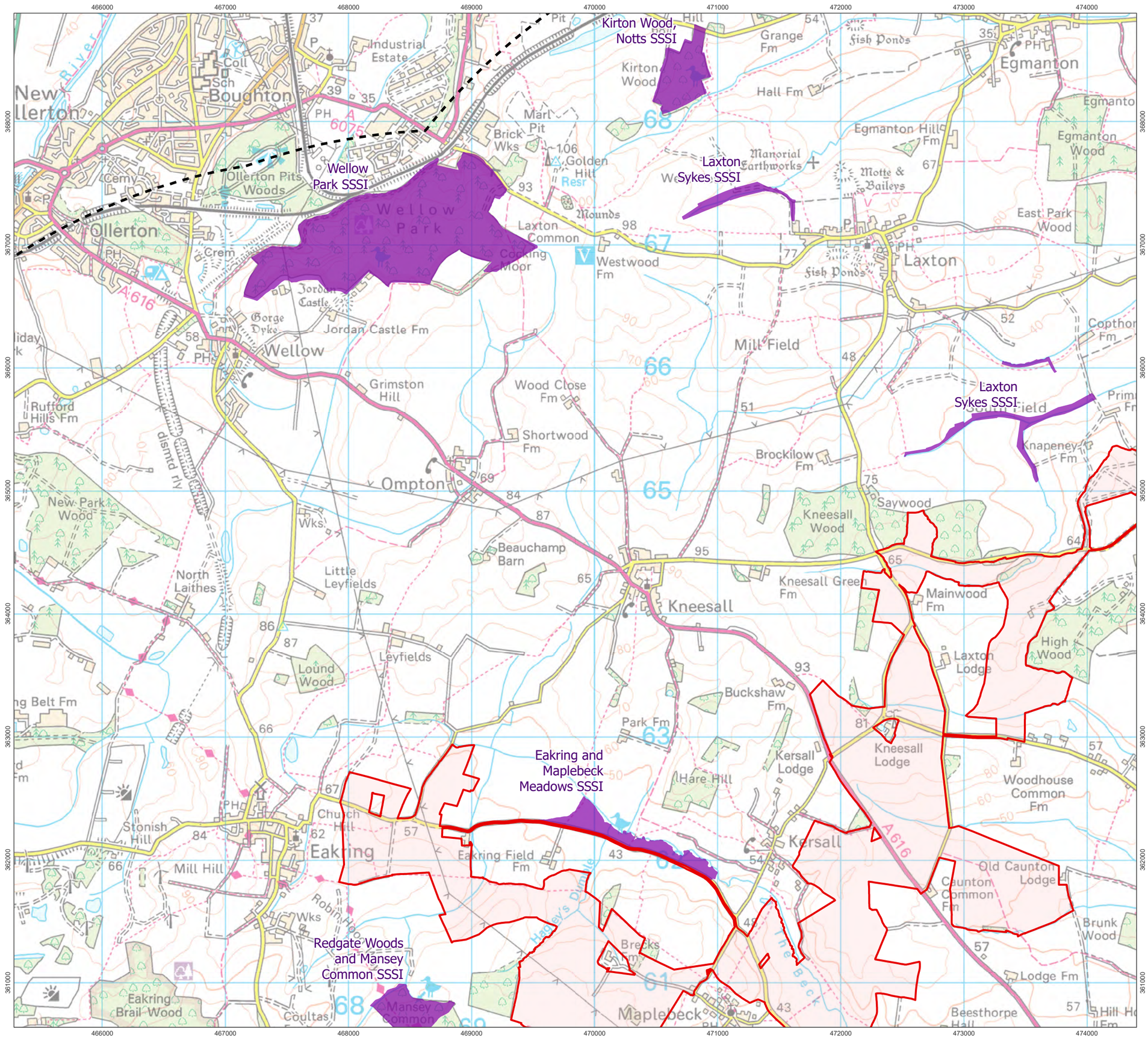
1:130,000 Scale @ A3

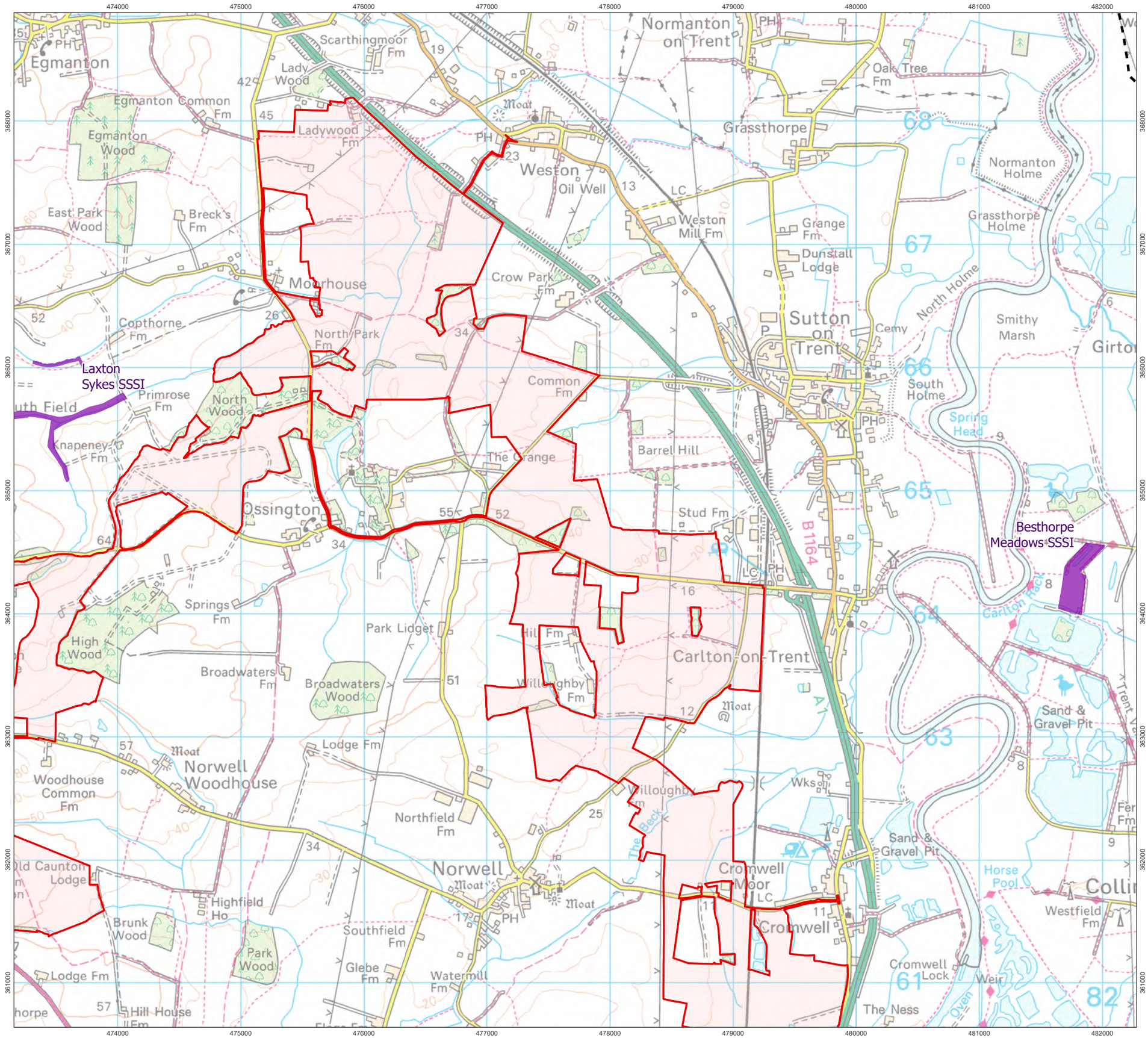
0 1 2 4 km

Ref:	Date: 31/10/2023

Statutory Designated Sites
Figure 6.1 - Overview

Great North Road Solar Park
Scoping Report





Order Limits

5 km Buffer of Order Limits

10 km Buffer of Order Limits

Special Area of Conservation (SAC)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

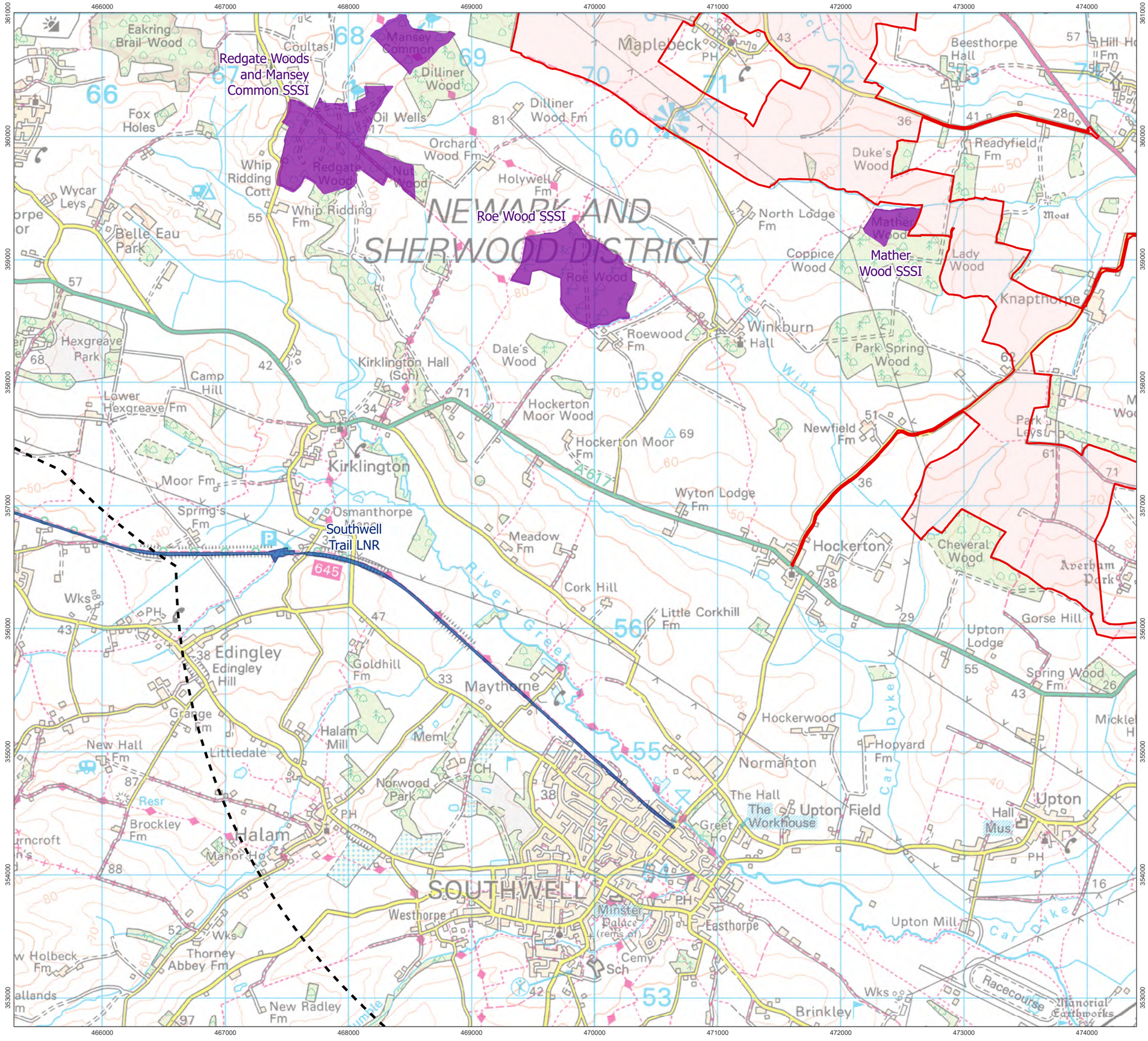
1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref:	Date: 31/10/2023

Statutory Designated Sites
Figure 6.1 - NE

Great North Road Solar Park
Scoping Report



Order Limits

5 km Buffer of Order Limits

10 km Buffer of Order Limits

Special Area of Conservation (SAC)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

1:30,000 Scale @ A3

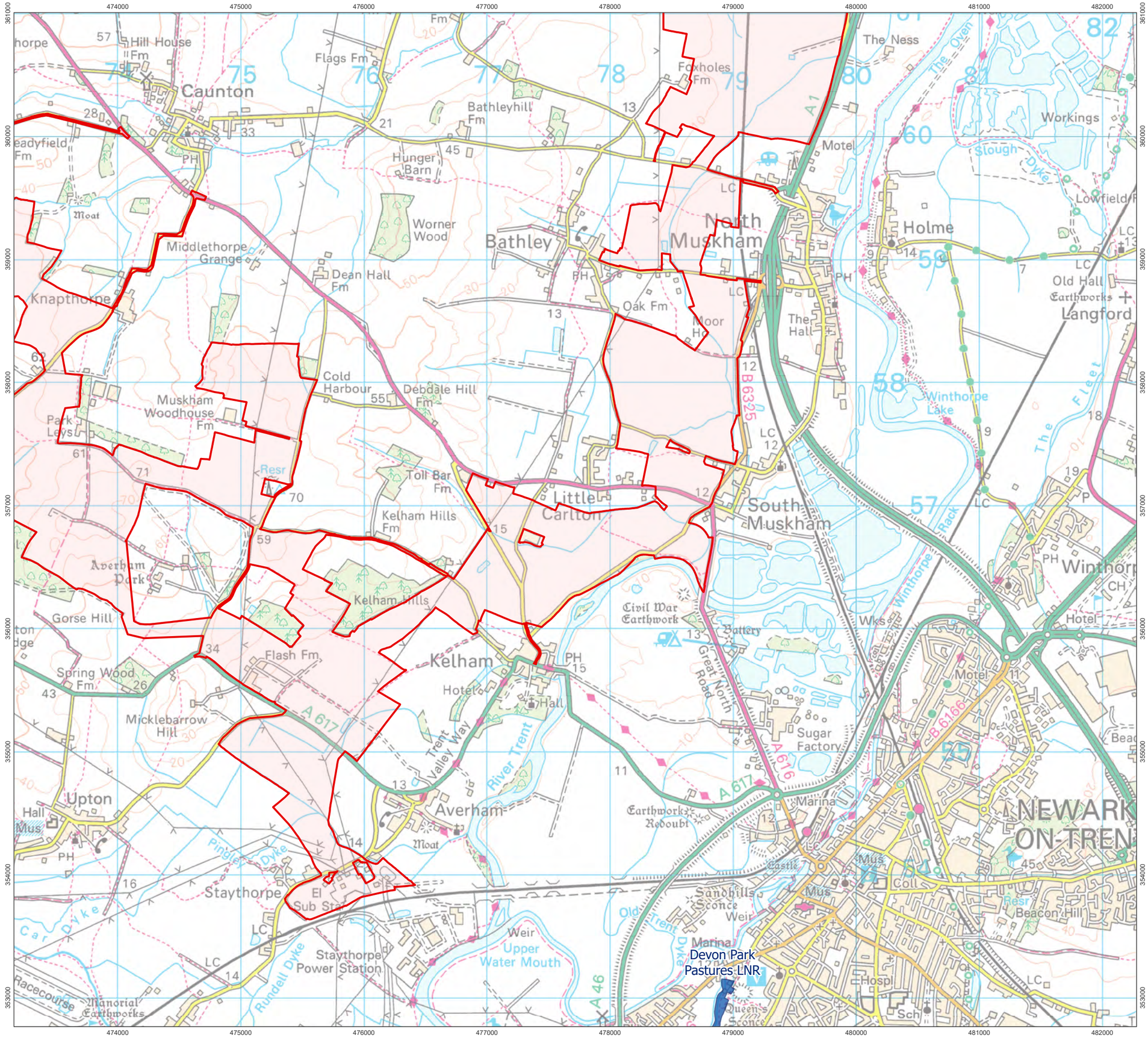
0 0.25 0.5 1 km

Ref:

Date: 31/10/2023

Statutory Designated Sites Figure 6.1 - SW

Great North Road Solar Park Scoping Report



1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref:	Date: 31/10/2023

Statutory Designated Sites
Figure 6.1 - SE

Great North Road Solar Park
Scoping Report

Order Limits
Flood Zone 3
Flood Zone 2

1:60,000 Scale @ A3

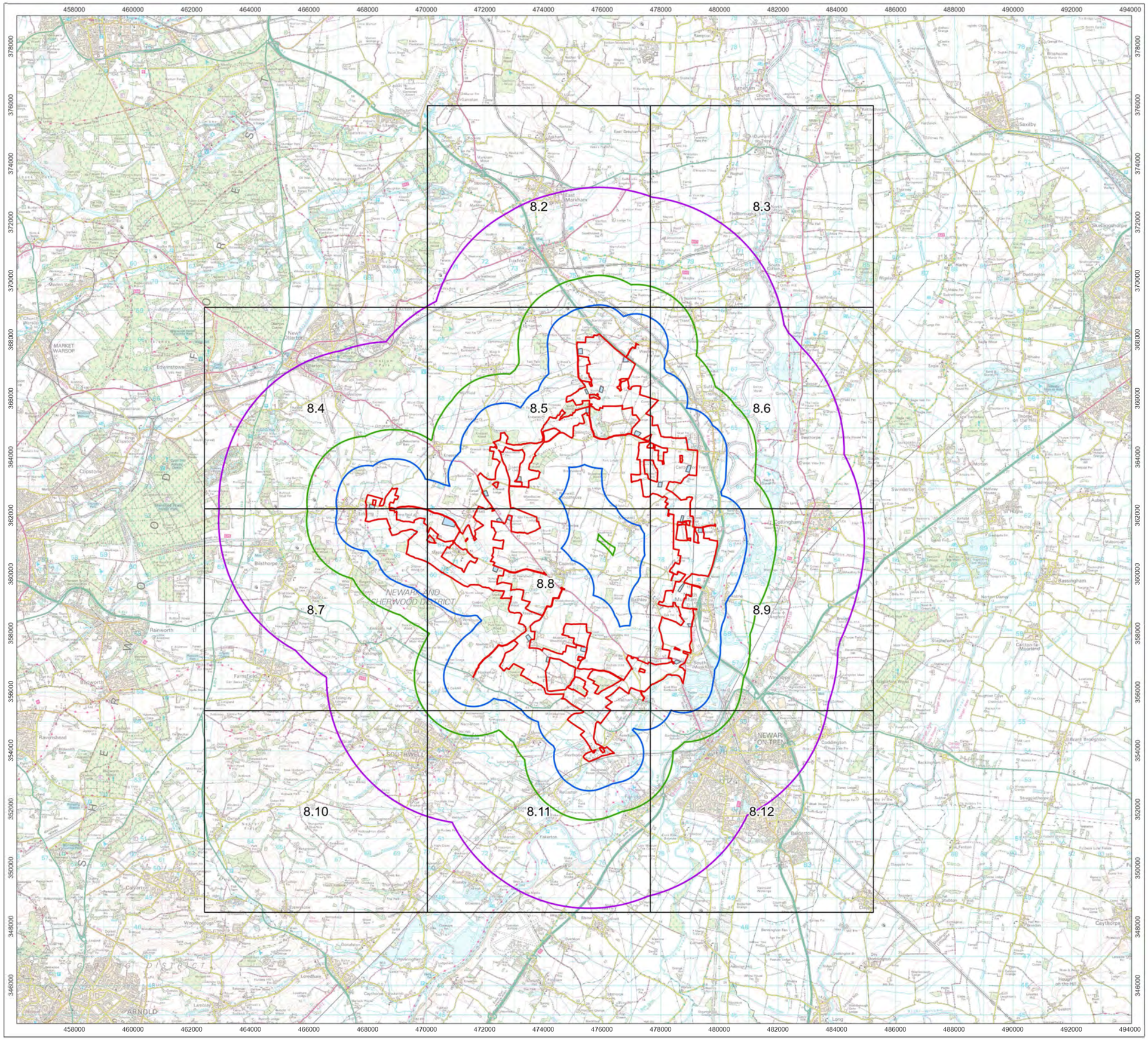
0 0.75 1.5 3 km

Ref:

Date: 31/10/2023

Flood Zones 2 & 3
Figure 7.1

Great North Road Solar Park
Scoping Report



Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.1

Great North Road Solar Park
Scoping Report

- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

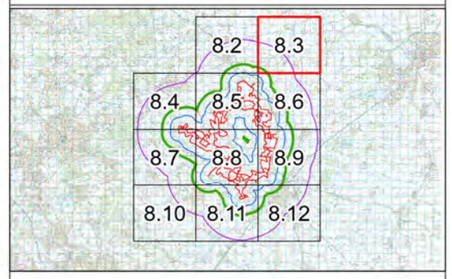
1:25,000 Scale @ A3

0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.2

Great North Road Solar Park
Scoping Report



- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

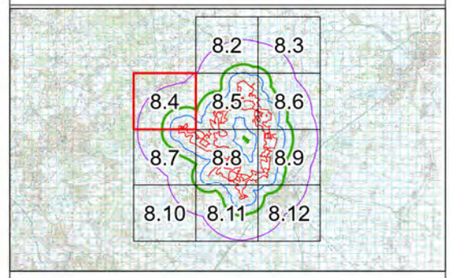
1:25,000 Scale @ A3

0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.3

Great North Road Solar Park
Scoping Report



- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

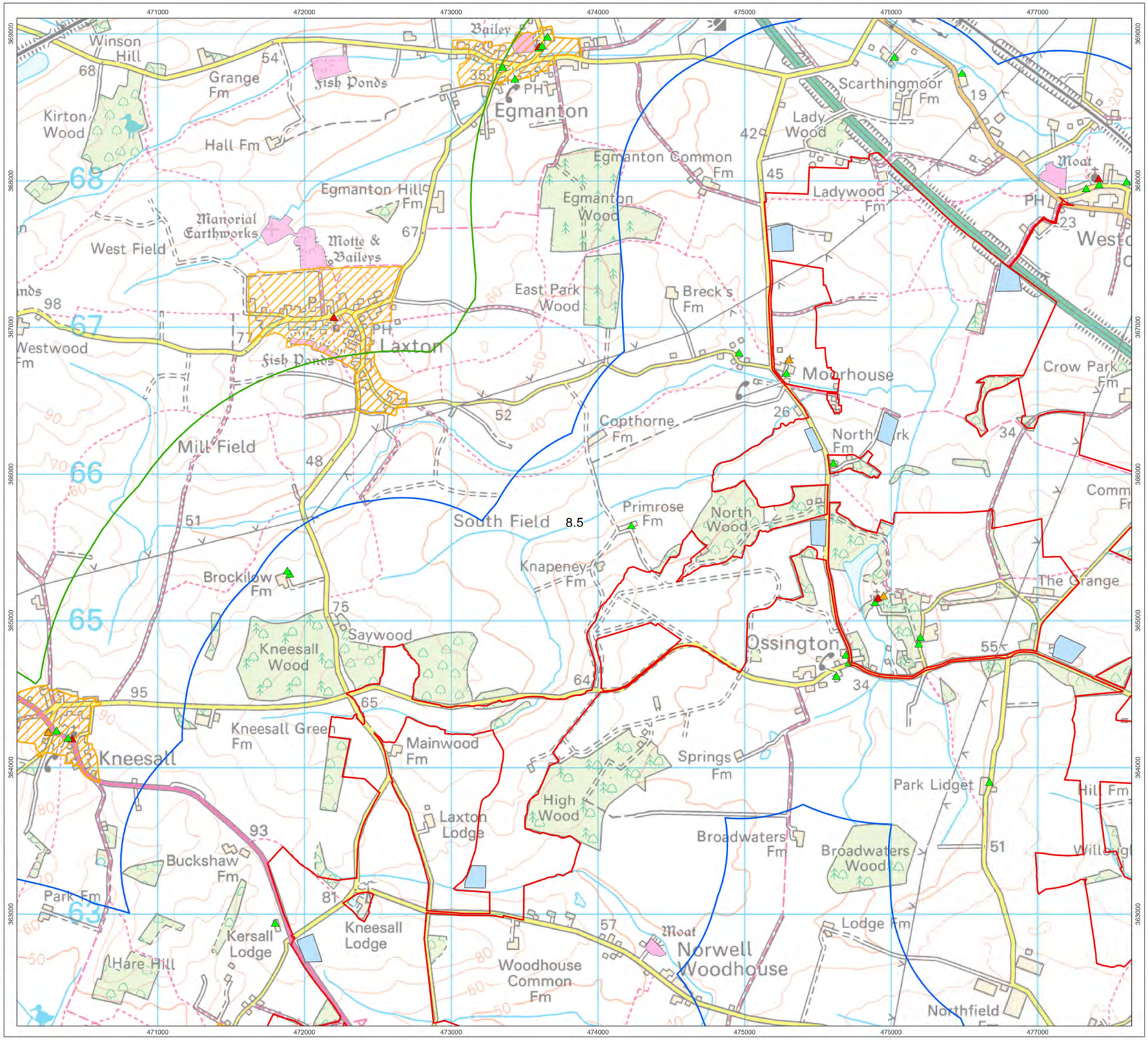
1:25,000 Scale @ A3

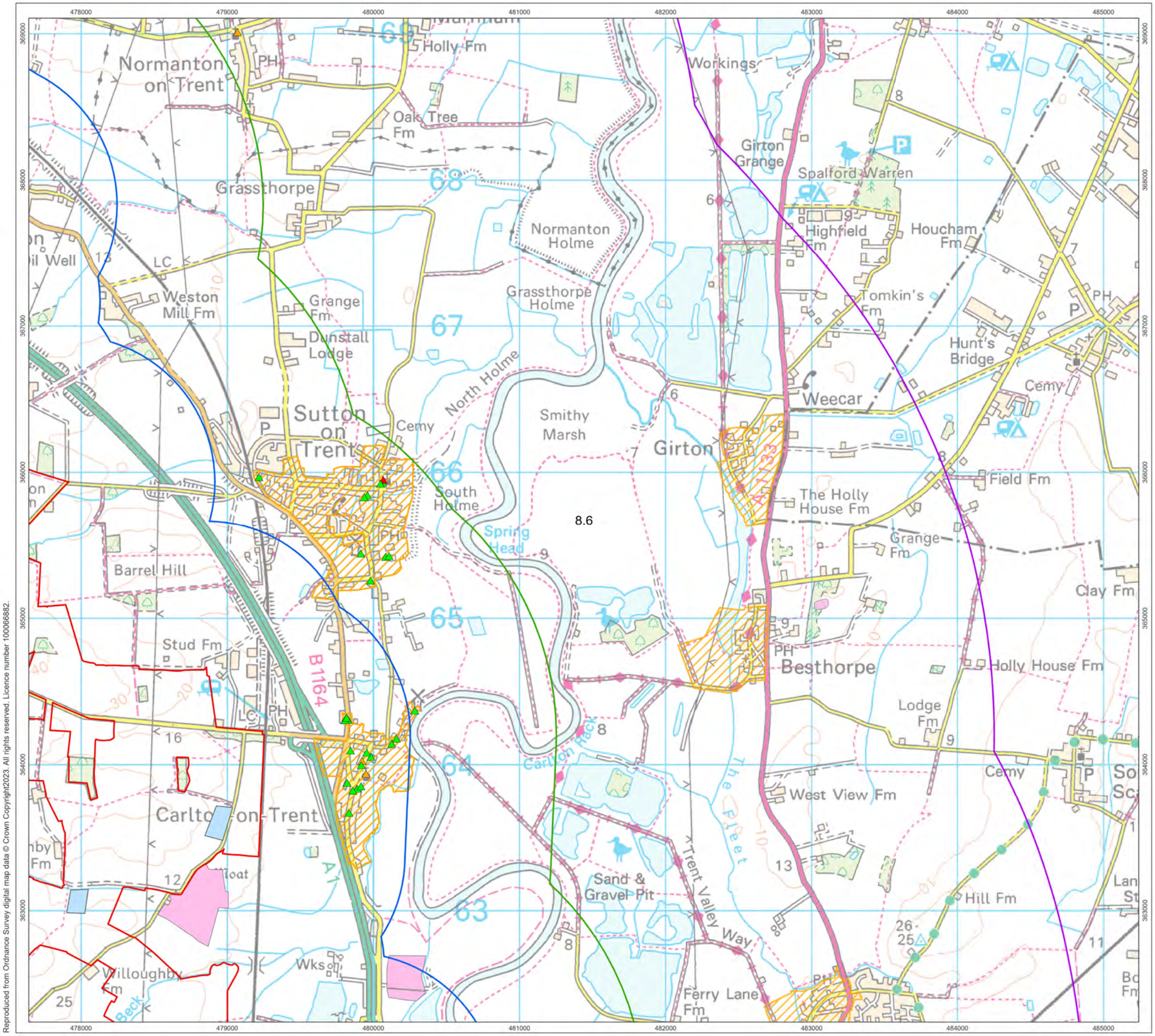
0 0.38 0.75 1.5 km

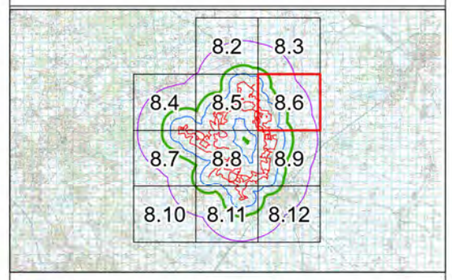
Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.4

Great North Road Solar Park
Scoping Report







- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

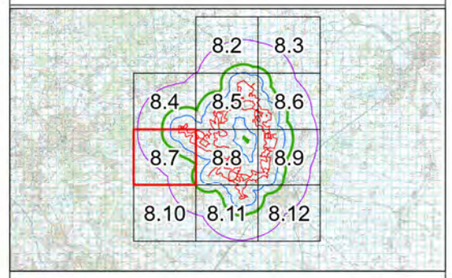
1:25,000 Scale @ A3

0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.6

Great North Road Solar Park
Scoping Report



- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

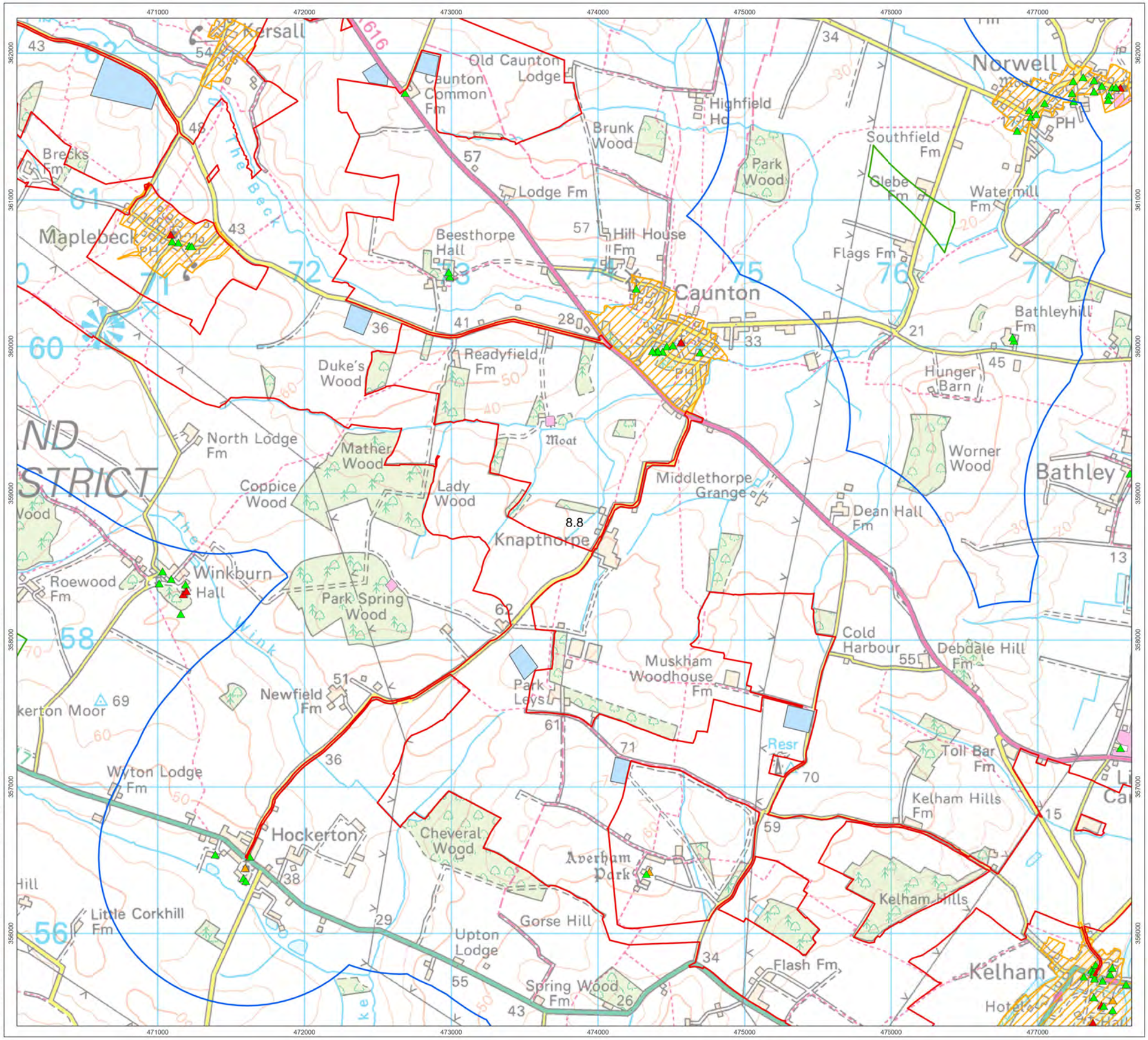
1:25,000 Scale @ A3

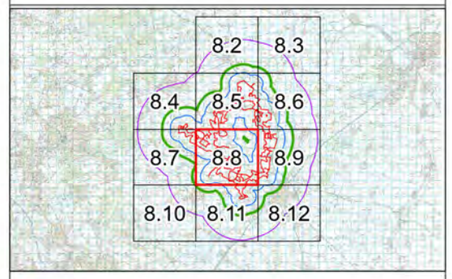
0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.7

Great North Road Solar Park
Scoping Report





- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

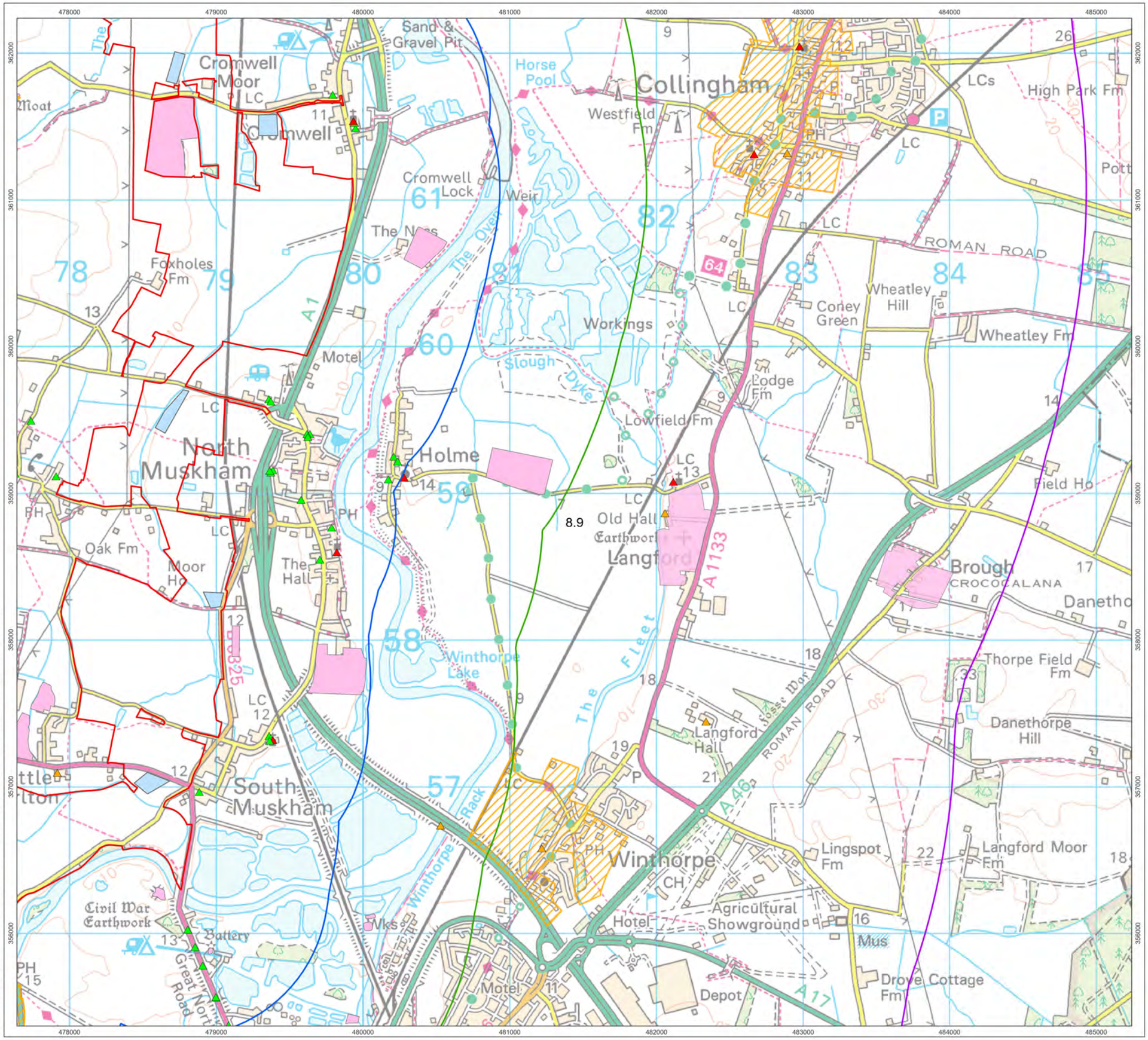
1:25,000 Scale @ A3

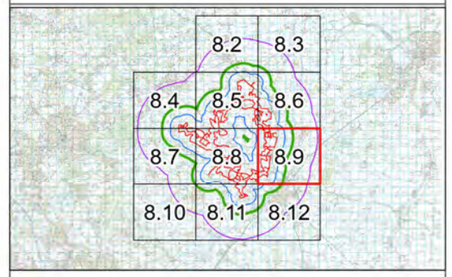
0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.8

Great North Road Solar Park
Scoping Report





- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

1:25,000 Scale @ A3

0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.9

Great North Road Solar Park
Scoping Report

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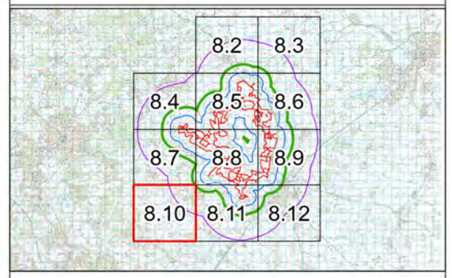


- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

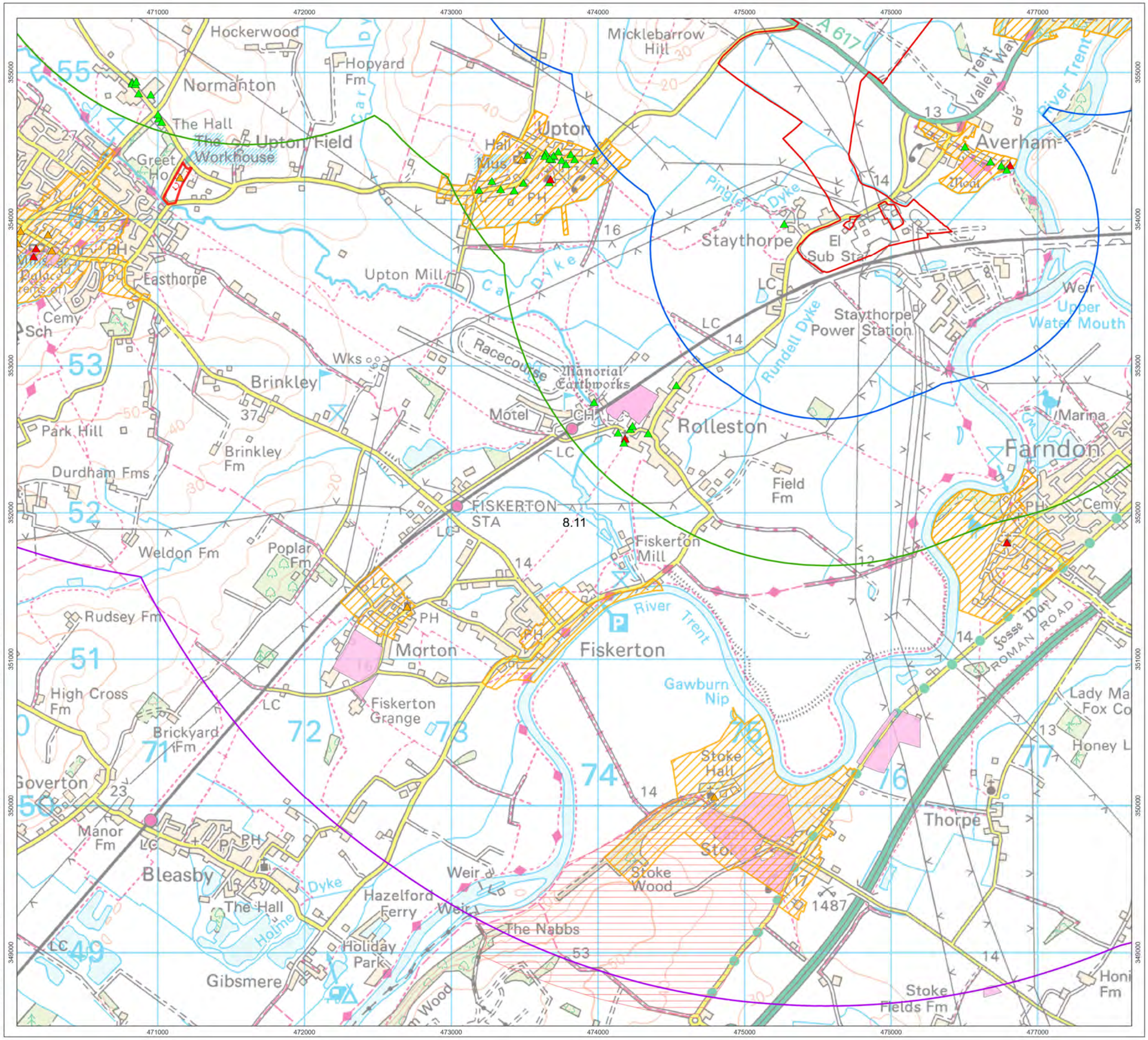
1:25,000 Scale @ A3

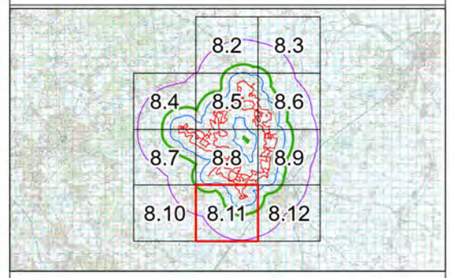
0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.10

Great North Road Solar Park
Scoping Report





- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

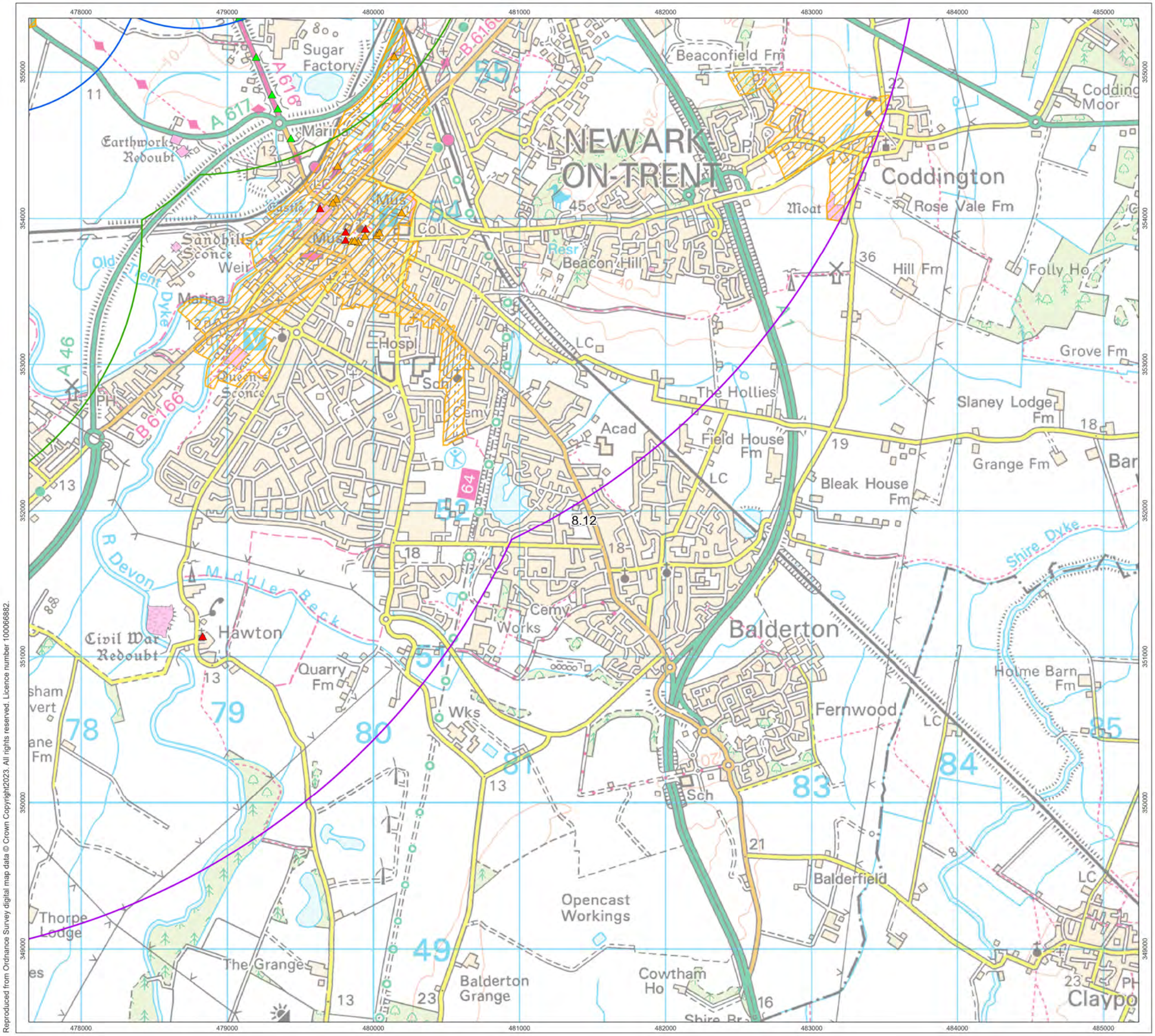
1:25,000 Scale @ A3

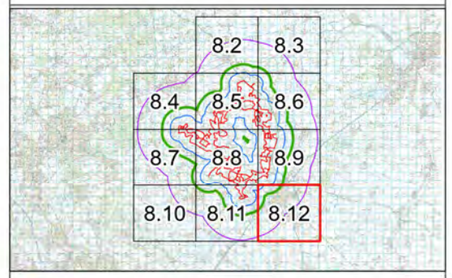
0 0.38 0.75 1.5 km

Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.11

Great North Road Solar Park
Scoping Report





- Site
- 1 km Archaeological Study Area
- 2 km Inner Study Area
- 5 km Outer Study Area

Designated Heritage Assets

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Registered Battlefields
- Conservation Areas
- Scheduled Monuments
- Grade I Parks and Garden
- Grade II Parks and Garden

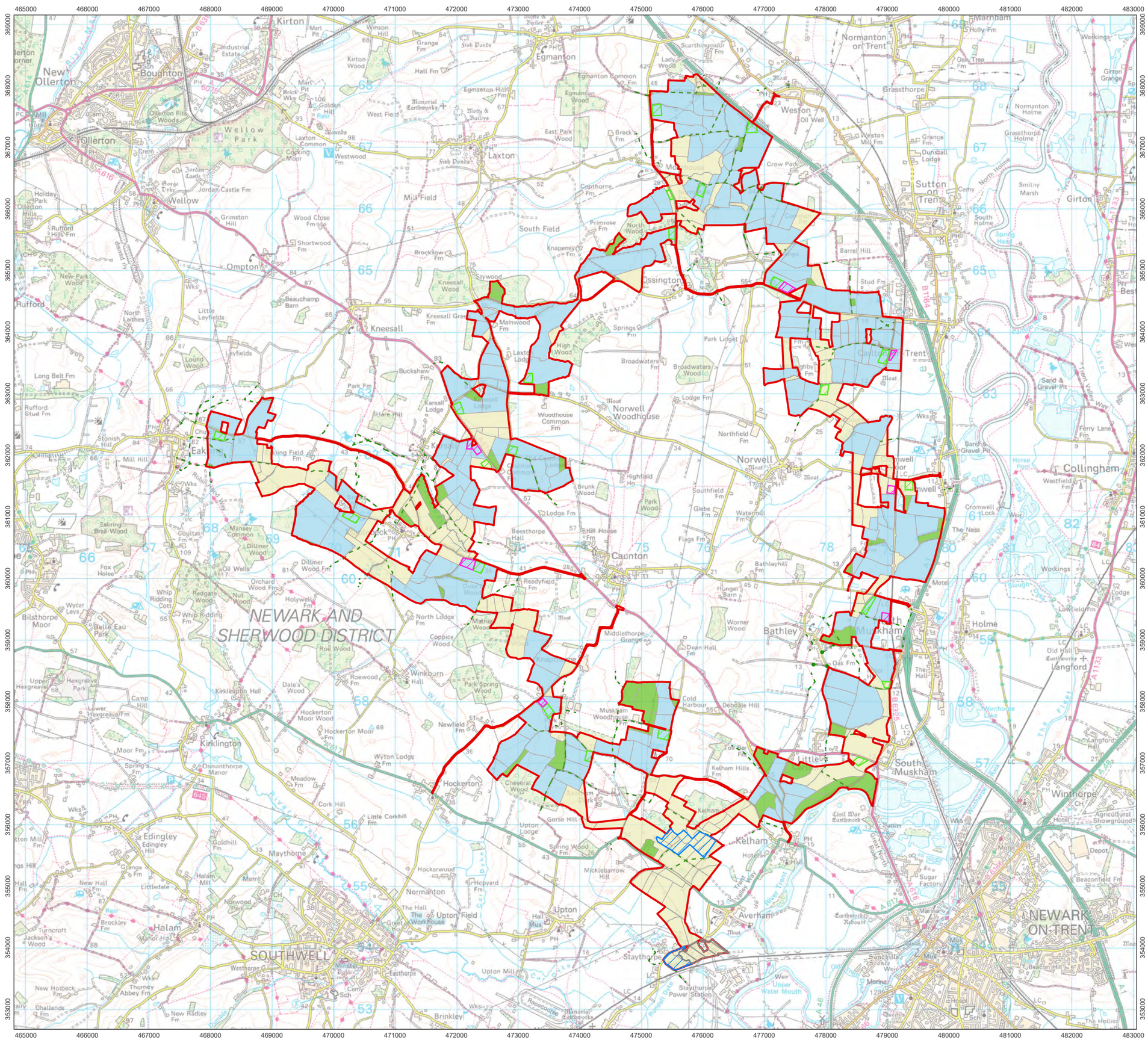
1:25,000 Scale @ A3

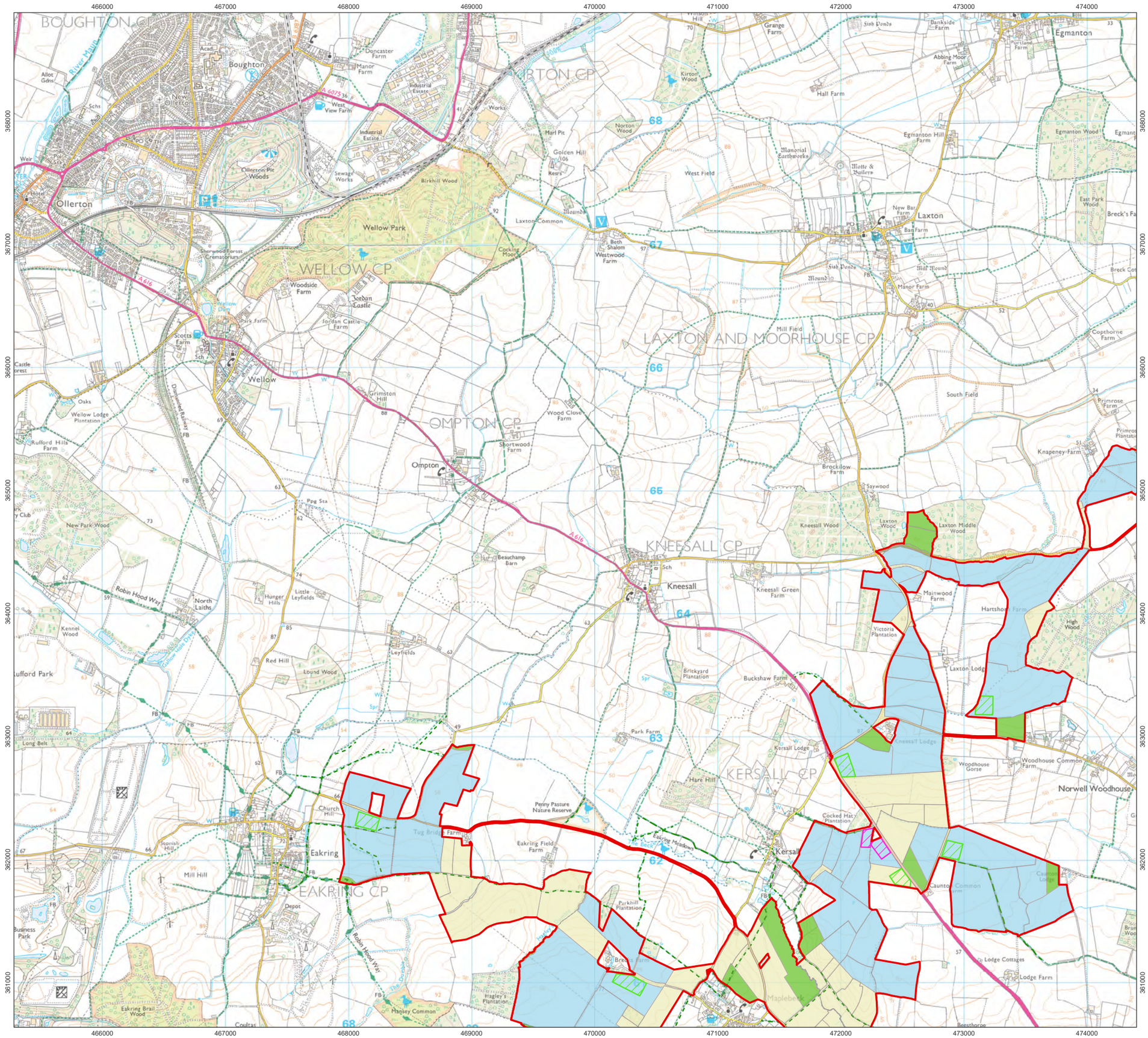
0 0.38 0.75 1.5 km

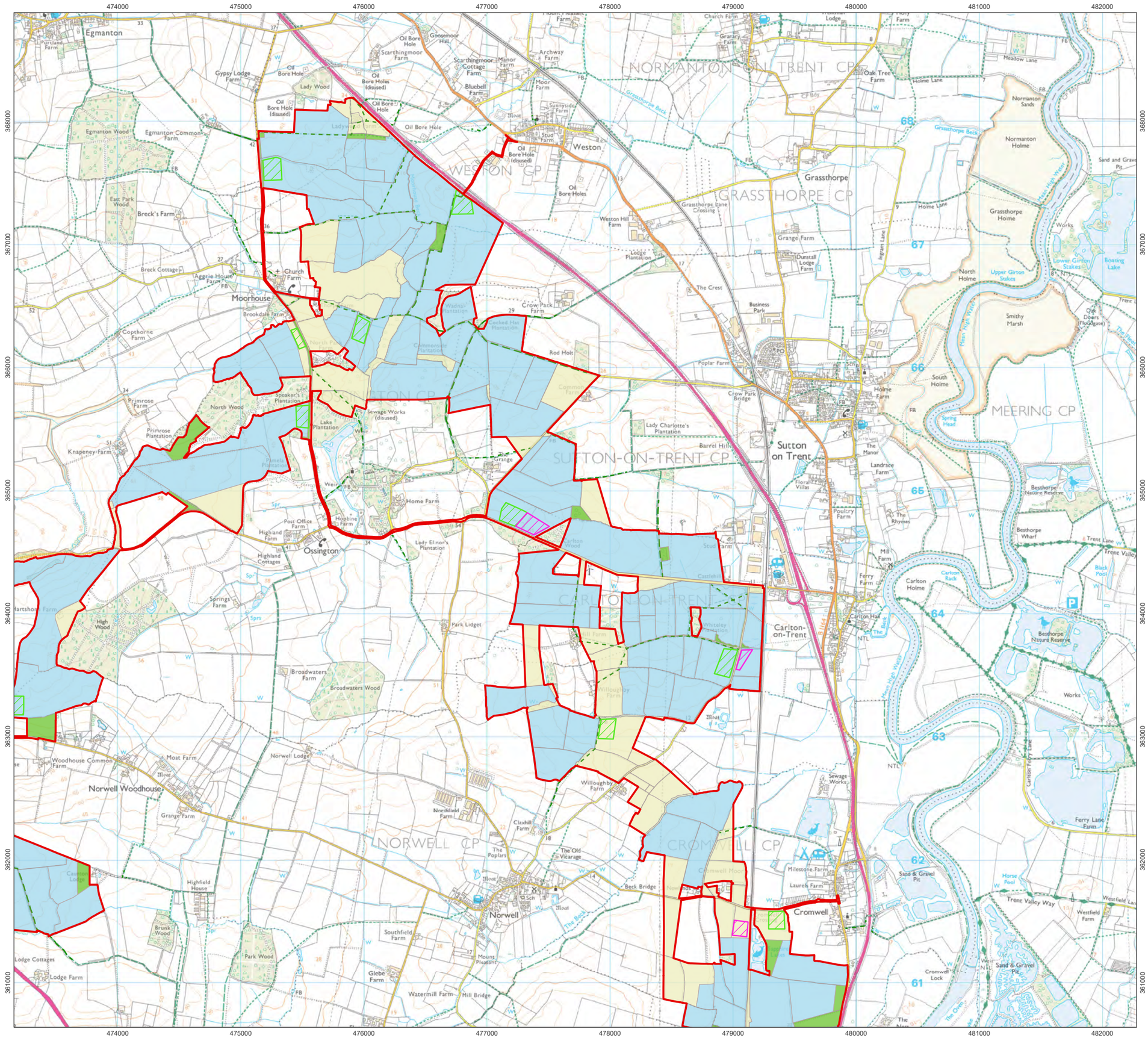
Produced By: TP	Ref:
Checked By: MK	Date: 27/10/2023

Designated Heritage Assets
Figure 8.12

Great North Road Solar Park
Scoping Report







- Order Limits
- Staythorpe National Grid Substation
- BESS 400kV Compound
- Substation Areas
- Construction Compound Areas

Public Rights of Way

- Footpath
- Bridleway
- Restricted Byway
- Byway Open to All Traffic

Development Areas

- Cable Area
- Other Area
- Solar Area

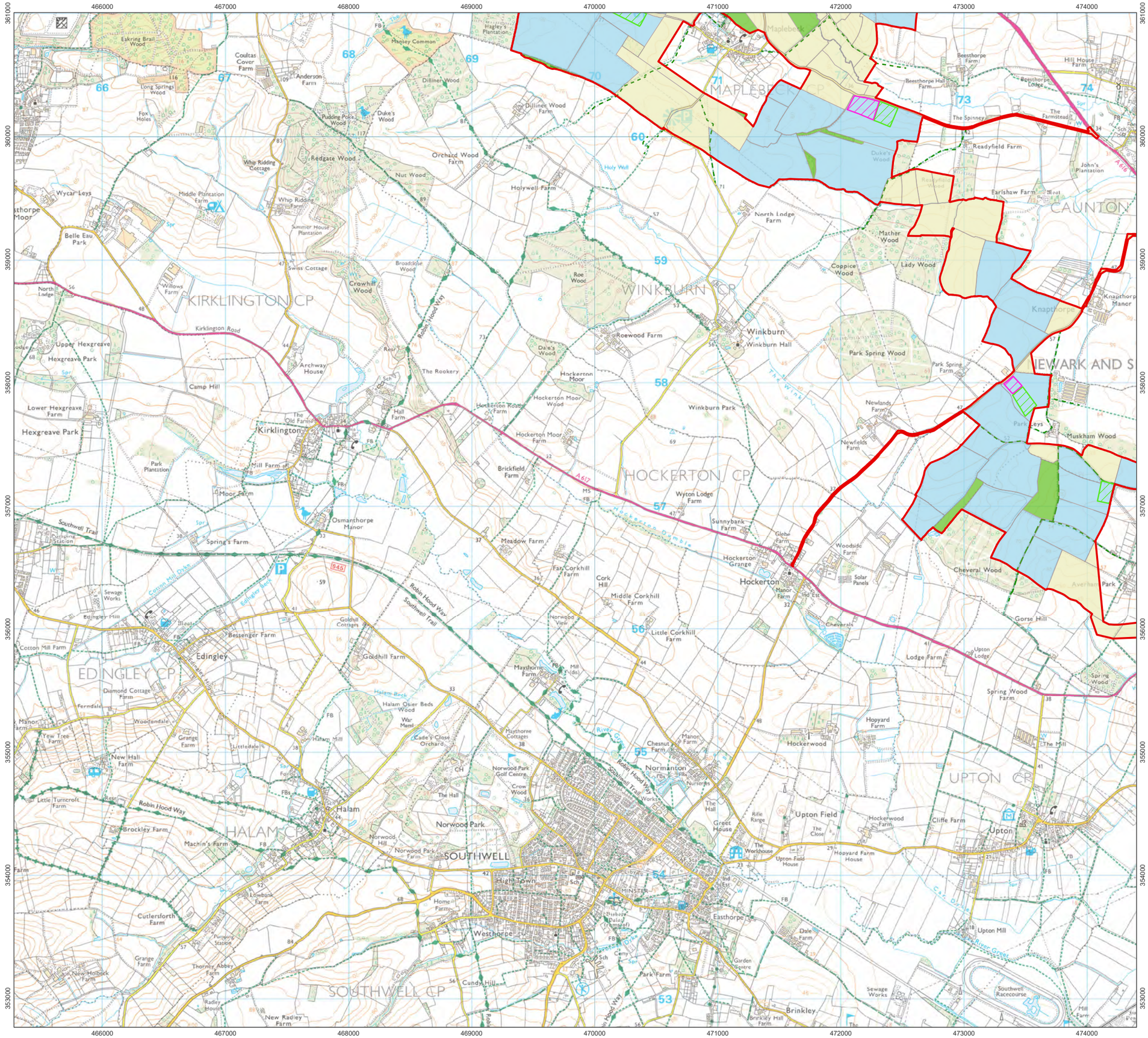
1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref:	Date: 07/11/2023

Public Rights of Way
Figure 10.1 - NE

Great North Road Solar Park
Scoping Report



1:30,000 Scale @ A3

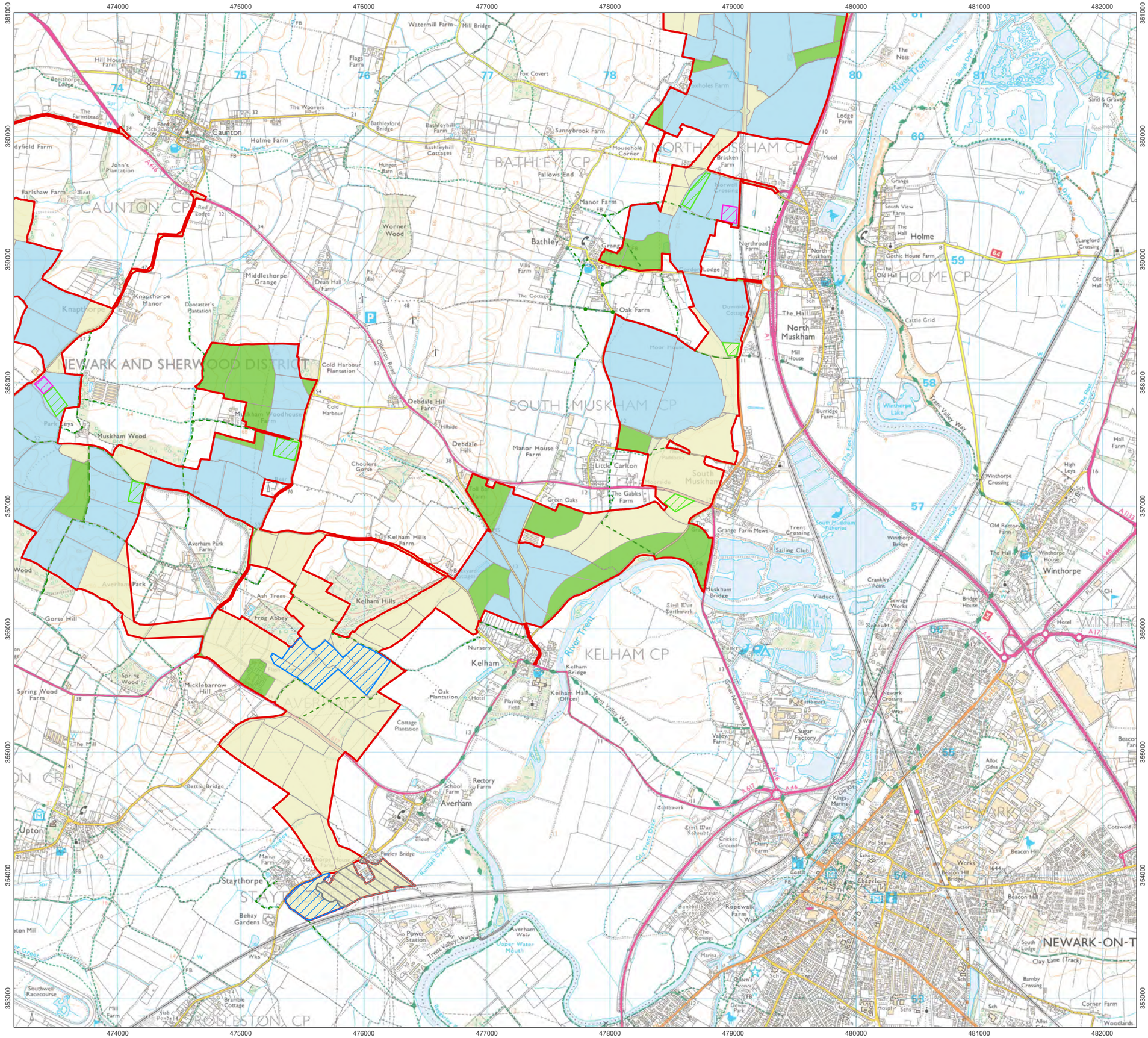
0 0.25 0.5 1 km

Ref:

Date: 07/11/2023

Public Rights of Way
Figure 10.1 - SW

Great North Road Solar Park
Scoping Report



Order Limits

Staythorpe National Grid Substation

BESS 400kV Compound

Substation Areas

Construction Compound Areas

Public Rights of Way

Footpath

Bridleway

Restricted Byway

Byway Open to All Traffic

Development Areas

Cable Area

Other Area

Solar Area

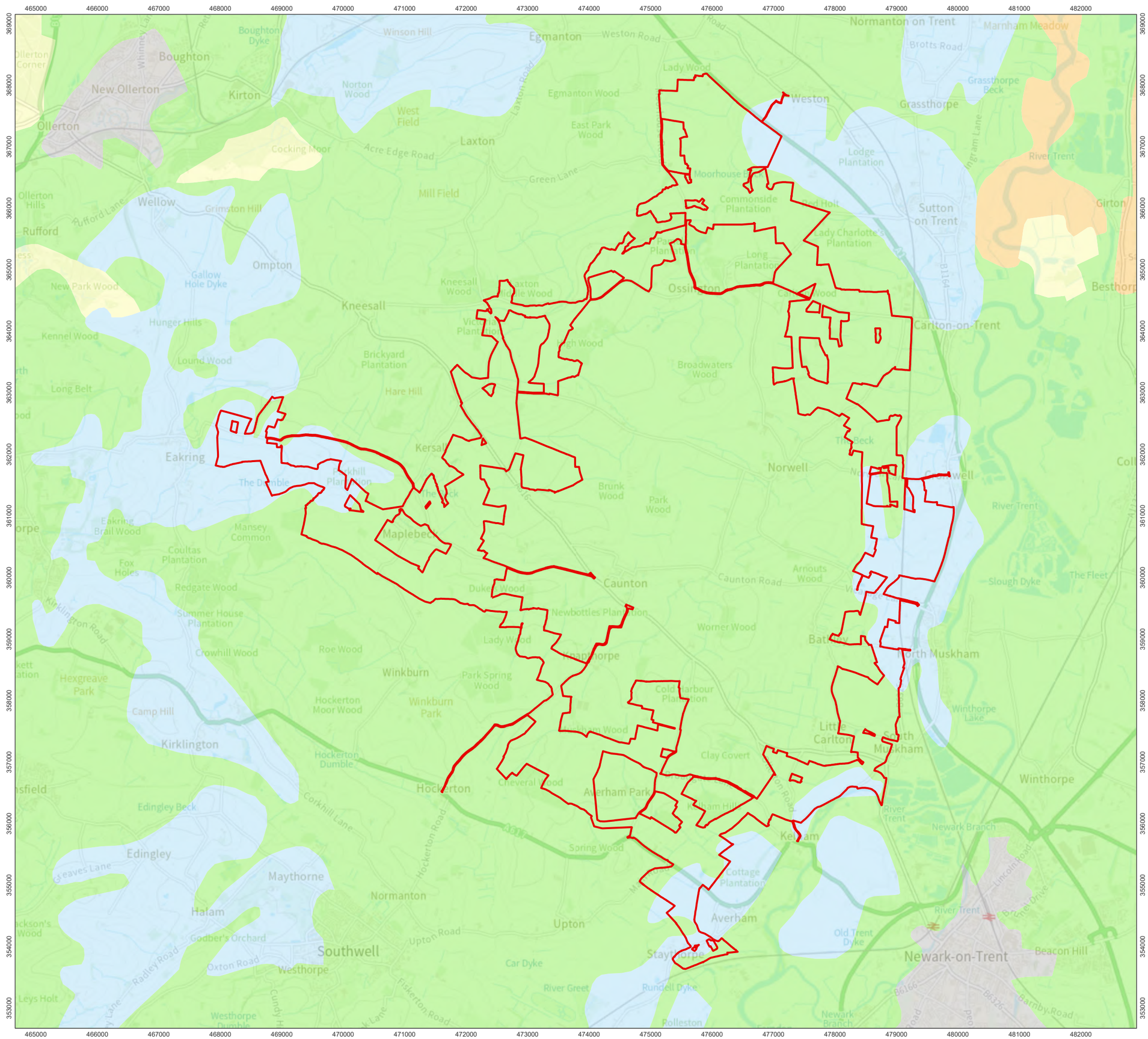
1:30,000 Scale @ A3

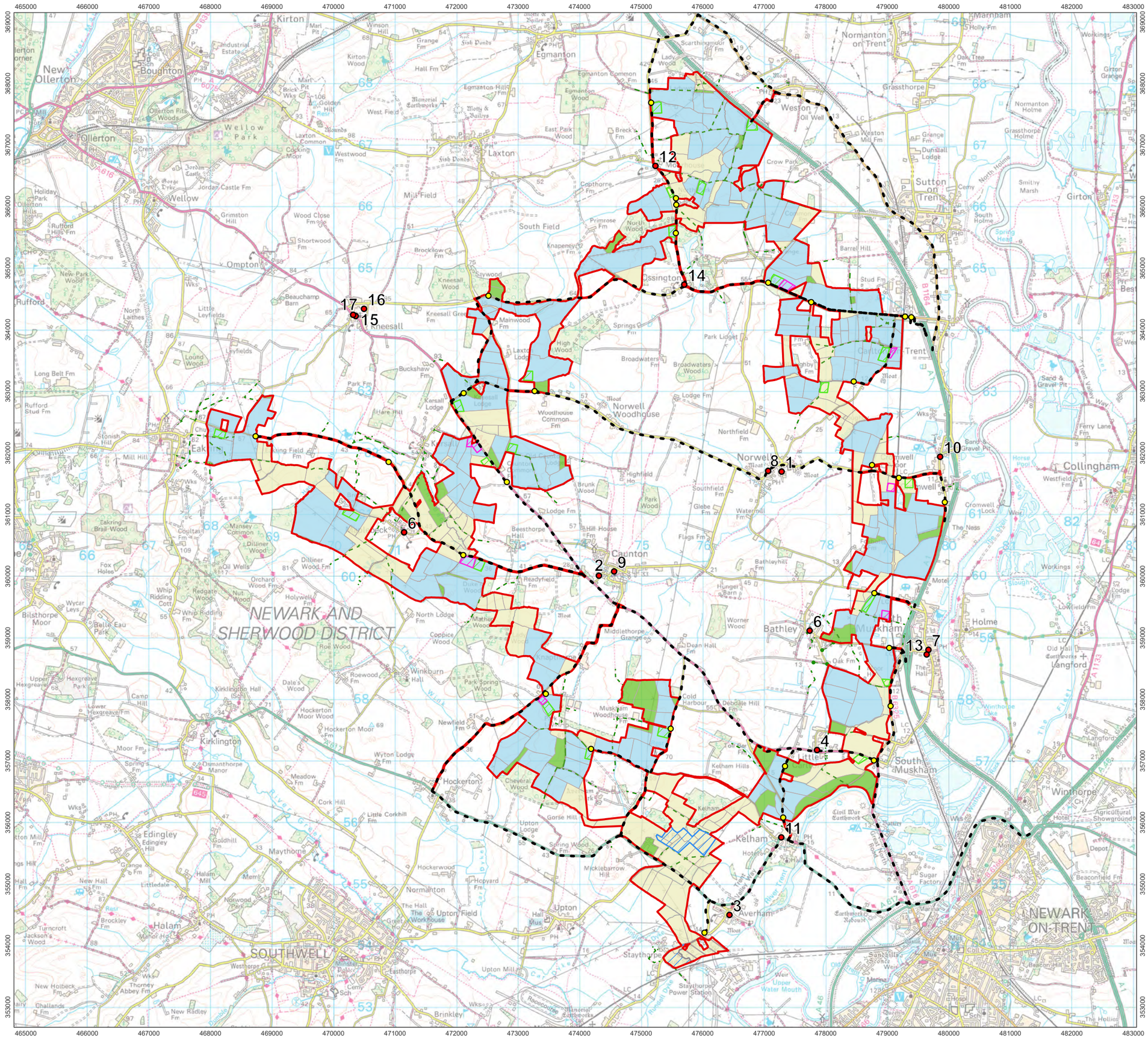
0 0.25 0.5 1 km

Ref:	Date: 07/11/2023

Public Rights of Way
Figure 10.1 - SE

Great North Road Solar Park
Scoping Report





- Order Limits
- Staythorpe National Grid Substation
- BESS 400kV Compound
- Substation Areas
- Construction Compound Areas

Public Rights of Way

- Footpath
- Bridleway
- Restricted Byway
- Byway Open to All Traffic

Development Areas

- Cable Area
- Other Area
- Solar Area
- Sensitive Receptors
- Proposed Access Locations
- Proposed Key Access Routes

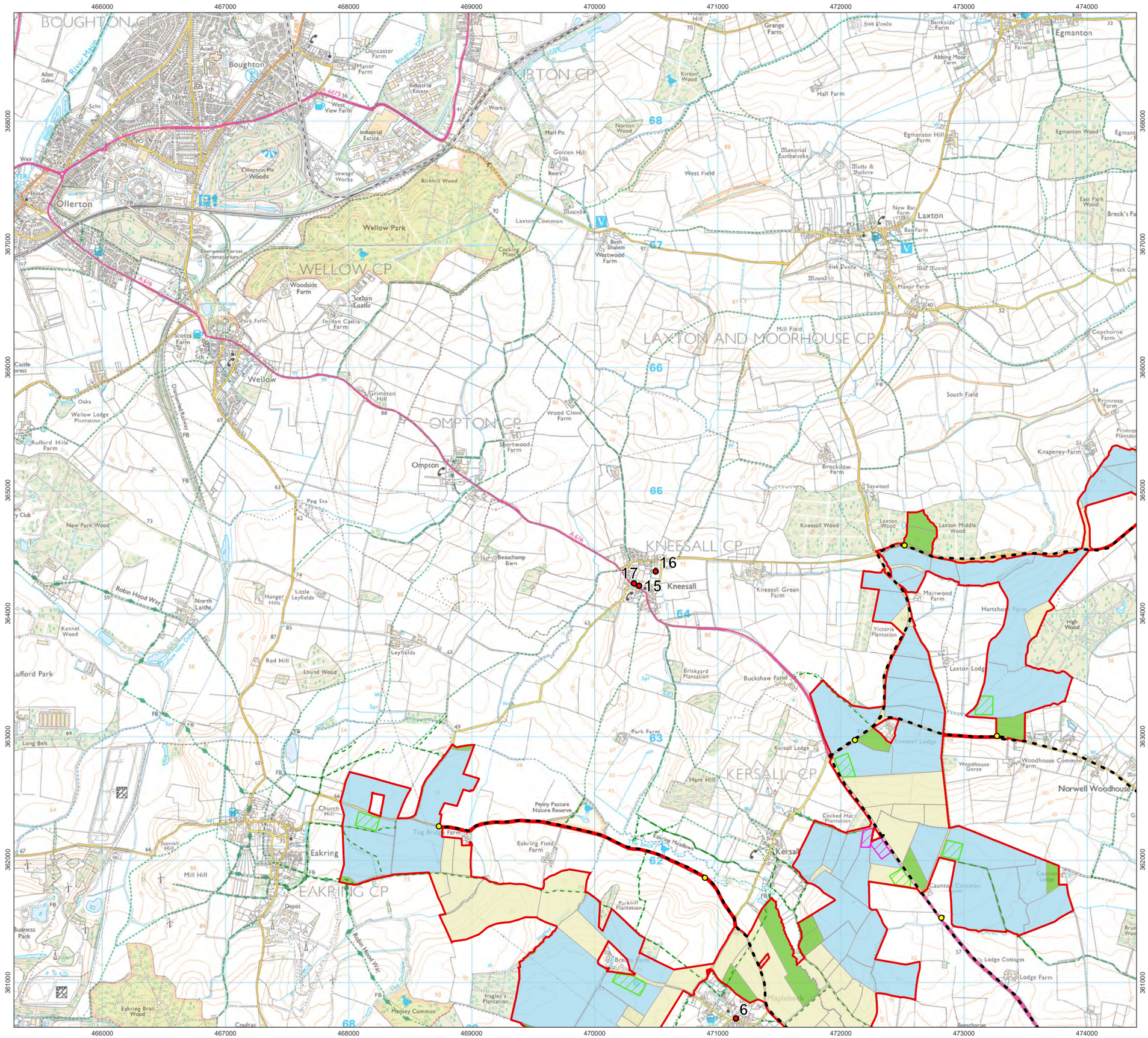
1:60,000 Scale @ A3

0 0.5 1 2 km

Ref:	Date: 07/11/2023

Traffic and Access
Figure 11.1 - Overview

Great North Road Solar Park
Scoping Report



- Order Limits
- Staythorpe National Grid Substation
- BESS 400kV Compound
- Substation Areas
- Construction Compound Areas

Public Rights of Way

- Footpath
- Bridleway
- Restricted Byway
- Byway Open to All Traffic

Development Areas

- Cable Area
- Other Area
- Solar Area
- Sensitive Receptors
- Proposed Access Locations
- Proposed Key Access Routes

1:30,000 Scale @ A3

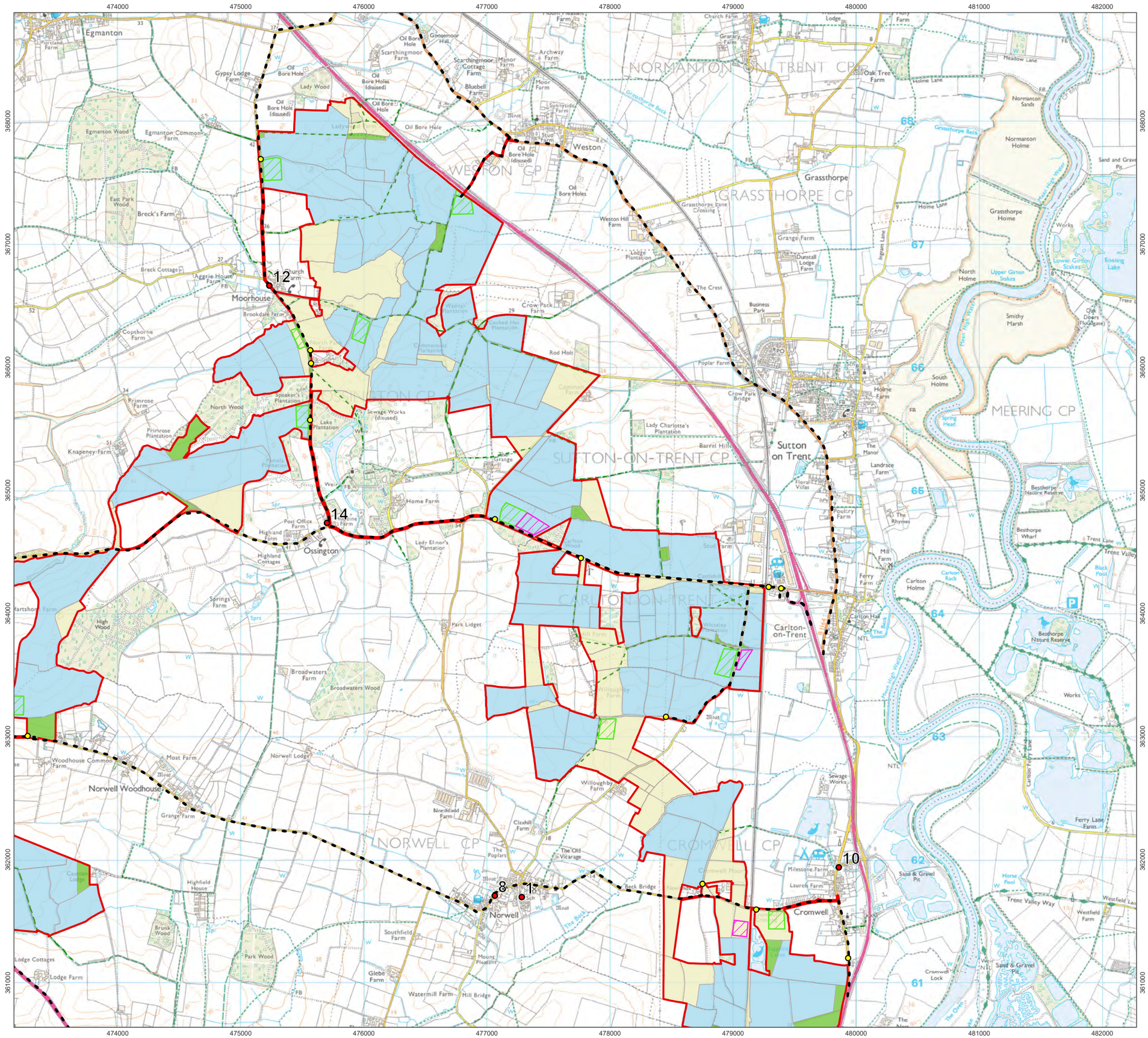
0 0.25 0.5 1 km

Ref:

Date: 07/11/2023

Traffic and Access
Figure 11.1 - NW

Great North Road Solar Park
Scoping Report



- Order Limits
- Staythorpe National Grid Substation
- BESS 400kV Compound
- Substation Areas
- Construction Compound Areas

Public Rights of Way

- Footpath
- Bridleway
- Restricted Byway
- Byway Open to All Traffic

Development Areas

- Cable Area
- Other Area
- Solar Area
- Sensitive Receptors
- Proposed Access Locations
- Proposed Key Access Routes

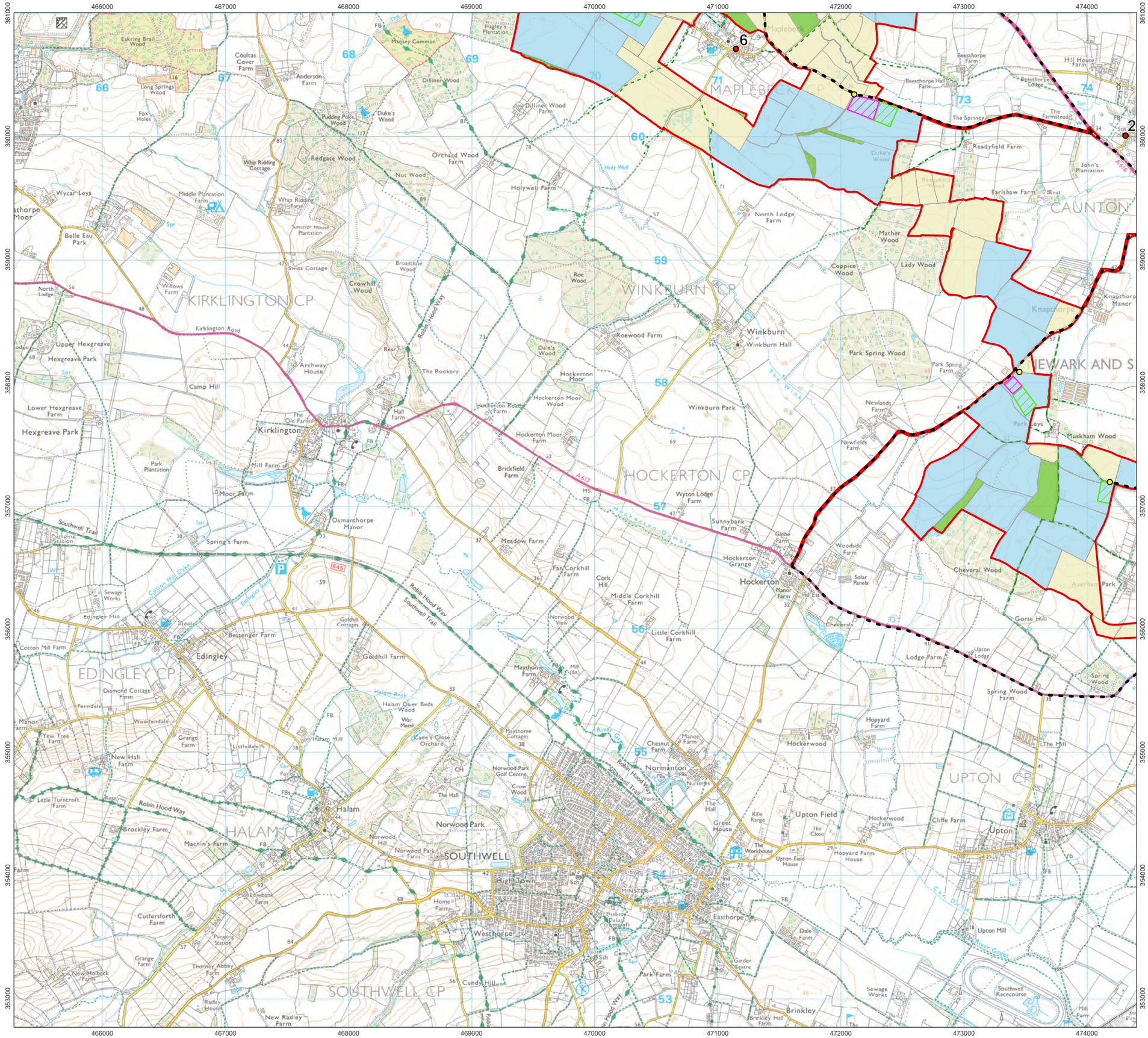
1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref:	Date: 07/11/2023

Traffic and Access
Figure 11.1 - NE

Great North Road Solar Park
Scoping Report



Order Limits 🟥
Staythorpe National Grid Substation ▨
BESS 400kV Compound ▨
Substation Areas ▨
Construction Compound Areas ▨

Public Rights of Way
Footpath
Bridleway
Restricted Byway
Byway Open to All Traffic

Development Areas
Cable Area
Other Area 🟩
Solar Area
● Sensitive Receptors
● Proposed Access Locations
Proposed Key Access Routes

1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref:

Date: 07/11/2023

Traffic and Access
Figure 11.1 - SW

Great North Road Solar Park
Scoping Report