Great North Road Solar And Biodiversity Park

Environmental Statement

Volume 4 – Technical Appendices

Technical Appendix A11.3: Geoarchaeological Desk-Based Assessment

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Contents

A11.5.1 INTRODUCTION

A11.5.1.1 PROJECT AND PLANNING BACKGROUND

1 Wessex Archaeology has been commissioned by Elements Green Trent Ltd ('the client') to produce a Geoarchaeological Desk-based Assessment (GDBA) and Geoarchaeological Landscape Characterisation (GLC) for land located north-west of Newark-on-Trent, Nottinghamshire (hereafter termed `the Development`) (**Figure A11.3.1**). The GDBA and GLC will form a technical appendix to the Environmental Statement (ES), required as part of the overall Environmental Impact Assessment (EIA) which will accompany the Development Consent Order (DCO) application for a proposed solar farm and associated infrastructure across an area of approximately 1,765 hectares (`The Order Limits`).

2 The Development will comprise the installation of a series of ground-mounted solar PV panels within the Order Limits. Associated works will include a Battery Energy Storage System (BESS), inverter housings, switch gear, access tracks, compounds, underground cabling, security measures and other ancillary equipment and landscaping (see ES Chapter 5 Development Description [ENO101062/APP/6.2.5].

3 The GDBA involves a development-wide review concentrating on surface deposits and areas of geoarchaeological potential to provide a framework for understanding the human occupation, exploitation and modification of, and adaptation to, past environments and landscapes at multiple spatial and chronological scales. The results of this GDBA will provide further information on the geoarchaeological and archaeological potential of the Development, facilitating an informed decision with regard to the requirement for, and methods of, any further archaeological and geoarchaeological works.

4 The land within the Order Limits has been divided up into separate Geoarchaeological Character Zones (GCZs) based on variations in superficial geology. The geoarchaeological potential of each GCZ is described, highlighting those zones that have low, medium, high or very high potential. Gaps in GI coverage are highlighted where there is insufficient data and where further works may be required to inform on archaeological potential.

A11.5.1.2 SCOPE OF DOCUMENT

5 This GDBA outlines the sub-surface superficial deposits underlying the Development and provides an assessment of their archaeological and geoarchaeological potential. It provides a suitable baseline within which to inform a program of further geoarchaeological or archaeological works (where appropriate).

6 In format and content, this document conforms to current best practice, including the guidance in Geoarchaeology: *Using Earth Sciences to Understand the Archaeological Record* (Historic England 2015a), and *Management of Research Projects in the Historic Environment* (Historic England 2015b).

7 The GDBA has been prepared with reference to wider regional and national guidance and research frameworks relevant to the Site, including the East of England Regional Research Framework (EERRF; 2021), *An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands* (Knight et al. 2012) and the Research and Conservation Framework for the British Palaeolithic (English Heritage 2008).

A11.5.1.3 SITE LOCATION, TOPOGRAPHY AND GEOLOGY

8 The Development will be located to the northwest of Newark-on-Trent within an area defined by the Order Limits (**Figure A11.3.1**). In the north, the Order Limits run south of Weston village, then next to Kersall, through Maplebeck, up to Eakring in the east. From Eakring, the Order Limits extend towards the south-west, through lands south of Caunton, Knapthorpe, and turning north at Staythorpe where the development runs north along the Trent Valley up to Carlton-on-Trent.

9 The Development lies within the Lower Trent Valley, occupying the valley floor and adjacent higher ground characterised by escarpments with deeply incised valleys and coombes. The majority of the land is occupied by arable fields and pasture, including areas of woodlands. The fields are surrounded by drainage ditches and dykes joining smaller streams that form tributaries of the River Trent. The watercourses in the Development are The Beck, Moorhouse Beck and Car/Pingley Dyke.

10 The solid geology of the Trent drainage basin comprises a wide range of bedrock that span the Pre-Cambrian to Cretaceous periods. The Development lies in area where the River Trent flows across Triassic sandstones and mudstones known in older literature as `Keuper Marl`, now mapped as Mercia Mudstone Group by the British Geological Survey (BGS) formed 246.7 - 205.7 million years ago (Mya) (**Figure A11.3.1**).

11 The overlying superficial geological deposits include a range of Pleistocene (2.7 Ma - 11.7 Kya) and Holocene (11.7 Kya – present) deposits (**Figure A11.3.2**). Deposits likely to be of Pleistocene date include glaciofluvial sands and gravels, Holme Pierrepont Sand and Gravel Member and isolated areas of windblown sand. The Holocene deposits comprise mainly alluvial sediments distributed along the valley floor and smaller streams. These sediments and their geoarchaeological potential are considered in more detail in **Section A11.5.5** and **Section A11.5.6**.

A11.5.2 AIMS AND OBJECTIVES

A11.5.2.1 AIMS

12 The aims of the GDBA and GLC are to:

- characterise the principal geological deposits present underlying the Site through a review of available Ground Investigation (GI) data, British Geological Survey borehole data (BGS GeoIndex) and the results of previous archaeological investigations;
- assess the archaeological and geoarchaeological potential of the Quaternary superficial deposits underlying the assessment area;
- identify the extent of Quaternary superficial deposits with archaeological potential, and;

- recommend appropriate and feasible measures, where possible, to mitigate impact on sensitive geoarchaeological deposits.

A11.5.2.2 OBJECTIVES

13 These aims were addressed by achieving the following objectives:

- collation and review of all GI, BGS and previous published and unpublished ("grey literature") data relevant to assessing the archaeological and geoarchaeological resource;
- interpretation of the sediments in their local and regional geoarchaeological context;
- production of a Geological Landscape Characterisation (GLC) for the assessment area, dividing the assessment area into Geoarchaeological Character Zones (GCZs) based on variations in the Quaternary lithostratigraphies;
- assessment of the likely archaeological potential of the Quaternary deposits present in each GCZ, and
- production of a Geoarchaeological Desk-Based Assessment GDBA report, including recommendations for further geoarchaeological and archaeological works, where appropriate

A11.5.2.3 SPECIFIC RESEARCH OBJECTIVES

14 A series of research themes outlined in the East Midlands Historic Environment Research Framework (EMERF 2021) are relevant to geoarchaeological investigation. These research themes can be reviewed and updated as work proceeds and can also reflect tangible actions to be addressed during the delivery of the Development.

15 The following overarching themes defined by the East Midlands Research Agenda are relevant to the geoarchaeological investigation of the development:

- Pleistocene and Holocene Climatic change
- Changes in sea level, the configuration of sea and land, the drainage network and the spatial extent of wetlands.
- The impact of human activity upon woodland clearance and other changes in regional vegetation.
- The impact of human activity upon soil development and geomorphic processes (notably alluviation, colluviation and aeolian deposition).

16 The following East Midlands Research Agenda topics may be relevant to geoarchaeological investigation within the Order Limits:

A11.5.2.3.1 Palaeolithic:

- **1G:** Elucidate from terrestrial sources the changing Pleistocene environment of the East Midlands.
- **1.5.2:** How may studies of fauna, pollen and other organic material from palaeochannels, caves, terrace sediments and other deposits refine our understanding of the evolving environment, and how may this have varied spatially?

A11.5.2.3.2 Mesolithic:

- **2.2.2**: How were sites distributed across low-lying and upland areas, and in particular how many sites might be concealed beneath alluvium, colluvium and other masking deposits or beneath the sea?
- **2.6.2:** How can we maximise the potential of paleochannels, upland or coastal peats and other organically rich deposits as sources of data on Early Holocene landscapes and changes in subsistence strategies and diet?

A11.5.2.3.3 Neolithic and Early to Middle Bronze Age

- **3E:** Target sites with Late Mesolithic and Early Neolithic organic remains.
- **3.4.2:** Can we identify locations with a high potential for elucidating variations in arable, pasture and woodland cover between ecological zones (e.g. paleochannels; upland peats)?

A11.5.2.3.4 Late Bronze Age and Iron Age:

- **4.8.1:** Can we chart more closely the processes of woodland clearance and agricultural intensification, their impact upon alluviation and colluviation, and variations between different areas?

A11.5.3 METHODOLOGY AND RATIONALE OF THE DESK BASED ASSESSMENT

A11.5.3.1 INTRODUCTION

17 Characterisation of the principal geological deposits present underlying the Development is achieved by reviewing the existing BGS data, BGS maps, previous work within the Order Limits and relevant `grey literature`. The GDBA and GLC provide a framework for more precisely determining the archaeological and geoarchaeological potential at a scale which can most effectively inform future decision making, including any requirements for archaeological investigations.

A11.5.3.2 DATA REVIEW

18 A review of the archaeological background to the Development was undertaken as part of a separate archaeological DBA (ES TA 11.1); however, a summary of Palaeolithic and Prehistoric archaeology in the area of the Development is described here, including a review of The English Rivers Project (TERPS; Wessex Archaeology and Wymer 2009) and Palaeolithic and Mesolithic Lithic Artefact Database (PaMELA; Wessex Archaeology and Jacobi 2014) supplied by the Portable Antiquities Scheme's database. **Figure A11.3.3** and **Section A11.5.9** shown the main findspots recorded in and within the vicinity of the Order Limits.

19 Later archaeological finds and key sites are also mentioned in the text where these are relevant to the geoarchaeological potential of the described deposits, including palaeochannels of the Trent. The assessment of possible palaeochannels was achieved by reviewing the Trent Valley Palaeochannels Database (Baker 2006). Aerial photographs supplemented by historic

mapping and parish boundary data allowed surface-visible palaeochannels to be recorded and the results are illustrated in **Figure A11.3.4**.

20 LiDAR data were visually inspected for signs of landform features of geoarchaeological potential, including palaeochannels, palaeolakes and periglacial landform features. Data coverage was good for the development (**Figure A11.3.5**) enabling the characterisation of the landscape.

A11.5.3.3 GEOLOGICAL LANDSCAPE CHARACTERISATION

21 The GLC works on the same principles as a Historic Landscape Characterisation (English Heritage 2004) and Landscape Character Assessment (Natural England 2014), but in this case largely considers the shallow buried and outcropping superficial geological elements of the landscape. The GLC considers variations in the Quaternary geology across the site, sub-dividing the assessment area into different Geoarchaeological Characterisation Zones (GCZs).

22 In total 65 BGS archive logs were reviewed along with LiDAR data and BGS map to characterise different GCZs. The boreholes used for the assessment are presented in **Section A11.5.9** and shown in **Figure A11.3.6**. In total nine GCZs were characterised and shown in **Figure A11.3.2.** Each zone is discussed in **Section A11.5.6**.

23 The GLC has been combined with the results of the DBA to provide an assessment of the archaeological potential of Quaternary deposits in each GCZ, providing a suitable baseline within which to inform the need for and scope of any subsequent archaeological/geoarchaeological field evaluation.

A11.5.3.4 CHRONOLOGY

24 Geoarchaeological investigations are typically undertaken with reference to geological periods (e.g., Quaternary), epochs (e.g., Pleistocene) and sub-epochs (e.g., Devensian) that reflect major climate sea-level and/or environmental changes. Here we adopt British nomenclature correlated to the Marine Isotope Stage (MIS) record to distinguish between different climatic periods, with dates given in Kya BP (thousands of years before present).

25 Marine Isotope Stages are deduced from marine palaeoclimatic records and reflect alternating warm (interglacial and interstadial) and cold (glacial and stadial) periods throughout the Quaternary (Table A11.3.1).

26 Where age estimates are available these are expressed in millions of years (Mya), thousands of years (Kya) and within the Holocene epoch as either years Before Present (BP), Before Christ (BC) and Anno Domini (AD). These are linked to the global Marine Isotope Stage (MIS) chronological framework.

Table A11.3.1 British Quaternary chronostratigraphy

Geological Period	Chronostratigraphy		Age (Kya)	MIS
Holocene	Holocene interglacial		11.7 – present	1
Late Pleistocene	Devensian Glaciation	Loch Lomond Stadial	11.7 – 12.9	2 – 5d
		Windermere Interstadial	12.9 – 15	
		Dimlington Stadial	15 – 26	
		Upton Warren Interstadial	40 – 43	
		Early Devensian	60 – 110	
	Ipswichian interglacial		115 – 130	5e
Middle Pleistocene		Unnamed cold stage	130 – 374	6
		Aveley interglacial		7
		Unnamed cold stage		8
		Purfleet interglacial		9
		Unnamed cold stage		10
	Hoxnian interglacial		374 – 424	11
	Anglian glaciation		424 – 478	12
	Cromerian Complex		478 - 780	13 – 19

A11.5.4 SUMMARY OF PREVIOUS WORK

27 The Order Limits have been subjected to ongoing geophysical surveys and archaeological evaluations. Previous investigations relevant to the development are listed in Table A11.3.2 and summarised below.

Table A11.3.2 Previous investigations

Report Type	Title	Report no.	Reference
Geophysical Surveys	Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire. Unpublished report	Cultural Heritage Report Number: 22036	ERM 2023a
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Brown Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023b
Archaeological Evaluation	*Land south of Staythorpe Road Staythorpe, Newark, Nottinghamshire.* Unpublished Client Report	268220.03	Wessex Archaeology 2022
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Burnett Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023c
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Carlton Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023d
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Chase Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023e
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land*	Cultural Heritage	ERM 2023f

Report Type	Title	Report no.	Reference
	To The West of A1, North of Staythorpe, Nottinghamshire (Dakin Land). Unpublished report	Report Number: 268310	
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Germany Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023g
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Garage Farm Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023h
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Garage Hewson Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023i
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Jackson Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023j
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land To The West of A1, North of Staythorpe, Nottinghamshire (Stainiforth Land).* Unpublished report	Cultural Heritage Report Number: 268310	ERM 2023k
Geophysical Surveys	*Detailed Gradiometer Survey Report. Land*	Cultural Heritage	ERM 2023l

Report Type	Title	Report no.	Reference
	To The West of A1, North of Staythorpe, Nottinghamshire (Ward Land). Unpublished report	Report Number: 268310	
Geophysical Surveys	*Land To The West of A1, North of Staythorpe, Nottinghamshire. (East Of Eakring, Maplebeck Estate, South Of Ollerton Road).* Unpublished Report	Cultural Heritage Report Number: 40439	ERM 2024
Geophysical Surveys	*Detailed Gradiometer Survey Report Land To The West Of A1, North Of Staythorpe, Nottinghamshire.* Unpublished Report	Ref: MSSK1838	Magnitude Surveys 2024
Archaeological Evaluation (Phase 1)	*Great North Road Solar Park. Interim Report for Archaeological Evaluation.* Unpublished Client Report	N/A	York Archaeological Trust 2025a
Archaeological Evaluation (Phase 2)	GNR Solar Farm Phase 2. Archaeological Evaluation Unpublished Client Report	276500	York Archaeological Trust 2025b

A11.5.4.1 GEOPHYSICAL SURVEYS (WESSEX ARCHAEOLOGY, AOC AND MAGNITUDE SURVEYS)

28 A series of geophysical surveys have been commissioned by Environmental Resources Management (ERM) with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features to assess the archaeological potential of land parcels and their suitability for development. The completed geophysical surveys were conducted by Wessex Archaeology (ERM 2023a-l), AOC (ERM 2024) and Magnitude Surveys (2024).

29 The results of the surveys highlighted areas of geophysical anomalies within the Order Limits. A concentration of geophysical anomalies can be seen in

the east of the Development, specifically concentrated in the following locations; south-west of Cromwell, west of Carlton-on-Trent, between Bathley and North Muskham, south of Little Carlton and South Muskham. These areas lie close to the River Trent and the Great North Road and would have been favourable for occupation and settlement.

30 The results of the surveys are used to inform the design of the Development. Where geophysical surveys have already been undertaken and areas of significant archaeological concentration have been identified, these areas have been taken into consideration within design and excluded from the development, and therefore the evaluation, on the basis that archaeological remains in these areas will be preserved in situ (that is, these areas have already been excluded from development).

A11.5.4.2 ARCHAEOLOGICAL EVALUATION (WESSEX ARCHAEOLOGY 2022)

31 Wessex Archaeology was commissioned by ARCUS Consultancy Services Ltd (Glasgow) to undertake an archaeological evaluation of land located to the south of Staythorpe Road, Nottinghamshire. This area lies within the southern part of the current Order Limits, and a brief summary of the archaeological evaluation is presented below.

32 The earliest feature uncovered was a north-east to south-west aligned Late Neolithic ditch, which was noted in three trenches in the central south-east area of the site. Sherds of Grooved Ware and Beaker pottery were recovered from one of the ditch fills, as well as worked flint typical of Late Mesolithic/Early Neolithic forms. Evidence of post-medieval/modern boundary ditches was also recorded in the north and western parts of the site and correspond well with boundaries shown on the 1884 Ordnance Survey (OS) map.

33 Additionally, a palaeochannel was identified at the northern edge of the site that was potentially a continuation of a river channel, from which a human thigh bone carbon dated to the Mesolithic period was recovered, 1.3 km to the east of the Site. The bulk sediment samples from the upper fills of the palaeochannel contained plant remains indicative of medieval/post-medieval settlement.

A11.5.4.3 PHASE 1 TRIAL TRENCHING (YORK ARCHAEOLOGICAL TRUST 2025A)

34 York Archaeology (YA) was commissioned by Elements Green to undertake a programme of archaeological evaluation (trial trenching) on several land parcels located to the north-west of Newark-on-Trent. The Phase 1 of the trial trenching was undertaken in May to June 2024. The areas encompassed by the trenching included lands at Maplebeck (centred on SK 71631 60013), Castle Hill (centred on SK 78021 64555), North Muskham (centred on SK 78273 59308), Cromwell Central (centred on SK 79278 60974) and Cromwell North (centred on SK 79666 61092). From a planned 444 archaeological evaluation trenches, 231 were excavated as part of this phase.

35 The evaluation area at Maplebeck consisted of 89 trenches of which 37 contained archaeological features. The features broadly comprised pits, gullies, and enclosure ditches, dating to the later prehistoric and Romano-British periods. Later ridge and furrow systems and former field boundaries identifiable on historic mapping were also recorded.

36 In the area at Castle Hill a probable Romano-British ditch was recorded, suggested to be a boundary ditch and a post-medieval pond was recorded as well as former field boundary ditches.

37 At Cromwell central archaeological features consisted of ditches, pits and ridge and furrow field systems as well as former field boundaries. Many of the features did not contain any dating evidence however are expected to date from the prehistoric to Romano-British period and medieval to modern periods along with undated and naturally formed features that included evidence of palaeochannels. In three trenches (205, 212 and 219) a possible palaeochannel was recorded containing layers of peat, white clay (marl) and organic material. A ditch-like surface feature was also encountered filled with black peaty deposits and fragments of wood indicating water management after the channel silted up.

38 At Cromwell north archaeological features including ditches, pits and postholes of medieval and post-medieval date and associated with agricultural activity were also identified including ridge and furrow and former field boundaries.

A11.5.4.4 ARCHAEOLOGICAL EVALUATION PHASE 2 (YORK ARCHAEOLOGY TRUST 2025B)

39 At the time of writing, the phase 2 archaeological evaluation has been completed within the wider GNR Solar Farm Order Limits with the interim report produced. The trench layout for this phase of trial trenching has been informed by the preliminary results of the geophysical survey and is focussed on areas of increased archaeological potential. The work has been approved and follows the Written Scheme of Investigation produced by Wessex Archaeology (Wessex Archaeology 2024).

A11.5.5 GEOARCHAEOLOGICAL BACKGROUND

A11.5.5.1 INTRODUCTION

40 The Development sits within the Lower Trent Valley, north-east of Newark-on-Trent with the eastern area of the Order Limits running along the current valley floor (**Figure A11.3.2**). The River Trent is the third longest river in Britan and together with its tributaries drains the area of the Midlands. The River Trent flows from Staffordshire to its confluence with the Humber Estuary. The northward course below Newark-on-Trent is unusual amongst British rivers due to geological changes in the late Quaternary. The dynamic nature of the River Trent, particularly in its middle and lower course, is a consequence both of its present configuration and of its Pleistocene and Holocene history that impacted the current landscape (Knight and Howard 2004, Barker 2006, Howard et al 2007, White et al 2007, Bridgland et al 2014, Bridgland et al 2015, Westaway et al 2015).

41 The western part of the Order Limits occupies escarpments overlooking the Trent floodplain (**Figure A11.3.2** and **Figure A11.3.5**). The landscape dips gently eastwards with the land disturbed by faulting giving the characteristic landscape of dissected escarpments formed by more resistant geological units with intervening clay vales formed on the weathered mudstone and siltstone. The pattern of escarpments has developed in the Quaternary as a result of glaciation and uplift (White et al 2007). Only scarce superficial deposits are recorded within this area of the Order Limits.

A11.5.5.2 GEOARCHAEOLOGICAL CONTEXT OF THE LOWER TRENT

A11.5.5.2.1 Pleistocene landscape

42 The River Trent came into existence following the Anglian glaciation (MIS 12; ~478-424 Kya) as a river draining the Dove, Derwent and Soar catchments via the Lincoln Gap and the newly eroded Fen Basin. Prior to the Anglian glaciation much of what is now the Trent catchment was drained by the Bytham system through Ancaster Gap in the Jurassic escarpment (Bridgland et al 2014 and 2015).

43 After the MIS 8 (~300-243 Kya) glaciation, the River Trent developed its west-to-east course through Derbyshire and started to flow west-east through the Lincoln Gap. A series of fluvial and outwash sands and gravels were deposited along the course of the Trent, summarised in Table A11.3.3. These deposits are not mapped within the Order Limits due to the alteration in the course of the River Trent north of Newark-on-Trent during the late Devensian.

44 There is little evidence of post-Anglian and pre-Devensian glaciation across the Development because this glaciation did not reached as far southwards as the Anglian and extended beyond the limit of the much later Devensian (last) glaciation (~25 Ka–15 Kya), which impinged only on the extreme upstream and downstream extents of the Trent system. The Trent Valley between Nottinghamshire, Newark-on-Trent and Lincoln has been denuded of glacial deposits and these deposits are mainly located within the higher grounds and mapped as surface veneers and palaeovalley fills (Carney 2007, Bridgland et al 2014).

45 The first substantial evidence for human occupation of the Trent occurs within deposits dated to MIS 8 and were recovered from quarries at Hilton and Willington in the Upper Trent. The majority of these artefacts are hand-axes suggesting human presence in the Trent during MIS 11-9 (~424 – 300 Kya), the Palaeolithic archaeology from the sites is believed to be reworked from older deposits that were destroyed by the MIS 8 ice sheet (Posnansky, 1963; Howard et al 2007, White and White 2007, Bridgeland et al 2014). Evidence for human presence in the close area to the Schame comes from find spots and consists of Lower and Middle Palaeolithic hand-axes found at Drove Lane (Newark, PAS ID LIN-D3C064) Norton Disney (PAS LVPL-6468B2), Coddington and Caunton (**Figure A11.3.3**).

46 Two key Palaeolithic sites at Norton Bottoms and Norton Disney are attributed to MIS 7 (~243-191 Kya) and are located c. 5.4 and 7.2 km from the development (**Figure A11.3.3**). The interglacial sediments at Norton Bottoms were recorded within a channel providing one of the best examples

of palaeoenvironmental evidence from the Trent catchment for an open park-grassland environment. At Norton Disney the palaeoenvironmental (pollen and mollusc) proxies suggested considerably wooded landscape with open ground along rivers and floodplains during MIS 7 c and 7 e substages (Schreve 2007, Bridgeland et al 2014).

47 The onset of MIS 6 glaciation saw the abandonment of Britian by hominids and there is currently no Palaeolithic artefacts dated between MIS 6 to MIS 4 (~191-56 Kya) form the Lower Trent. MIS 3 saw human returns to the British Isles. The nearest evidence of human presence within the Trent catchment are single findspots known form Lincolnshire, Derbyshire and Leicestershire.

Table A11.3.3 Summary of Trent sequence (adapted from Bridgeland et al 2014, Plate 2). Relevant deposits to the Development are highlighted

<table>
<tr><th>MIS</th><th>Paelaeo-Geography</th><th>Upper Trent</th><th>Middle Trent</th><th>Trent Trench</th><th>Lower Trent</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Humber Trent</td><td>Holocene Alluvium</td><td>Holocene Alluvium</td><td>Holocene Alluvium</td><td>Holocene Alluvium</td></tr>
<tr><td></td><td>Hemington</td><td></td><td></td></tr>
<tr><td rowspan="2">2</td><td rowspan="13">Trent via Lincoln</td><td>First Terrace</td><td>Holme Pierrepont</td><td>Holme Pierrepont</td><td>Holme Pierrepont</td></tr>
<tr><td>Second Terrace</td><td rowspan="4">Beeston</td><td rowspan="4">Bassingfiled</td><td rowspan="4">Scarle</td></tr>
<tr><td>3</td><td>Whitemoor Haye</td></tr>
<tr><td>4</td><td rowspan="11"></td></tr>
<tr><td>5a</td></tr>
<tr><td>5d-5b</td></tr>
<tr><td>5e</td><td rowspan="5"></td><td></td></tr>
<tr><td>6</td><td>Egginton Common</td><td>Balderton</td></tr>
<tr><td>7</td><td></td><td>Norton Bottoms</td></tr>
<tr><td rowspan="4">8</td><td>Etwall</td><td>Eagle Moor (lower facet)</td></tr>
<tr><td>Downcutting</td><td>Downcutting</td><td>Downcutting</td></tr>
<tr><td>Sandiacre</td><td rowspan="3"></td><td>Eagle Moor (upper facet)</td></tr>
<tr><td>Wragby Glaciation</td><td>Thrussington till</td><td>Chellaston (outwash gravel) and Oadby till facies</td><td>Outwash

Skellingthorpe Clay (glacial lake)</td></tr>
<tr><td>9</td><td></td><td></td><td></td><td></td></tr>
</table>

MIS	Paelaeo-Geography	Upper Trent	Middle Trent	Trent Trench	Lower Trent
10	Soar-Trent via Lincoln		Elvaston and Swarkestone Channels		
11					
12	Anglian Glaciation	Till	Till (Oadby facies)	Till (Oadby facies	Till (Oadby facies
13-17	Bytham River				Ancaster River Deposits

A11.5.5.2.2 Landscape development in the Late Devensian

48 The course of the River Trent was disrupted by the ice of the last glaciation, which advanced in lobes down the western and eastern sides of Britain, around ~ 25 Kya. By ~19 Kya the ice was approaching its southernmost extent in the east of the country, blocking the Yorkshire Ouse–Humber system and forming Glacial Lake Humber. It is likely that Lake Humber overflowed southwards into the Trent, cutting a channel across the Trent–Ouse interfluve that, upon deglaciation, was used by the Trent when it adopted its modern course to the Humber. The terraces formed by the new course of the Trent during MIS 2 are mapped as Holme Pierrepont Sand and Gravel Member (HPSG) within the Lower Trent (Bridgeland et al 2104 and 2015, Table A11.3.3). These deposits are mapped by the BGS underlying the eastern part of the Order Limits and are discussed in **Section A11.5.3**.

A11.5.5.2.3 Holocene landscape development

49 At the end of Pleistocene and Early Holocene, high discharges associated with glacial meltwaters and low sea levels prompted a period of incision creating the present Holocene floodplain of the Trent. The river established its current meander belt among the floodplain gravel terraces leading to development of an anastomosing river system during the early and middle Holocene, c. 7300-800 cal BC (Salisbury 1992, Lillie and Grattan 1995, Howard 2005, Howard and Knight 2007, Bridgeland et al 214).

50 There is evidence that the edges of the newly formed Trent valley were a focus for human activity. One of the most important Late Upper Palaeolithic sites, dated to the Late Pleistocene Windermere Interstadial (c. 12,7Kya–10,7Kya BC) was excavated at Farndon Fields just south of Newark near the confluence of the river Devon, c. 4.3 km south of the Development. The Site comprised in situ preserved flint scatter debris of the Creswellian and Federmesser cultural traditions and was found in alluvial deposits beneath the present ploughsoil (Cooke and Mudd 2014).

51 During the Mesolithic period the Development will have been covered by canopy forest and a number of Mesolithic findspots are recorded within the Order Limits and along the floodplain, including Caunton (**Figure A11.3.3**). Around 5200 cal? BC the impact of progressive post-glacial sea level rise resulted in the increased deposition of organic silty clays and the

Development of wetland riparian habitats, including the formation of alder carr woodland, grassland and reedswamp (Knight et al 2007).

52 The changes in sediment discharge led to reworking of earlier Late Devensian gravels and the deposition of Hemington Gravel Member. This unit has been mapped by LiDAR as slightly more elevated floodplain deposits such as point-bar and levees (White at al 2007, 20). Although the Hemington Gravel Member are not mapped by the BGS within the Order Limits (**Figure A11.3.2** and Table A11.3.3), there is a possibility of them being present. At Langford, near Newark, c. 4 km east from the development, the Hemington unit was mapped containing rich archaeological deposits, including well preserved organic material (Howard 2005, Knight and Howard 2007).

53 In the second millennium BC, a rich wetland mosaic dissected by a network of major and minor channels flowing across the valley floor prevailed within the Lower Trent. The network of old channels within the Order Limits is confirmed by the palaeochannel data shown in **Figure A11.3.4**. Analysis of palaeoenvironmental evidence from palaeochannels across the River Trent indicate an increase in woodland clearance during the Bronze Age and a transition to a more open landscape (Knight et al 2007). This increased soil erosion (colluviation) and alluviation of fine-grained sediments lead to the expansion of river floodplains, and a similar expansion in alluvial deposits may be expected within the Order Limits.

54 From the Romano-British period onwards, the River Trent was subjected to intensive and systematic redevelopment. Around Newark-on-Trent, the channels of the River Trent provided power for mills in the 16th century. The bifurcation of the channel at Kelham is argued to be an artificial course created to supply mills in that part of the valley. Despite the water management the River Trent is still active and prone to channel migration and avulsion. A considerable number of mill dams, boats, fish traps, and bridges have been buried by floodplain sediments in historic period (Clay 1992, Sailsbury 1992, Brown et al 2001, Knight and Howard 2007).

A11.5.5.3 QUATERNARY DEPOSITS AND THEIR GEOARCHAEOLOGICAL POTENTIAL

A11.5.5.3.1 Introduction

55 BGS mapping, palaeochannel surveys (Baker 2006) and previous archaeological research summarised above suggest that the following Quaternary deposits and landforms are present within the Order Limits:

- Palaeochannels – Pleistocene - Holocene
- Peat – Holocene
- Alluvium– Holocene
- Slope Deposit – Late Pleistocene - Holocene
- Coversands - Late Glacial
- Holme Pierrepont Sands and Gravels – Late Devensian
- Glaciofluvial – Middle Pleistocene
- Till – Middle Pleistocene

56 Relevant background information on these deposits is outlined below. Their geoarchaeological and paleoenvironmental context is assessed in detail in **Section A11.5.7**.

A11.5.5.3.1 Till Deposit

57 Till deposits are mapped by the BGS as outcrops covering the escarpments in the western part of the Order Limits. Tills are poorly sorted sediments deposited directly by ice sheets and their occurrence within the Lower Trent is sparse. Where mapped, they often occupy higher grounds, suggesting that there has been significant dissection of the landscape since the glaciation, making dating of the tills problematic (White et al 2007, Bridgeland et al 2015). Determining the age, extent and character of the till across the Development would be important in understanding the influence of past cold stages across the Lower Trent.

58 Although the tills themselves have limited archaeological and paleoenvironmental potential, they may seal and preserve underlying stratigraphy containing archaeological sites, artefacts and/or associated environmental remains.

A11.5.5.3.2 Glaciofluvial Deposit

59 Glaciofluvial deposits are mapped by the BGS as an outcrop covering the escarpments in the western part of the Development. Glacial sands and gravels are deposited by seasonal meltwater outwash at the edge of ice sheets or as subglacial, englacial and supraglacial deposits of ice sheets. The available archive borehole SK76SW26 suggests c. 25 m of glaciofluvial deposits in that area. These deposits were attributed to the Middle Pleistocene glaciations and further investigation could contribute to a better understanding of the post-Anglian and pre-Devensian glaciations in the Lower Trent.

60 Glaciofluvial sands and gravels have a limited archaeological and geoarchaeological potential but may contain eroded and redeposited Palaeolithic archaeology and seal deposits of Palaeolithic archaeological and geoarchaeological potential. As discussed in **Section A11.5.5.2**, a number of reworked hand axes have been recovered from sediments dated to MIS 8 and MIS 6.

A11.5.5.3.3 Holme Pierrepont Sands and Gravels (HSPG)

61 The Holme Pierrepont Sands and Gravels (HSPG) is attributable to the Devensian (MIS 2; c. 25 – 9.7 Ka) and mapped within the Middle and Lower Trent. The HSPG can consist of sandy gravels, up to 10 m thick, and has been interpreted as an extensive valley sandur formed of glacial sediments deposited by meltwater outwash at the end of a glacier. The HSPG may have aggregated in two separate pulses of braid plain aggradation either side of the 'Last Glacial Maximum' (White et al 2007, Howard et al 2011).

62 The HSPG can contain Lower and Middle Palaeolithic archaeology reworked from earlier deposits, whilst channels, recorded in this deposit, have been shown to contain organic material preserving a wide range of palaeoenvironmental proxies. Channels with organic fills, overlain by the HSPG, have been recorded at Holme Pierrepont near Nottingham. The analysis of microfossils provided evidence of cold, though not fully arctic

climatic conditions and a largely treeless landscape, roamed by large herbivores. Radiocarbon dating indicates that these sediments were deposited during the Loch Lomond Stadial (12.9 and 11.7 Kya) (Howard et al 2011).

63 In the middle Holocene period, the HSPG were affected by erosion, lateral channel migration and channels abandoned and reformed In certain areas of the Middle and Lower Trent, the Late Devensian deposits have been reworked and redeposited as Hemington Gravel Member. Although the later Holocene gravels are not mapped by BGS within the Order Limits there is a possibility that some of the Late Devensian deposits have been reworked sealing Holocene archaeology.

A11.5.5.3.4 Coversands deposits

64 This deposit is mapped as outcrops along the eastern boundary of the Order Limits near Carlton-on-Trent (**Figure A11.3.2** and **Figure A11.3.8**). In the wider area of Trent, coversands are mapped as overlying the Middle and Upper Pleistocene river terraces and are known to be cold climate deposits, that later could be reworked by alluvial and fluvial processes.

65 At Farndon Fields gravels were overlain by coversands which have been deposited during the Loch Lomond Stadial (Younger Dryas; GS-1) and Early Holocene, 10.500 – 9400 BC (Cooke and Mudd 2014). Similar dates were obtained for coversands in Nottinghamshire at Girton, ~9300 BC (Baker et al. 2013), while at Tiln coversand deposition was found to commence ~11.700 BC (Howard et al. 1999). Reactivation of coversands during the Holocene is recorded at Tiln, Girton and Farndon Fields with dates ranging between ~ 7300 and 5900 BC. Some of the reworked coversands are likely to have been widely incorporated into the Holocene fluvial environment (Cooke and Mudd 2014).

66 Although the coversands were deposited in cold environments they have potential to seal archaeological horizons; for example, at Farndon Fields a phase of soil formation was recorded beneath coversands, suggesting the possibility of a stable terrestrial surface which may have been contemporary with phases of activity associated with the Creswellian and/or Federmesser flint deposition (Cooke and Mudd 2014). Also, at Tiln, 10 km north from the development, coversands covered Late Devensian organic sediments (Howard and Knight 2007). Extensive coversands have been observed blanketing terraces at Collingham, c. 1.7km east of the development.

A11.5.5.3.5 Alluvial deposits

67 Alluvium is a generalized term covering unconsolidated sediment transported by water in a non-marine environment (e.g. rivers). It has also been used as a banner term to include other sediment such as peat, which forms under different conditions, but that can occur as distinct bands or discrete features within alluvium. Although Pleistocene river gravels are technically alluvium, the term here is applied to fine-grained deposits of Holocene date.

68 Alluvium is mapped widely across the route by the BGS associated with the course of the Trent, The Beck, Moorhouse Beck and number of unnamed streams (**Figure A11.3.2**).

69 Minerogenic alluvium has the potential to contain organic layers (e.g. peat) of a high geoarchaeological potential that may preserve a range of paleoenvironmental indicators useful for reconstructing past vegetation, environment and the impact of human communities on the landscape. Alluvium also has the potential to contain or partially mask archaeology; buried archaeological sites are recorded in the Lower Trent preserved beneath later alluvial deposits (**see Section A11.5.5.2**). For instance, at the aforementioned Farndon Fields, alluvium sealed the coversands deposit and in places the basal alluvial deposits consist of a palaeosol formed in silty alluvium (Cooke and Mudd 2014). The stratigraphic sequence recorded at Staythorpe and Kelham comprised alluvial clay sealing Roman archaeology (Knight et al 2007).

A11.5.5.3.6 Peat

70 Peat comprises partially decomposed organic matter preserved within waterlogged anaerobic (oxygen-free) conditions. Peat deposits are ideal contexts for the preservation of plant micro and macrofossils and invertebrate remains that provide key data on past vegetation environments, climate, land-use and the long-term impact of human communities on the landscape.

71 Preservation of peat deposit within the Lower Trent Valley is well established and often associated with preservation of palaeochannels (Baker 2006, Knight et al 2007). Mesolithic peats within palaeochannels were present at Rampton in Nottinghamshire (7610-7200 cal BC), and Staythorpe (5300-4730 cal BC). At Girton, c. 5 km north of the development, a 1 to 2 m peat bed was recorded below 3 m of alluvium. The peat was radiocarbon dated between 1530 – 1210 cal BC to 1370 – 900 cal BC. Evidence of progressive waterlogging of the Lower Trent valley floor is provided by extensive peat deposits dating to the Roman period (Knight et al 2007).

A11.5.5.3.7 Palaeochannels

72 Palaeochannels have the potential to contain and preserve organic layers, including peat and archaeological material ranging from the Early Holocene to post-medieval periods (Sailsbury 1992, Knight et al 2007). Despite most of the channels mapped by Baker (2006, **Figure A11.3.4**) remaining undated, there is a high possibility that these channels are Holocene in date. However, older Pleistocene channels filled with Holocene sediments can be also encountered below the HPSG (Howard et al 2011).

73 As the River Trent was a focus of human activity, archaeological sites scattered along the Trent and its old channels have been recorded around the Development. Mesolithic sites were discovered at Staythorpe, South Muskham, Winthorpe, Langford Moor, Girton Quarry, Stanley Terrace and Collingham (Howard and Knight 2007). In comparison, in the western part of the Development, only one Mesolithic findspot was recorded north at Caunton (**Figure A11.3.3**) which clearly shows the importance of rivers and streams in the past.

A11.5.5.3.8 Slope Deposit

74 Slope deposits are not mapped by the BGS within the Order Limits, but Head (cold-climate slope deposits) are mapped outside the southern boundary (**Figure A11.3.2**). There is a possibility for slope deposits to be

present particularly at the base of the slopes, filling coombs and gullies, and along smaller river valleys in the western part of the Development.

75 The slope deposit could be of Late Pleistocene/Early Holocene date and attributed to Head deposits mapped by BGS. Head deposits are defined as poorly sorted cold-climate slope deposits that represent glacial debris reworked from earlier formations. Although Head primarily refers to deposits formed through solifluction processes (alternate freeze-thawing), more recent post-glacial soil wash deposits called colluvium may have been included in this classification.

76 Colluviation is likely in areas of topographical relief where soil instability has been brought on by activities such as clearance of woodland, agricultural activity and soil degradation, leading to downslope movement of sediment in the Holocene period. Progressive accumulation of colluvium sealing Iron Age and Roman archaeology is known from Kelham, located south of the development (Knight and Howard 2007). Therefore, presence of colluvium at the transition between the escarpment and floodplain is possible.

A11.5.6 GEOARCHAEOLOGICAL LANDSCAPE CHARACTERISATION

A11.5.6.1 INTRODUCTION

77 The GLC comprises a review of available BGS archive boreholes supplemented by BGS maps and LiDAR data., The Order Limit is divided into nine Geoarchaeological Character Zones (GCZs 1 to 9) (**Figure A11.3.2** and **Figures 6-14**) The GCZs provide a framework for more precisely determining the archaeological and geoarchaeological potential at a scale which can most effectively inform future decision making, including any requirements for any future archaeological evaluation.

A11.5.6.2 GEOARCHAEOLOGICAL CHARACTERISATION ZONES

78 The Order Limit is broken down into nine separate GCZs summarised in Table A11.3.4 and outlined below.

Table A11.3.4 Geoarchaeological Character Zones

GCZ	Quaternary deposit	MIS	Geological Period	Archaeological Period	Estimated depth of deposits (m bgl)	Figure A11.3.x
1	? Slope deposits Alluvium and peat Paleochannels Coversands HPSG	1-2	Late Devensian to Late Holocene	Late Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	6

GCZ	Quaternary deposit	MIS	Geological Period	Archaeological Period	Estimated depth of deposits (m bgl)	Figure A11.3. x
2	? Slope deposits Alluvium and peat ? HPSG	1-2	Late Devensian to Late Holocene	Late Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	7
3	? Slope deposits Alluvium and peat ? Coversands HPSG	1-2	Late Devensian to Late Holocene	Late Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	8
4	Slope deposits (limited) Alluvium and peat Paleochannels Head	>1	Pleistocene – Holocene	Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	9
5	No superficial mapped. Possibly limited Alluvium and Slope Deposits	>1	Pleistocene – Holocene	Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	10
6	Till Glaciofluvial	12-2	Pleistocene	Palaeolithic	Below the modern topsoil/ ploughsoil	11
7	No Superficial	n/a	Holocene	Mesolithic	Uncertain	12
8	? Slope deposits Alluvium Head	>1	Pleistocene – Holocene	Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	13
9	? Alluvium ? Slope Deposit	>1	Pleistocene – Holocene	Palaeolithic to post-medieval period	Below the modern topsoil/ ploughsoil	14

A11.5.6.2.1 GCZ 1

79 This zone covers an approximately 8.5 km section that occupies the north-south oriented floodplain of the River Trent north-west from Newark-on-Trent. It stretches from Staythorpe in the south to the edge of The Beck valley (**Figure A11.3.6**). The zone is characterised by relatively low-lying

lands along the Trent, with elevation highs ranging from 13 m OD to 10 m OD. The zone is occupied by arable fields and pasture lands dissected by dykes flowing into the Trent.

80 The superficial geology is classified by the BGS as fine grained alluvium and Late Devensian sands and gravels of the HPSG, resting on Mercia Mudstone bedrock. The review of BGS archive boreholes form this zone (**Section A11.5.8**) confirmed the presence of thick deposits of the HSPG in 10 boreholes. In the southern part of GCZ 1, these sands and gravels reach up to of 8.2 m in thickness (SK75NE87, near South Muskham) decreasing towards the north to around to 2.30 m (SK76SE19, west of Cromwell). The reviewed logs imply two distinctive lithostratigraphic units within the formation. The lower is dominated by mainly coarse, rounded quartz and quartzite with sandstone and angular chert grading to clayey sandy gravels. In the upper parts the gravel seems to be finer and embedded with a medium sand. It is possible that the upper sands may be associated with the Holocene reworking (Hemington Gravel Member).

81 Around 1.7 m of oxidised alluvium was recorded in boreholes SK75NE87, SK75NE88 and SK75NE218 located south of Kelham. Although no organic sediments are noted in the archive logs, previous archaeological research confirmed peat presence within old channels of the Trent. At Staythorpe (Wessex Archaeology 2022) a palaeochannel filled with fine grained and waterlogged sediments was encountered. The palaeoenvironmental assessment of the plant material suggested that the upper fills have been deposited in the medieval to post-medieval period.

82 LiDAR combined with the palaeochannel database (Baker 2006) suggested point bars, levees and a number of palaeochannels running roughly parallel to the course of the Trent. The possible buried channels are mapped north to Staythorpe and Averham, south of Kelham, between Little Carlton and South Mushkam up to Bathley, Bracken Farm and west of Cromwell (**Figure A11.3.4** and **Figure A11.3.5**). The recent archaeological evaluation (phase 1) confirmed the presence of a palaeochannel in the area of Cromwell North (York Archaeological Trust 2025a).

83 Head and colluvium are not mapped by the BGS or recorded in archive boreholes, but archaeological excavation at Kelham (Knight et al 2007) demonstrated that they may be encountered. The possible areas would be north of Kelham and a section between Bathley and Moorfield Farm, within the escarpments and footslopes (**Figure A11.3.5** and **Figure A11.3.6**).

84 Coversands are not mapped by the BGS maps but excavations at Farndon Fields (Cooke and Mudd 2009) and Collingham (Knight et al 2007) demonstrated their presence above the Late Devensian gravels as well as the possibility of interstitial soils sealed by coversands. Therefore, any sandy deposit would have the potential to preserve Upper Palaeolithic sites.

A11.5.6.2.2 GCZ 2

85 This zone occupies an area on both sides of The Beck, the right tributary of the Trent, that flows on a roughly north-east/south-west alignment towards GCZ 8. The BGS maps the superficial deposit as alluvium. No boreholes were available from this zone and the closest borehole SK76SE1 (450 m outside the eastern boundary) shows c. 1.9 m of the HSPG gravels. BGS

boreholes near Sutton-on-Trent, SK76SE11, show the presence of 0.46 m of oxidised alluvium over 4.5 m of sandy gravel. Therefore, there is a limited potential for presence of Pleistocene fluvial deposits but Holocene alluvium and slope deposits flanking the edge of footslopes can be present.

86 LiDAR maps show that a part of The Beck has been canalised south of Willoughby Farm, and possible small meanders (oxbow) may be present there suggested by the LiDAR (**Figure A11.3.7**).

A11.5.6.2.3 GCZ 3

87 Adjected to GCZ 2 from the north is GCZ 3 which was separated based on a lack of superficial deposits mapped by BGS. Two sub-zones, GCZ 3a and GCZ 3b, were created based on the presence of superficial deposits.

88 GCZ 3 occupies higher grounds adjected to the Trent valley floor, ranging in elevation from 16m OD at the edge of the floodplain rising to 44 m OD towards west. The higher ground is dissected by a number of small dry valleys, possibly erosional gullies cut into the clayey bedrock. Some of the coombs may filled with slope deposit with potential to contain reworked archaeological material. The zone is occupied by arable fields and pasture lands.

89 Outcrops of coversands (Blown Sands) are mapped south of Sutton-on-Trent, just to the east of GCZ 3a. There are small dykes and streams flowing towards the Trent, some which are likely to be artificial and associated with water management in the historical period. Borehole SK76SE33 (at Ossington Farm near Norwell), suggests presence of 0.8m of clay implying potential of the streams to produce Holocene alluvium.

90 *GCZ_3a*

91 This sub-zone is located at the edge of the valley floor with superficial deposits mapped as alluvium overlying the HSPG. The closest boreholes SK76SE3 show up to 1.5 m of gravel deposits, and boreholes near Carlton-on-Trent, SK76SE16 and SK76SE18, noted c. 0.90 m of alluvium over c. 8.0 m of sands and gravel.

92 *GCZ 3b*

93 There is no available borehole data for GCZ 3b, but the BGS mapping shows alluvium along an unnamed dyke/ stream. BGS borehole SK76SE35, south of Willoughby Farm along Carlton Lane, show c. 2.0 m of clay that could be interpreted as alluvium or reworked clayey bedrock.

A11.5.6.2.4 GCZ 4

94 Located in the northern most part of the Order Limits, this zone was distinguished based on the presence of floodplain sediments associated with Moorhouse Beck and smaller unnamed streams and dykes (**Figure A11.3.9**). Moorhouse Beck is a north-south oriented tributary of Goosemoor Dyke that joints the Trent at Grassthrope. The stream valley floor lies at c. 23 m OD and the slopes adjected to the floodplain rise up to 32m OD.

95 The review of 14 archive borehole logs shows no evidence for alluvium but they were predominantly located within the upper slopes of the escarpments. Assessment of LiDAR data demonstrated a number of small erosional gullies

dissecting the slopes. These landforms may be filled with slope deposits containing reworked geoarchaeological material (**Figure A11.3.9**).

A11.5.6.2.5 GCZ 5

96 GCZ 5 occupies a c. 4.6 km long area in the western part of the Order Limits. The northern part of GCZ 5 is located above higher parts of the escarpments, elevated above 85 m OD. The plateau is covered by arable fields and woodlands west of Ossington. Moving to the south-west direction, the zone occupied a steep north-west facing slope along an unnamed stream. As shown by LiDAR, slopes flanking the valley are dissected by erosional gullies that have the potential to be filled with slope deposits and could contain reworked material from sites located upslope (**Figure A11.3.10**).

97 The southwest part of the zone is dissected by an unnamed stream flowing from Kneesall, through GCZ 5 then redirecting north-east to join Moorhouse Beck. No superficial deposits are mapped by the BGS, but fine-grained alluvium may be encountered along the streams.

98 Two boreholes SK76SW27 and SK76SW23, east of Ossington, were assessed but contained no superficial deposits suggesting a limited geoarchaeological potential in this zone.

A11.5.6.2.6 GCZ 6

99 This zone is identified based on the presence of Middle Pleistocene glacial deposits mapped by BGS. This zone occupies the summit of a ridge at 85 m OD, that separates two small stream valleys. This zone is covered by arable fields (**Figure A11.3.11**).

100 Borehole SK76SW26 suggests presence of around 20.0 m of glacial sediments described as `drift` deposits. The till and glaciofluvial sediments are of uncertain date and could have been deposited between MIS 12 to MIS 6.

A11.5.6.2.7 GCZ 7

101 GCZ 7 is separated from GCZ 8 by the small valley of an unnamed stream. This zone occupies plateaus of the escarpments located east of Kersall and north of Maplebeck. The ground levels range between 65 m to 71 m OD. The assessment of BGS records and LiDAR maps show no potential to contain any superficial deposits.

102 This zone may have an archaeological potential and Mesolithic flint tools, including bladelet and blades, are mapped at Caunton Common Farm (**Figure A11.3.12**).

A11.5.6.2.8 GCZ 8

103 This zone occupies the narrow north-west/south-east valley of The Beck, lying at 34 m OD and is covered by arable fields flanking the river (**Figure A11.3.13**).

104 Holocene alluvium is mapped by BGS along The Beck but assessment of borehole log SK766SW25 shows no evidence of alluivum. An additional review of borehole logs along the river indicated the presence of c. 2.10 m of

oxidised minerogenic alluvium with occasional gravel inclusion. A Lower-Middle Palaeolithic hand-axe was recorded at Caunton within this alluvial sequence, suggesting the possibility of Palaeolithic artefacts being reworked and redeposited along the course of The Beck.

A11.5.6.2.9 GCZ 9

105 This zone encompasses a c. 10 km long section covering escarpments located in the south-west part of the Order Limits. The south-east end of this zone is located adjected to GCZ 1, marking the edge of the floodplain north of Averham village. The elevation highs ranging between 50 m and 70 m OD. Artificial dykes and small valleys of unnamed streams dissected the escarpments.

106 No superficial deposits are mapped within the zone and a review of available borehole logs confirmed the lack of Quaternary deposits (**Figure A11.3.14**). Assessment of the LiDAR indicates the presence of erosional gullies and coombes cutting the slopes. These landforms may be associated with slope deposits, which, if present, have the potential to contain reworked archaeological material.

A11.5.7 ASSESSMENT OF GEOARCHAEOLOGICAL POTENTIAL

A11.5.7.1 INTRODUCTION

107 The Geoarchaeological Landscape Characterisation (GLC) has revealed the presence, or likely presence, of Quaternary deposits within the Order Limits and has enabled the division of the assessment area into nine Geoarchaeological Characterisation Zones (GCZs). Information provided by the Geoarchaeology Desk-based Assessment (GDBA) has allowed the archaeological potential of lithostratigraphic units in each GCZ to be assessed.

A11.5.7.2 ARCHAEOLOGICAL POTENTIAL

108 An archaeological potential rating has been assigned to the Quaternary deposits, representing a measure of probability. This has been determined via the application of professional judgement, informed by the evidence from the Site itself and equivalent deposits in the surrounding area. Potential to preserve significant paleoenvironmental remains and material suitable for scientific dating is included within this assessment. '*Potential'* is expressed on a four-point scale, assigned in accordance with the following criteria:

- **High** Situations where evidence is known or strongly suspected to be present within deposits and which are likely to be well preserved.
- **Moderate** Includes cases where there are grounds for believing that evidence may be present, but for which conclusive evidence is not currently available.
- **Low** Circumstances where the available information indicates that evidence is unlikely to be present, or that their state of preservation is liable to be severely compromised.
- **Unknown** Cases where currently available information does not provide sufficient evidence on which to provide an informed assessment with regard to the potential for material to be present.

109 In cases where moderate, high or unknown archaeological potential has been identified, further investigations would be required to an establish the likely significance of any archaeological remains or buried heritage resource. The archaeological and palaeoenvironmental potential of deposits in each GCZ is summarised in Table A11.3.5 and discussed below. The assessed superficial deposits can contribute to research aims stated by EERRF (2021), the possibility of contribution of each Quaternary deposit is discussed below.

Table A11.3.5 Archaeological and palaeoenvironmental potential

GCZ	Quaternary Deposits	Archaeological potential	Palaeoenvironmental potential of deposits
1	Colluvium	Low – Moderate	Low – Moderate
	Alluvium	High*	Moderate – High*
	Peat and organic rich alluvium	High	High
	Paleochannels	High*	High
	Head	Low – Moderate	Low
	Coversands	Low – Moderate	Low
	HSPG	Moderate – High*	Moderate to high*
2	Colluvium	Low – Moderate	Low – Moderate
	Alluvium	High*	Moderate – High*
	Peat and organic rich alluvium	High	High
	Head	Low – Moderate	Unknown
	HSPG	Moderate – High*	Moderate to high*
3	Colluvium	Low – Moderate	Low – Moderate
	Alluvium	High*	Moderate – High*
	Peat and organic rich alluvium	High	High
	Coversands	Low	Low
	Head	Low – Moderate	Unknown
	HSPG	Moderate – High*	Moderate to high*
4	Colluvium (limited)	Low	Low – Moderate
	Alluvium	Moderate – High*	Moderate – High*
	Peat and organic rich alluvium	High	High
	Paleochannels	High*	Moderate – High*
	Head	Low	Unknown
5	No superficial	Unknown	Unknown

GCZ	Quaternary Deposits	Archaeological potential	Palaeoenvironmental potential of deposits
	(Possibly of limited Alluvium and Slope Deposits)		
6	Till Glaciofluvial	Low - Moderate Low - Moderate	Low Low
7	No Superficial	Unknown	Unknown
8	Alluvium (limited Possibility of Slope Deposits)	Low – High* Unknown	Low – High* Unknown
9	No superficial (Possibly of limited Alluvium and Slope Deposits)	Unknown	Unknown

*may contain organic-rich or peat units of high archaeological and palaeoenvironmental potential
** if Palaeolithic and datable units will be present.

A11.5.7.3 KEY AREAS OF PLEISTOCENE POTENTIAL

A11.5.7.3.1 Till and glaciofluvial deposits

110 Till and Glaciofluvial deposits recorded in GCZ 6 are cold stage sediments that can contain reworked Palaeolithic artefacts. Understanding the age of till and glaciofluvial deposits is critical to determining the potential of associated deposits to produce Palaeolithic archaeology and palaeoenvironmental remains. It would be essential to establish the geoarchaeological potential of these deposits within the Order Limits and their relationship to glaciation dynamics within the Lower Trent Valley.

A11.5.7.3.2 Holme Pierrepont Sands and Gravels

111 The HPSG sands and gravels deposits will be present in GCZ 1 and may be present in GCZ 2 and GCZ 3. Deposits of the HPSG have a moderate to high geoarchaeological potential and may contain Lower and Middle Palaeolithic archaeology reworked from earlier deposits, whilst channels at the base of the sands and gravels have been shown to contain organic material preserving a wide range of paleoenvironmental evidence (Howard et al 2011).

A11.5.7.3.3 Coversands

112 Coversands may be present within the Order Limits, possibly in GCZ 3 and in the southern part of GCZ 1. Although they have a low archaeological potential, their presence may inform us about changes in the local landscape during the Late Pleistocene / Early Holocene.

113 Furthermore, at Farndon Files, the Late Devensian sands and gravels were covered by coversands which also sealed interstadial soil (Cooke and Mudd 2009). Therefore, these deposits have potential to seal important archaeological horizons and contribute to understanding changes in the Late Pleistocene / Early Holocene landscape.

A11.5.7.3.4 Head deposits

114 Not recorded by BGS in any of the GCZs but may be present as fills of erosional gullies, coombs and/or deposited in the area of footslopes of escarpments. Head deposits have little direct geoarchaeological potential but may seal underlying stratigraphy containing Palaeolithic archaeology and environmental remains.

A11.5.7.4 KEY AREAS OF HOLOCENE POTENTIAL

A11.5.7.4.1 Alluvium, peat and rich organic sediments

115 Holocene Alluvium is present in GCZ 1, GCZ 2, GCZ 3b, GCZ 4 and GCZ 8. Where the alluvium is composed of minerogenic sediments (e.g. sands, silts and clays) it likely formed away from dryland areas in an active floodplain environment and is therefore considered to have limited archaeological potential. The palaeoenvironmental potential of such minerogenic sediments is similarly limited, although they may contain remains of diatoms, ostracods and foraminifera that are important proxies for reconstructing changing conditions from freshwater to brackish water environments associated with changing hydrological conditions.

116 Where peat and rich organic sediments are preserved along the route and within the alluvial sediments, they will be of a high geoarchaeological potential. Peat deposits may form a component of Holocene alluvial sequences preserved within river valleys or preserved as discrete landform deposits (e.g. palaeochannels). However, mapping by the BGS is unlikely to fully resolve peat deposits within river valleys where they may simply be classified as alluvium.

117 Alluvium can mask archaeological sites and contain reworked archaeological material. Understanding the occurrence of archaeological sites along the floodplain will contribute to understanding the distribution of Prehistoric sites along the Trent. Furthermore, onset of alluviation is often linked with soil erosion caused by woodland clearance, therefore dating of the alluvial sequences will help to evaluate the impact of landscape management on the past environment.

A11.5.7.4.2 Palaeochannels

118 A complex network of palaeochannels is mapped in GCZ 1 (**Figure A11.3.4**). Previous archaeological work demonstrated that they can be filled by alluvium interbedded with organic sediments. The mapped palaeochannels, but also artificial dykes and ditches filled with organic sediments may be essential to provide data (i.e. pollen and mollusc) regarding changes in vegetation caused by past landscape management and land-use practices. For instance, palaeochannels at Staythorpe contained peat dated to 5300-4860 cal BC. Furthermore, pollen derived from

the upper fills of these palaeochannels produced evidence for woodland clearance and a transition to an open, increasingly agricultural landscape during the Early Bronze Age period, c. 1740-1520 cal BC (Knight et al 2007).

A11.5.7.4.3 Colluvium

119 There is a possibility to encounter slope deposits across the GCZs. Although archaeological and palaeoenvironmental material recovered from colluvium will be redeposited they can preserve a range of palaeoenvironmental data important for understanding vegetation, climate and environmental dynamics and change during Holocene. The Holocene colluvium also inform about landscape management (i.e. woodland clearance) and can also mask archaeological features.

A11.5.7.5 CONTRIBUTION OF THE GDBA TO THE SPECIFIC REGIONAL AGENDAS AND AIMS

120 A series of EERRF (2021) specific objectives relevant to this GDBA were highlighted in **Section 2.3** and summarised in Table A11.3.6. At this stage the GDBA is best placed to highlight key deposit types and locations where these specific objectives have the most potential to be realised during future works. Whilst we cannot provide definitive answers to these specific objectives at this stage, the results of the GDBA do help to direct the course of future research with respect to each location.

121 The till, glaciofluvial, coversands and the HPSG have the highest potential to address research agendas related to the changing Pleistocene environment of the East Midlands and the Lower Trent in particular (**Research Agenda 1G**). And the highest potential to record these sediments are within GCZ 1, GZC3 a and GCZ 3. Additionally, any organic deposits within the HPSG will provide us with a range of paleoenvironmental proxies to contribute to **Research Aim 1.5.2**.

122 The Holocene deposits, including fills of paleochannels, have the highest potential for producing deposits and archaeology concerned with specific objectives focused on aspects of the settlement and environment of the later prehistoric and historic period (**Research Aims/Agendas: 2.2.2**, **2.6.2**, **3E**, **3.4.2**, **4.8.1**).

Table A11.3.6 Summary of Quaternary sediments that can contribute to agendas and aims stated in EERRF (2021)

Research Agenda/ Question	Superficial deposits						
	Till/ Glaciofluvial	Head	The HPSG	Coversands	Alluvium	Peat	Colluvium
1G: Elucidate from terrestrial sources the changing Pleistocene environment of the East Midlands.	✓	✓	✓	✓			
1.5.2: How many studies of fauna, pollen and other organic material from palaeochannels, caves, terrace sediments and other deposits refine our understanding of the evolving environment, and how may this have varied spatially (Pleistocene)			✓				
2.2.2: How were sites distributed across low-lying and upland areas, and in particular how many sites might be concealed beneath alluvium, colluvium and other masking deposits or beneath the sea?				✓	✓		✓
2.6.2: How can we maximise the potential of palaeochannels, upland or coastal peats and other					✓	✓	

Research Agenda/ Question	Superficial deposits						
	Till/ Glaciofluvial	Head	The HPSG	Coversands	Alluvium	Peat	Colluvium
organically rich deposits as sources of data on Early Holocene landscapes and changes in subsistence strategies and diet?							
3E: Target sites with Late Mesolithic and Early Neolithic organic remains.					✓	✓	
3.4.2: Can we identify locations with a high potential for elucidating variations in arable, pasture and woodland cover between ecological zones (e.g. palaeochannels; upland peats)?					✓	✓	✓
4.8.1: Can we chart more closely the processes of woodland clearance and agricultural intensification, their impact upon alluviation and colluviation, and variations between different areas?					✓		✓

A11.5.8 RECOMMENDATIONS FOR FURTHER GEOARCHAEOLOGICAL INVESTIGATIONS

A11.5.8.1 INTRODUCTION

123 Through a review of available BGS mapping of superficial deposits, archive borehole data, LiDAR and the palaeochannels database the GDBA has assessed the possible presence, lateral and horizontal extent of Quaternary deposits and landforms across the Development. The archaeological and paleoenvironmental potential of these deposits has been assessed, and the significance of any archaeological material they may contain considered in relation to national and regional research themes and priorities (English Heritage 2008; EERRF 2021).

124 Data coverage within the Development varied, with only 34 archive boreholes located within the Order Limits boundary. The assessment of the available data does however provide a preliminary interpretation of the possible presence and distribution of Quaternary deposits across the extent of the Order Limits. The palaeochannel database (Baker 2006) and LiDAR images worked to provide a valuable insight into palaeochannel distribution, especially for GCZ 1. Channel features suggested by LiDAR overlapped well with Baker (2006) database for the majority of the floodplain area. Additionally, recent archaeological evaluation (Wessex Archaeology 2022, York Archaeological Trust 2025a, 2025b) confirmed the presence of these palaeochannels and preservation of organic fills inside these landforms.

125 The GDBA and GLC have identified areas, based on current evidence, where Quaternary deposits may be present and which could contain archaeological evidence and/or deposits with palaeoenvironmental potential, as well as some areas where there is insufficient data to consider potential. These data provide a basis for suggestions for further geoarchaeological investigations.

A11.5.8.2 PROPOSED RECOMMENDATIONS FOR FURTHER GEOARCHAEOLOGICAL INVESTIGATIONS

126 Based on variations in geological characteristics of the deposits present, linked to the assessment of the archaeological and geoarchaeological potential of any Quaternary deposits, the Order Limits has been divided into nine GCZs specific to the Development. Further evaluations of the Quaternary sediments and landforms will help to address specific research agendas and aims proposed by EERRF (2021, see Table A11.3.6).

127 Suggestions are made here towards a broad strategy for investigating areas of geoarchaeological potential, primarily for GCZ 1, GCZ2, GCZ3b, GCZ 4, GCZ 6 and GCZ 8. The most appropriate method of evaluating Quaternary deposits is through monitoring of any ground investigation works (GI) should they be required as part of the Development. The GI monitoring would allow creation of preliminary deposit modelling for each of these areas and presents further targeted assessment by purposive geoarchaeological boreholes, test pitting and geoarchaeological trenching which may be required in any areas in order to offset any impacts of the proposed Development .

128 In zones: GCZ 5, GCZ 7, GCZ 9, the extent of survival of any Quaternary deposits is currently unknown. Review of GI logs would be a minimum requirement to assess presence of Quaternary deposits and determine their significance. Assessment of any Holocene deposit during forthcoming archaeological evaluations would be also a suitable method of evaluation to assess the extent of survival of Quaternary sediments and to assess their archaeological and geoarchaeological potential.

A11.5.9 REVIEWED DATA

A11.5.9.1 SUMMARY OF REVIEWED BGS BOREHOLE LOGS

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
GCZ 1	SK76SE26	478866	361646	9.51	10	Holme Pierrepont Sand and Gravel Member	9.51 m OD
	SK76SE19	479307	361569	-	9.6	Holme Pierrepont Sand and Gravel Member (c. 2.30m)	0.3 m bgl
	SK76SE17	479481	360645	11.3	4.26	Holme Pierrepont Sand and Gravel Member (2.45 m)	11.0 m OD (0.32 m bgl
	SK76SE20	478620	360340	-	9.5	Holme Pierrepont Sand and Gravel Member (2.40m)	0.4 m bgl
	SK75NE76	478070	359720	13.1	6.0	Holme Pierrepont Sand and Gravel	12.7 m OD (0.4 m bgl)

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
						Member (4.20m)	
	SK75NE77	479170	359620	-	8.0	-	-
	SK75NE79	478300	358500	11.9	7.0	Holme Pierrepont Sand and Gravel Member (5.0 m)	11.5 m OD (0.2 m bgl)
	SK75NE81	479040	357900	11.9	7.0	Holme Pierrepont Sand and Gravel Member (5.40m)	11.6 m OD (0.3 m bgl)
	SK75NE82	478060	357650	12.2	7.5	Holme Pierrepont Sand and Gravel Member (6.40m)	11.9 m OD (0.3 m bgl)
	SK75NE83	477510	357200	12.0	10.00	? Sandy Alluvium (1.80m) Holme Pierrepont Sand and Gravel Member (5.00m)	11.20 m OD (0.8 m bgl)
	SK75NE84	478030	356630	13.4	9.0	Holme Pierrepont Sand and Gravel Member (7.00m)	13.10 m OD (0.3 m bgl)
	SK75NE189	477510	356350	-	6.1	None	-

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
	SK75NE188	476930	356470	-	6.1	None	-
	SK75NE86	477780	355870	-	7.8	Alluvium / Silt (1.80m) Holme Pierrepont Sand and Gravel Member (5.10m)	0.0 m bgl
	SK75NE87	476950	355930	-	9.0	Alluvium (0.70m) Holme Pierrepont Sand and Gravel Member (2.90m)	0.2 m bgl
	SK75NE88	476120	355470	11.9	9.5	Alluvium (1.70m) Holme Pierrepont Sand and Gravel Member (8.20m)	13.1 m OD (0.0 m bgl)
	SK75NE218	475941	355276	-	9.0	Alluvium (1.00m) Holme Pierrepont Sand and Gravel Member (9.00m)	1.0 m bgl

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
GCZ 2	SK76SE11	479959	362842	27.94	9.14	Alluvium (0.49m) Holme Pierrepont Sand and Gravel Member (c. 4.50m)	27. 36 m OD (0.48 m bgl)
	SK76SE12	479962	362814	27.03	9.14	Alluvium (1.31m), Peaty sand (2.10m) Holme Pierrepont Sand and Gravel Member (2.4m)	26.73 m OD (0.3m bgl)
	SK76SE1	479491	362484	1.12	10	Holme Pierrepont Sand and Gravel Member (1.9m)	0.3 m bgl
GCZ 3	**SK76SE35**	478140	362630	-	33	? Clay	0.4 m bgl
	SK76SE22	478520	362937	14.55	825	None	-
	SK76SE33	477010	362630	-	30	? Clay (0.80m)	0.6 m bgl
	SK76SE25	478421	364578	49.45	844	None	-
	SK76NE74	476749	366075	38.46	863	None	
GCZ 3a	SK76SE3	479126	363772	1.22	1026	? Gravel (1.5m)	1.22 m OD

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
	SK76SE16	479561	363418	-	6.1	Holme Pierrepont Sand and Gravel Member (2.7m)	0.3m bgl
	SK76SE18	479425	363554	-	9.5	Alluvium (0.0.89m) Holme Pierrepont Sand and Gravel Member c. 8.1m	0.27 m bgl
GCZ 4	SK76NE36	476051	367182	-	1086	None	
	SK76NE39	475888	367657	23.3	1028	? Holme Pierrepont Sand and Gravel Member (9.0m)	23.0 m OD
	SK76NE14	475581	367605	-	1122	None	
	SK76NE26	475375	367555	-	1018	None	
	SK76NE40	476303	367611	-	1002	None	
	SK76NE8	476674	367392	-	1062	None	
	SK76NE15	475765	368206	-	1059	None	
	SK76NE73	475759	368224	-	2162	None	
	SK76NE6	475408	368131	-	1022	None	
	SK76NE81	475400	368200	-	?	None	
	SK76NE27	475068	368071	-	1061	None	
	SK76NE38	475165	367894	-	1071	None	
	SK76NE9	475112	367698	-	1142	None	

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
	SK76NE26	475375	367555	-	1018	None	
GCZ 5	SK76SW27	474893	364638	47.8	870	None	
	SK76SW23	473457	364527	-	848	None	
GCZ 6	SK76SW26	471801	362676	85.0	782	Glaciofluvial	85.07 m OD
GCZ 7	SK76SW31	473800	361900	-	168	None	
	SK76SW16	473428	361239	-	454	None	
	SK76SW15	473943	361197	49.0	449	None	
	SK76SW12	473646	360807	57.0	733	None	
	SK76SW1	473798	360555	-	818	None	
GCZ 8	SK76SW25	471569	360665	41.4	697	None	
	SK76SW8	473515	360313	30.0	768	None	
	SK76SW14	473355	360200	34.0	715	None	
	SK76SW13	473639	360334	30.0	684	None	
	SK76SW3	473709	360215	30.0	687	None	
	SK76SW47	473900	360200	34.3	6.1	? Alluvium (2.10m)	34.10 m OD (0.2 m bgl)
	SK76SW46	473900	360150	32.4	6.5	? Alluvium (2.10m)	34.20 m OD (0.2 m bgl)
GCZ 9	SK76SW22	470044	362233	43.5	698	None	
	SK66SE133	469290	362346	54.3	652	None	
	SK66SE117	469951	360911	79.7	671	None	
	SK76SW21	470529	360102	83.2	?	None	
	SK75NW10	473239	358005	56.9	763	None	
	SK75NW12	474287	358428	53.0	768	None	
	SK75NE185	475170	356800	60.1	39.32	None	

Geoarchaeological Landscape Zone (GCZ)	Borehole	Easting	Northing	High (m OD)	Depth	Superficial Deposit	Depth of Superficial
	SK75NE69	475175	356814	60.1	37.8	None	

A11.5.9.2 ARCHAEOLOGICAL GAZETTEER

HER ID	PAS ID	TERPS ID	PaMELA ID	Name	Description	Period	Easting	Northing
		23572		Caunton, no specific provenance	Hand-axe	Lower-Middle Palaeolithic	474500	360000
		23568		Coddington, no specific provenance	Hand-axe	Lower-Middle Palaeolithic	483500	354500
		25023		Norton Bottoms Pit of C and G Concrete Ltd.	Hand-axe	Lower-Middle Palaeolithic	486600	358900
			5627	Caunton	Retouched Tool	Mesolithic	473200	361900
			5627	Caunton	Debitage	Mesolithic	473200	361900
			5627	Caunton	Retouched Tool	Mesolithic	473200	361900
			5664	Girton Quarry	Retouched Tool	Early Mesolithic	481440	362720
			5664	Girton Quarry	?	Later Prehistoric	481440	362720
			5631	Collingham	Microlith	Early Mesolithic	481500	361900
			5702	Langford Moors	Axe/Adze	?	483600	356300
			5940	Winthorpe (Aerodrome Farm)	Tranchet Axe/Adze	Early Mesolithic	482100	356100
			5887	Stanley Terrace	Retouched Tool	?	480800	354500
			786	Farndon Fields	Flint tools	Late Upper Palaeolithic	478050	352200

HER ID	PAS ID	TERPS ID	PaMELA ID	Name	Description	Period	Easting	Northing
			4432	Farndon Fields	Flint tools	?	478050	352200
			5756	Farndon (near)	Debitage	?	477900	351900
	LVPL-6468B2			Norton Disney	Hand-axe	Lower Palaeolithic	486000	358998
	LIN-D3C064			Langford	Hand-axe	Middle Palaeolithic	483000	355998
	LIN-6118B4			Farndon	Flake / blade	Possible Upper Palaeolithic	477000	350998

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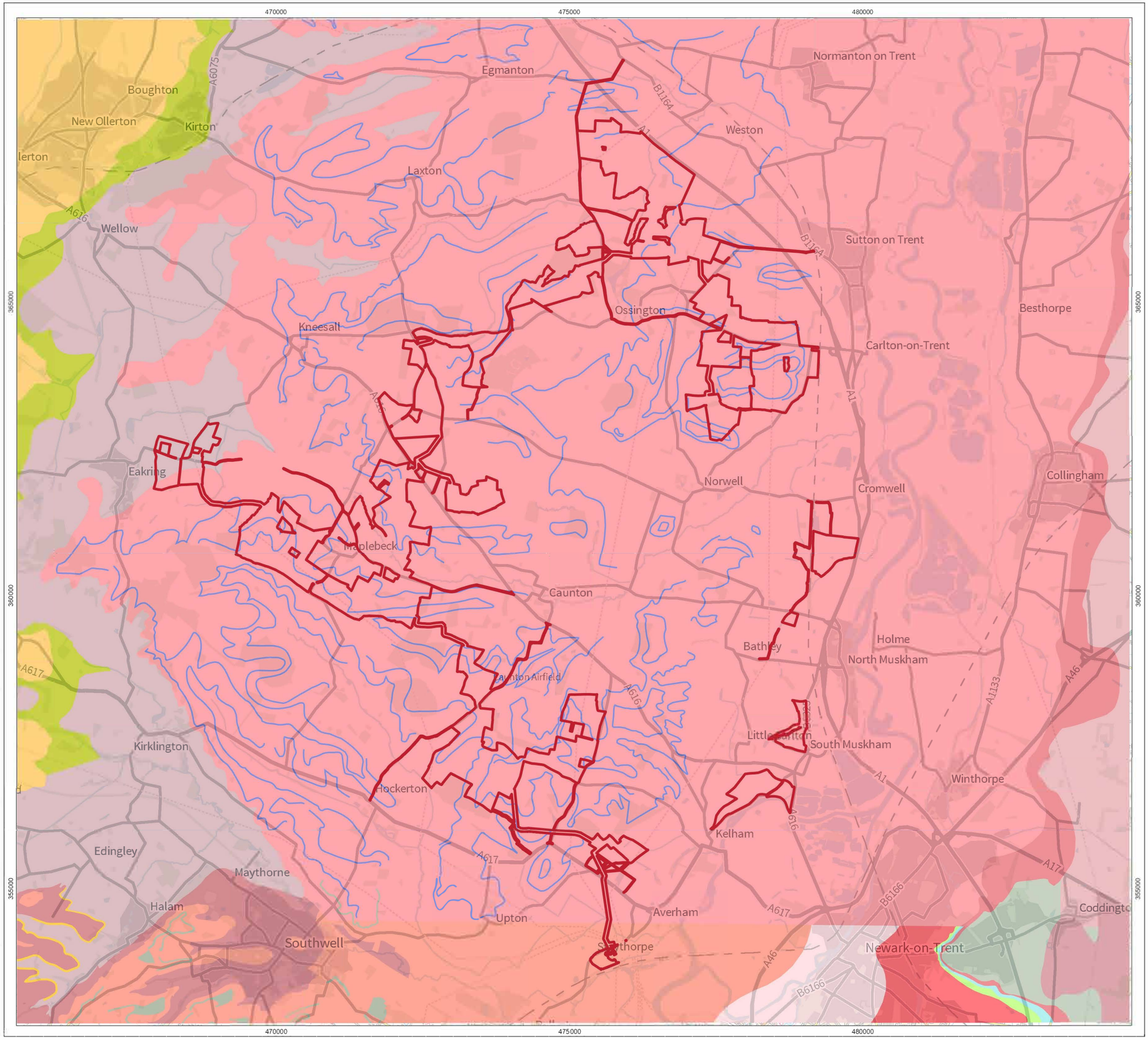
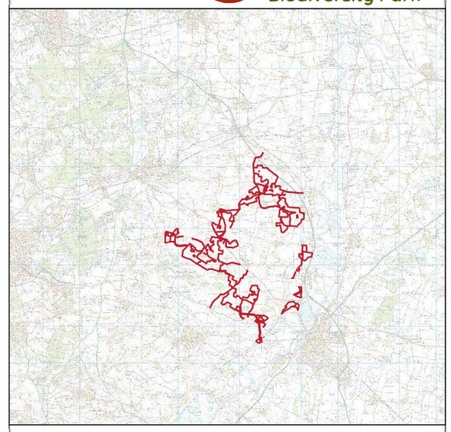
179 White, T.S. and White, M.J. 2007 Lower and Middle Palaeolithic Archaeology of the Trent Valley. In: White (eds) The Quaternary of the Trent Valley and Adjoining Regions. Filed Guide. Quaternary Research Association, London. pp.72-80.



Solar & Biodiversity Park



- Order Limits

BGS bedrock geology

- Mercia mudstone group - Mudstone
- Tapporley siltsone formation - Siltsone, Mudstone and Sandstone
- Retford member - Mudstone
- Chester formation - Sandstone, Pebbly (Gravelly)
- Radcliffe member - Mudstone and Siltstone
- Gunthorpe member - Mudstone
- Edwalton member - Mudstone
- Branscombe mudstone formation - Mudstone
- Westbury formation - Mudstone
- Barnstone member - Mudsstone and Limestone interbedded
- Blue anchor formation - Mudstone
- Cotham member - Mudstone
- Barnby member - Mudstone

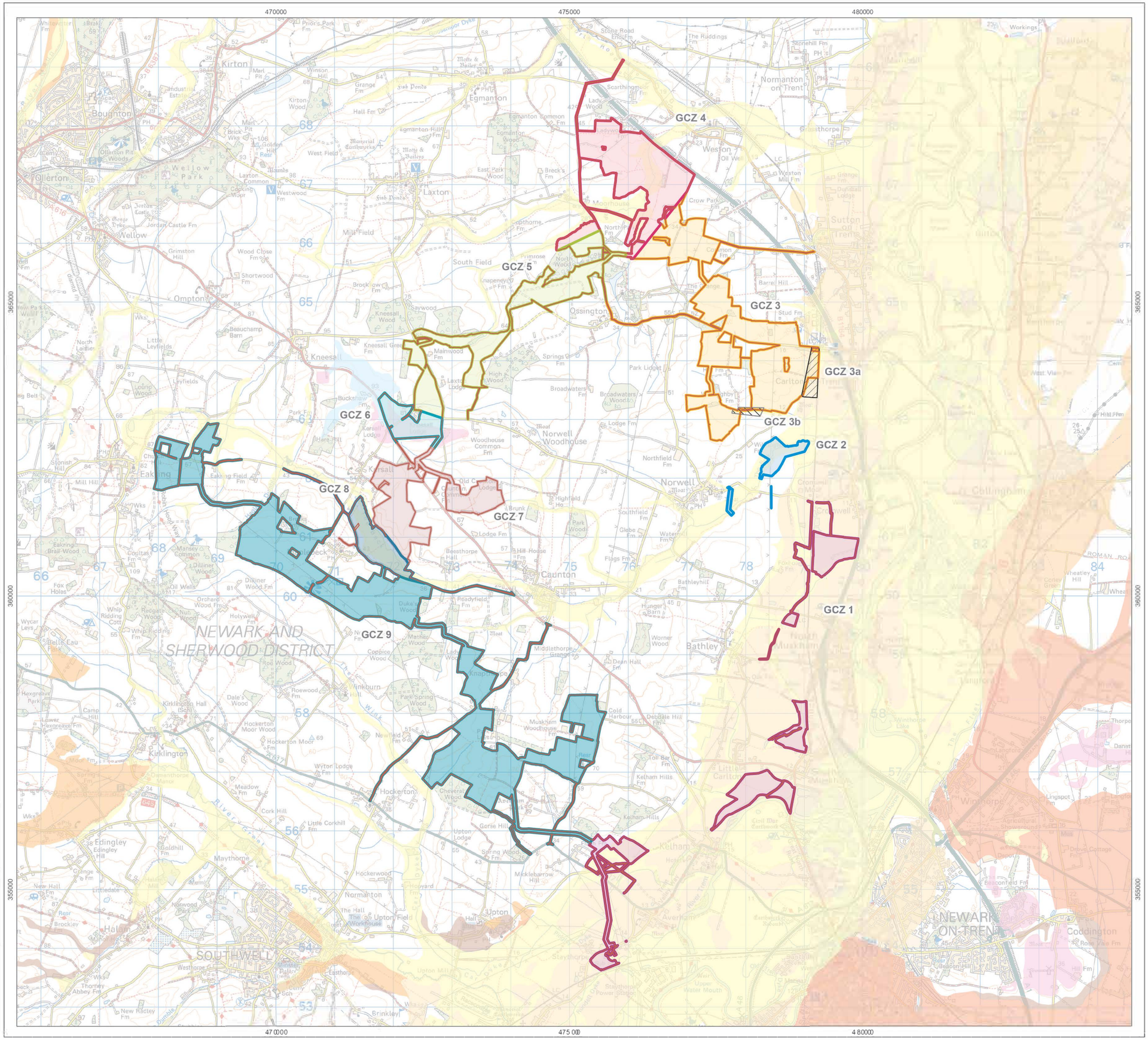
1:62,500 Scale @ A3

0 0.75 1.5 3 km

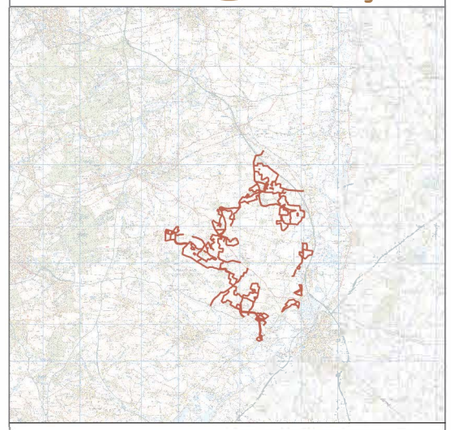
Ref: 276500-GDBA1	Date: 26/06/2025

Site location and BGS bedrock geology: Figure A11.3.1

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



Order Limits

GCZ

- GCZ 1
- GCZ 2
- GCZ 3
- GCZ 3A
- GCZ 3B
- GCZ 4
- GCZ 5
- GCZ 6
- GCZ 7
- GCZ 8
- GCZ 9

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

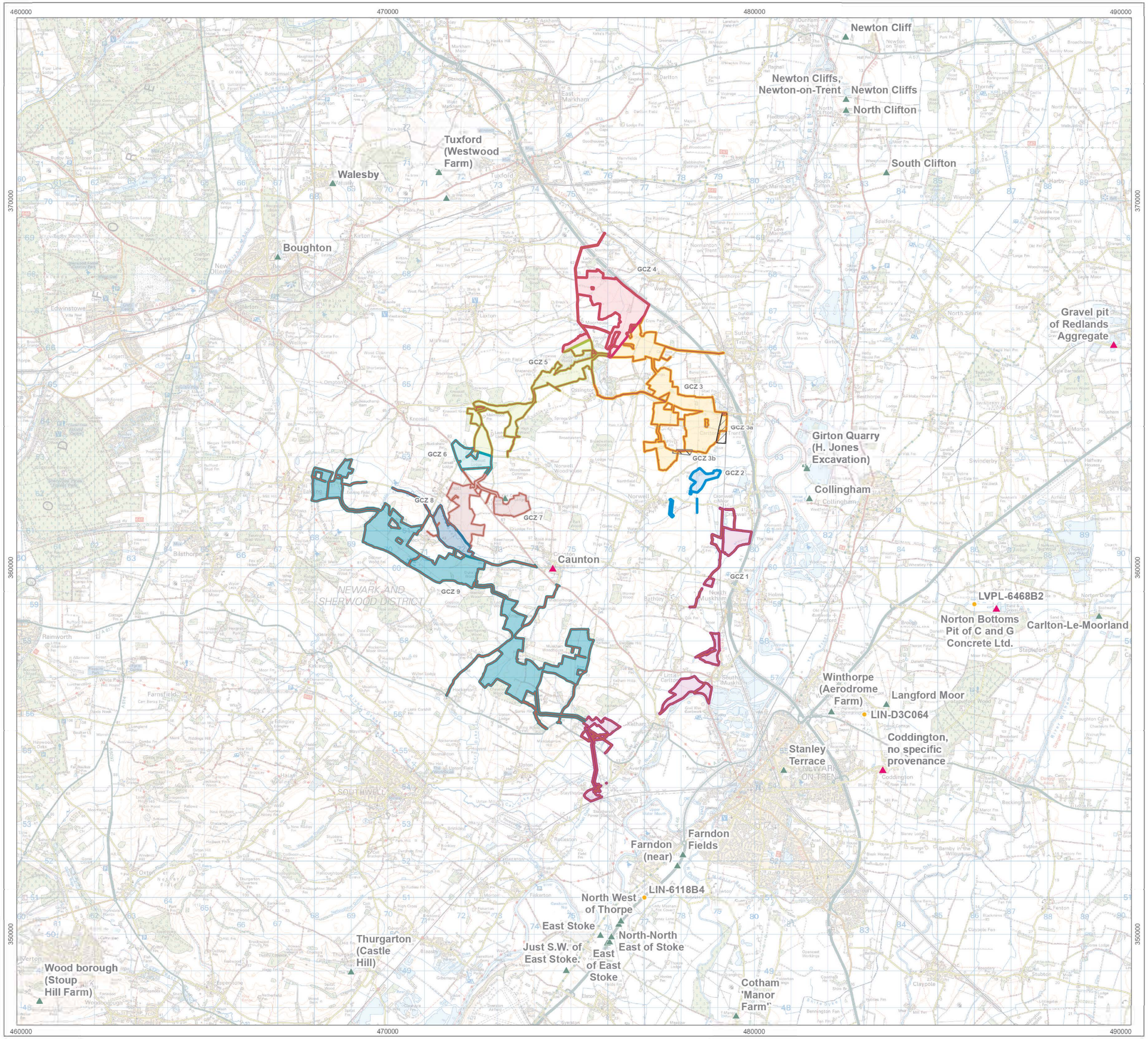
1:62,500 Scale @ A3

0 0.75 1.5 3 km

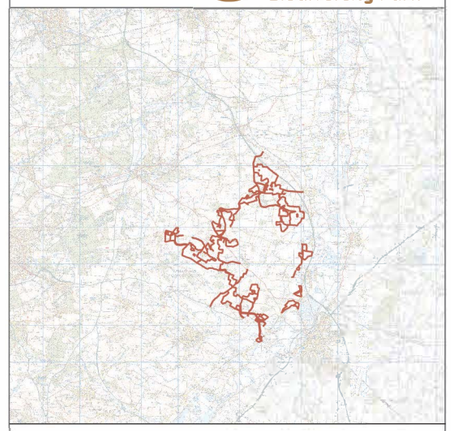
Ref: 276500-GDBA2	Date: 26/06/2025

Site location and BGS superficial geology: Figure A11.3.2

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



- Order Limits
- TERPS
- PaMELA
- PAS Palaeolithic findspots

GCZ

- GCZ 1
- GCZ 2
- GCZ 3
- GCZ 3A
- GCZ 3B
- GCZ 4
- GCZ 5
- GCZ 6
- GCZ 7
- GCZ 8
- GCZ 9

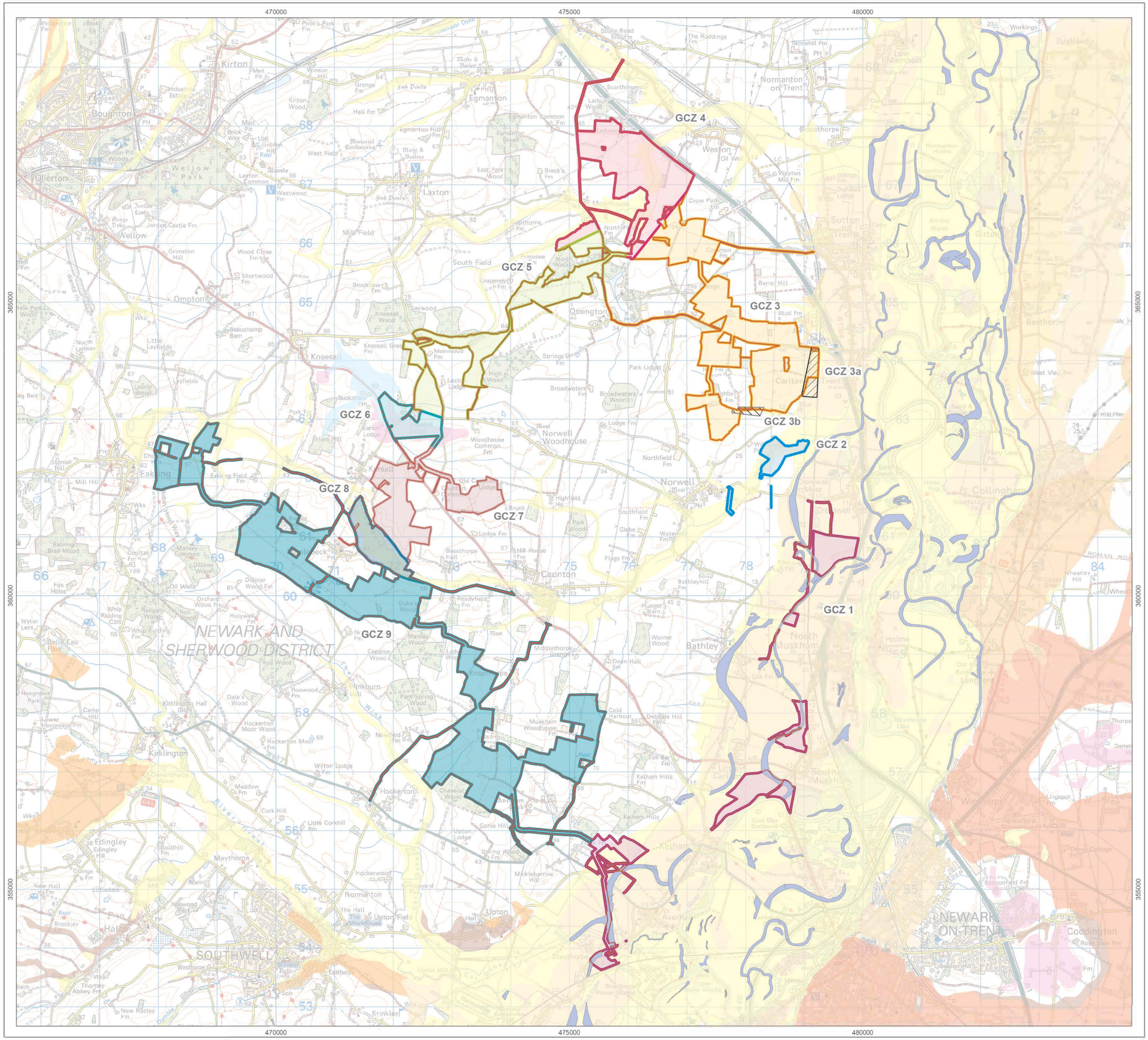
1:100,000 Scale @ A3

0 1.25 2.5 5 km

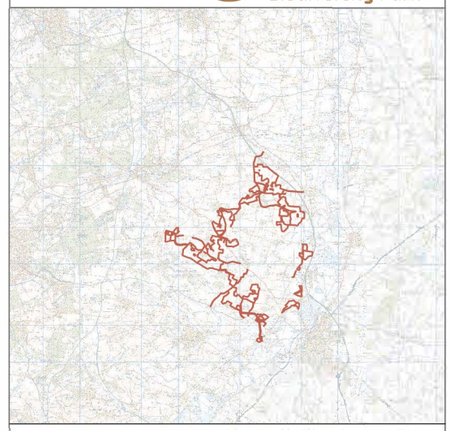
Ref: 276500-GDBA3	Date: 26/06/2025

Palaeolithic and Mesolithic findspots: Figure A11.3.3

Great North Road Solar and Biodiversity Park Preliminary Environmental Information Report



Solar & Biodiversity Park



Order Limits
Palaeochannel

GCZ
- GCZ 1
- GCZ 2
- GCZ 3
- GCZ 3A
- GCZ 3B
- GCZ 4
- GCZ 5
- GCZ 6
- GCZ 7
- GCZ 8
- GCZ 9

BGS superficial deposits
- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

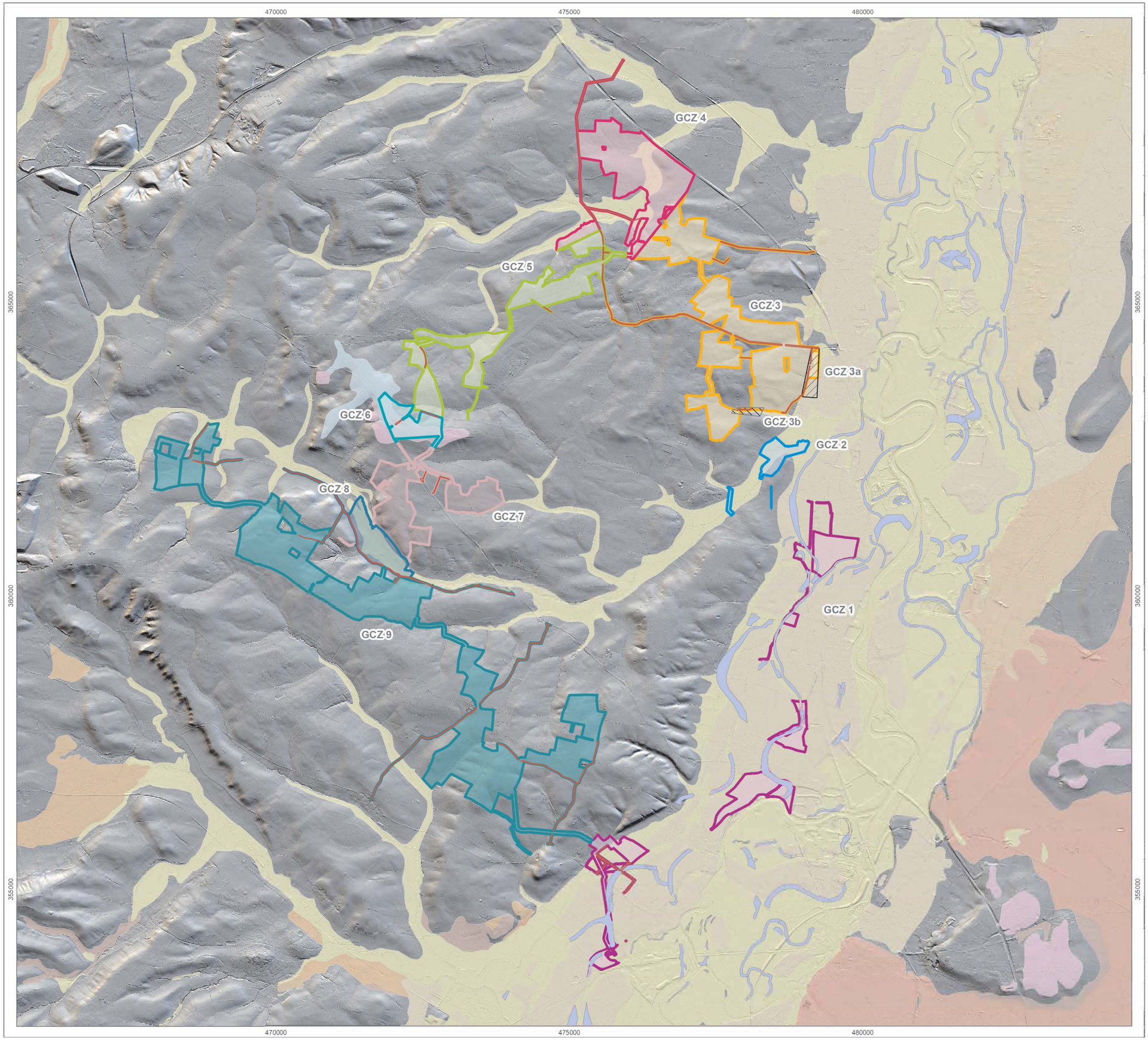
1:62,500 Scale @ A3

0 0.75 1.5 3 km

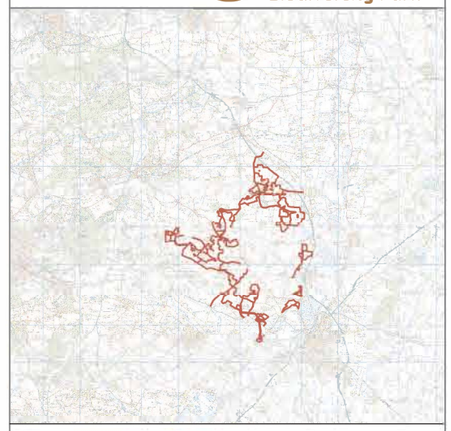
Ref: 276500-GDBA4	Date: 26/06/2025

Palaeochannels location (Baker 2006): Figure A11.3.4

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



Order Limits
Palaeochannel

GCZ
- GCZ 1
- GCZ 2
- GCZ 3
- GCZ 3A
- GCZ 3B
- GCZ 4
- GCZ 5
- GCZ 6
- GCZ 7
- GCZ 8
- GCZ 9

BGS superficial deposits
- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

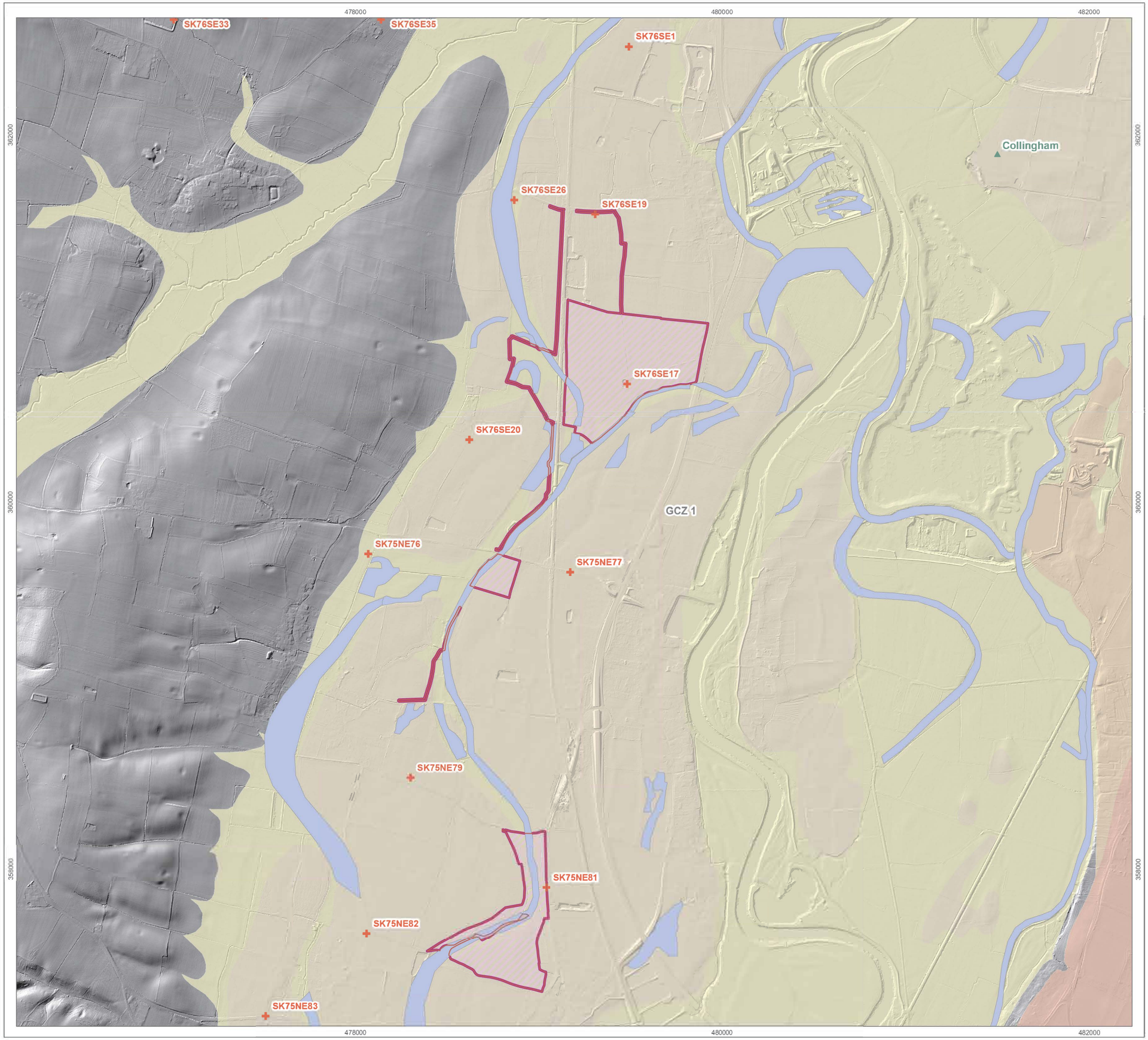
1:62,500 Scale @ A3

0 0.75 1.5 3 km

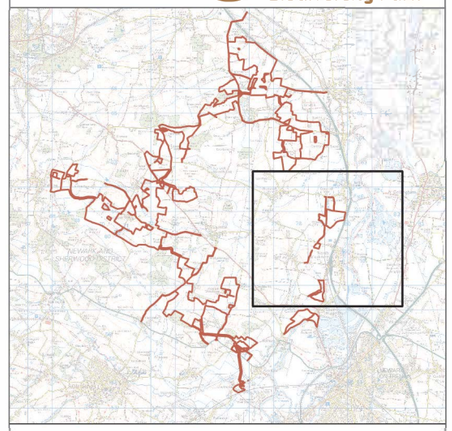
Ref: 276500-GDBA5	Date: 26/06/2025

LiDAR data and palaeochannels (Baker 2006): Figure A11.3.5

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



- Order Limits
- Palaeochannel
- PaMELA
- Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

- GCZ 1

1:20,000 Scale @ A3

0 0.25 0.5 1 km

Ref: 276500-GDBA6a	Date: 26/06/2025

Geoarchaeological Character Zone 1: Figure A11.3.6a

Great North Road Solar and Biodiversity Park Environmental Statement

475000

480000

355000

SK75NE79

SK75NE81

SK75NE82

GCZ 1

SK75NE83

SK75NE69

SK75NE185

SK75NE84

SK75NE188

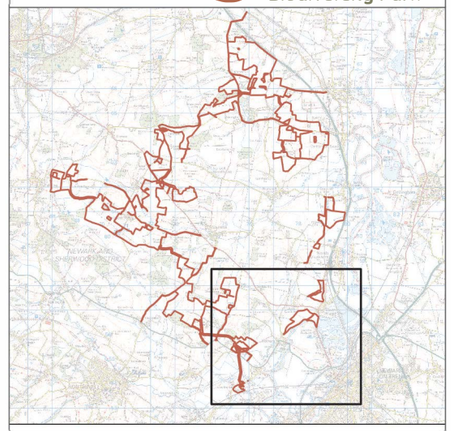
SK75NE189

SK75NE87

SK75NE86

SK75NE88

SK75NE218



Solar & Biodiversity Park

Order Limits

Palaeochannel

Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

GCZ 1

1:20,000 Scale @ A3

0 0.25 0.5 1 km

Ref: 276500-GDBA6b	Date: 26/06/2025

Geoarchaeological Character Zone 1: Figure A11.3.6b

Great North Road Solar and Biodiversity Park Environmental Statement

478000

480000

362000

SK76SE18

SK76SE16

SK76SE22

SK76SE11

SK76SE12

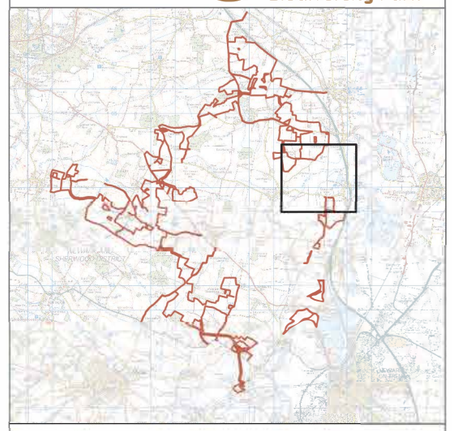
SK76SE35

GCZ 2

SK76SE1

SK76SE26

SK76SE19



Order Limits

Palaeochannel

Borehole

BGS superficial deposits

Alluvium - Clay, Silt, Sand and Gravel

Holme pierrepont sand and gravel member - Sand and Gravel

Scarle sand and gravel member - Sand and Gravel

River terrace deposits - Sand and Gravel

Balderton sand and gravel member - Sand and Gravel

Eagle moor sand and gravel member - Sand and Gravel

Till, mid pleistocene - Diamicton

GCZ

GCZ 2

1:10,000 Scale @ A3

0 0.13 0.25 0.5 km

Ref: 276500-GDBA7

Date: 26/06/2025

Geoarchaeological Character Zone 2: Figure A11.3.7

Great North Road Solar and Biodiversity Park Environmental Statement

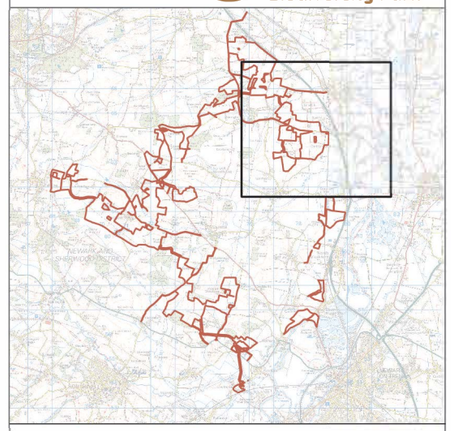
476000
478000
480000
366000
364000
362000

GCZ 5
GCZ 3
GCZ 3a
GCZ 3b

SK76NE74
SK76SE25
SK76SE3
SK76SE18
SK76SE16
SK76SE22
SK76SE11
SK76SE12
SK76SE33
SK76SE35
SK76SE1
SK76SE26

Girton Quarry (H. Jones Excavation)
Collingham

Solar & Biodiversity Park



Order Limits
Palaeochannel
PaMELA
Borehole

BGS superficial deposits
- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ
- GCZ 3
- GCZ 3A
- GCZ 3B

1:20,000 Scale @ A3

0 0.25 0.5 1 km

Ref: 276500-GDBA8 | Date: 26/06/2025

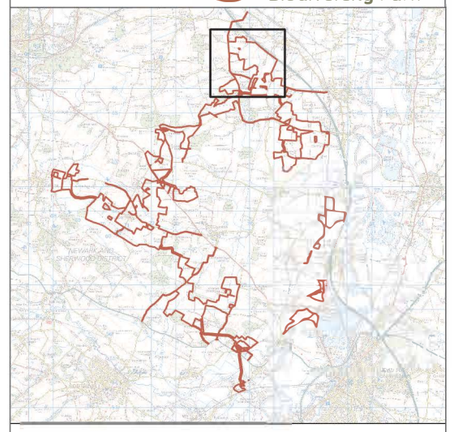
Geoarchaeological Character Zone 3: Figure A11.3.8

Great North Road Solar and Biodiversity Park Environmental Statement

475000
476000
477000
368000
367000
366000

SK76NE81
SK76NE73
SK76NE15
SK76NE6
SK76NE27
SK76NE38
SK76NE9
SK76NE39
SK76NE14
SK76NE40
SK76NE26
SK76NE26
SK76NE8
GCZ 4
SK76NE36
SK76NE74

Solar & Biodiversity Park



Order Limits
Borehole

BGS superficial deposits
- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ
- GCZ 4

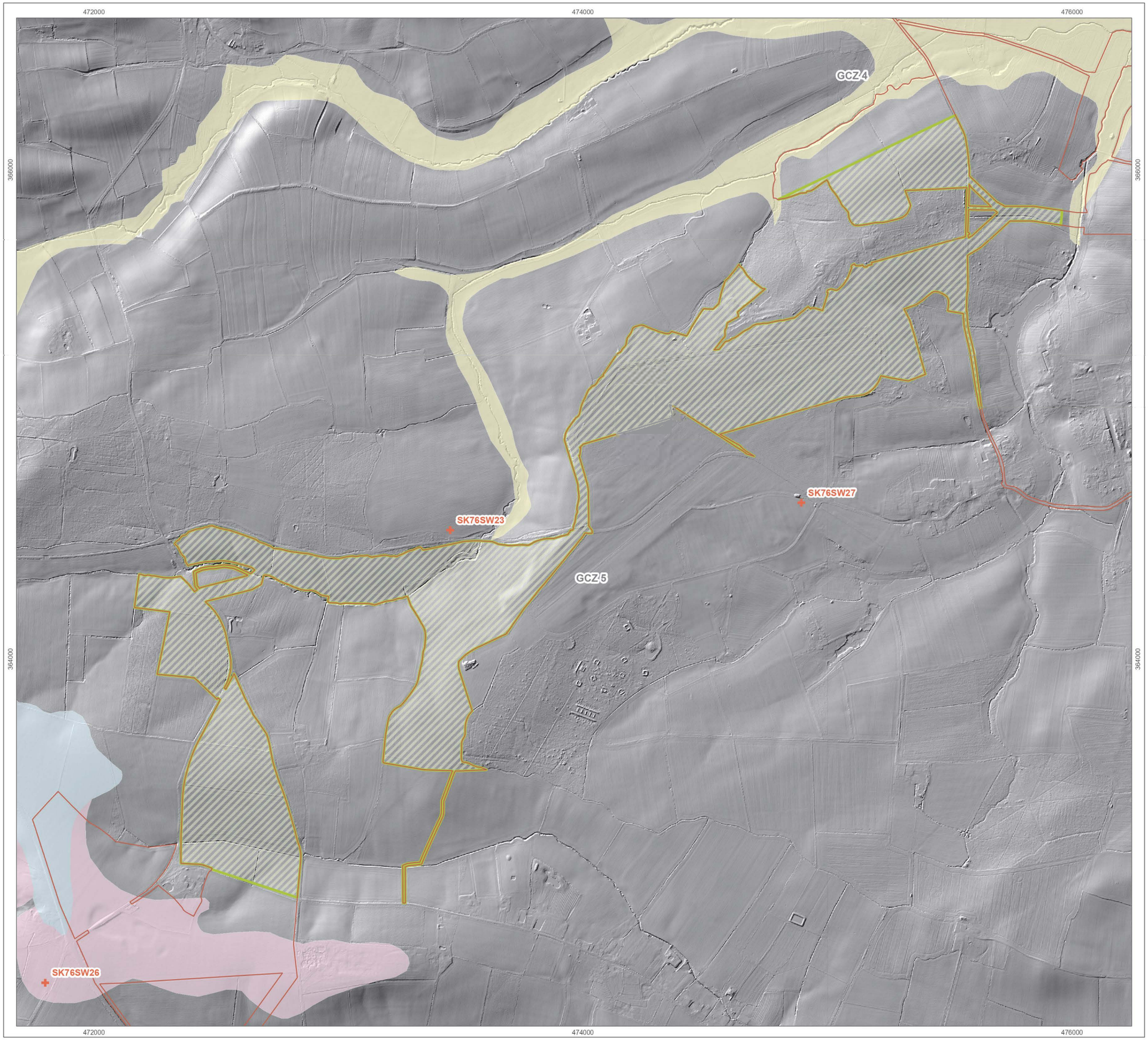
1:10,000 Scale @ A3

0 0.13 0.25 0.5 km

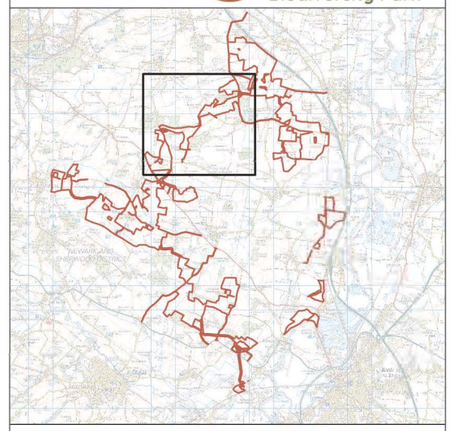
Ref: 276500-GDBA9	Date: 26/06/2025

Geoarchaeological Character Zone 4: Figure Aii.3.9

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



- Order Limits
- Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

- GCZ 5

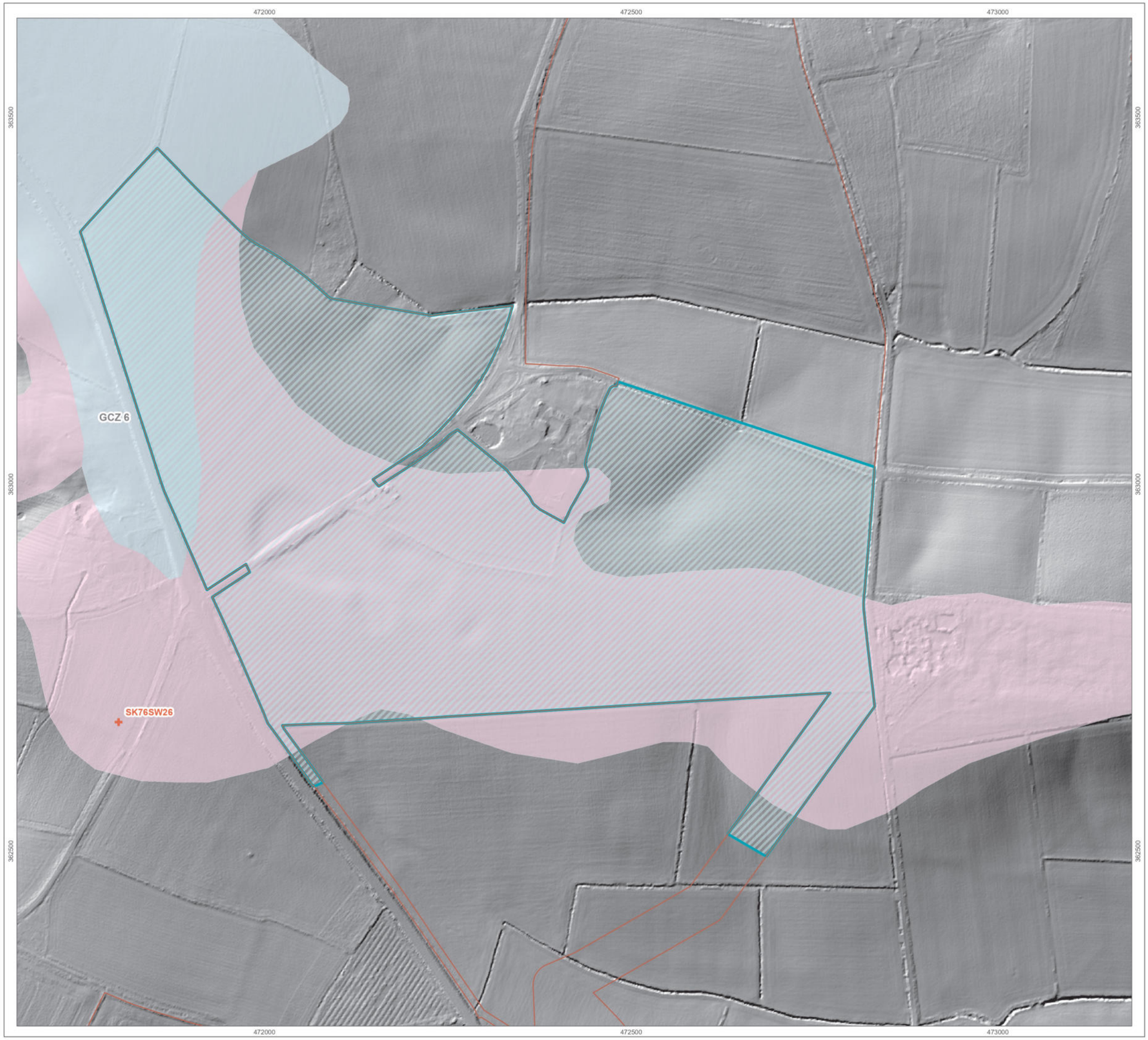
1:15,000 Scale @ A3

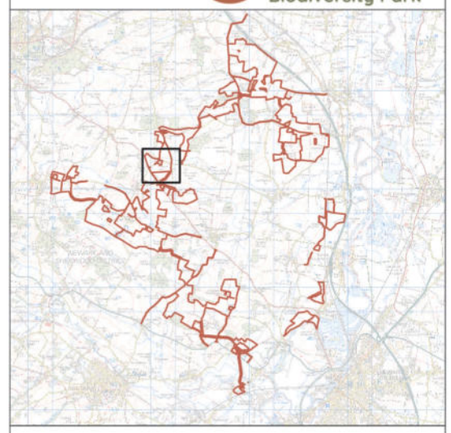
0 0.2 0.4 0.8 km

Ref: 276500-GDBA10	Date: 26/06/2025

Geoarchaeological Character Zone 5: Figure A11.3.10

Great North Road Solar and Biodiversity Park Environmental Statement





Order Limits

Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Searle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

- GCZ 6

1:5,000 Scale @ A3

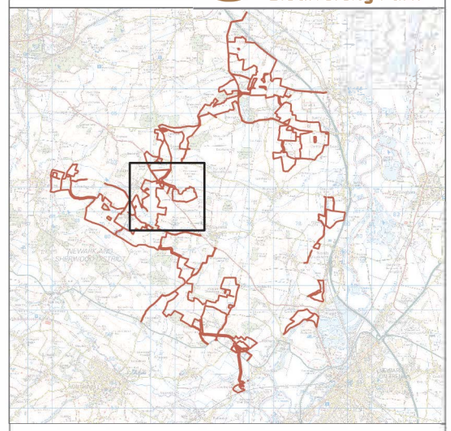
0 0.05 0.1 0.2 km

Ref: 276500-GDBA11	Date: 26/06/2025

Geoarchaeological Character Zone 6: Figure A11.3.11

Great North Road Solar and Biodiversity Park Environmental Statement

Solar & Biodiversity Park



- Order Limits
- GCZ 7
- PaMELA
- Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

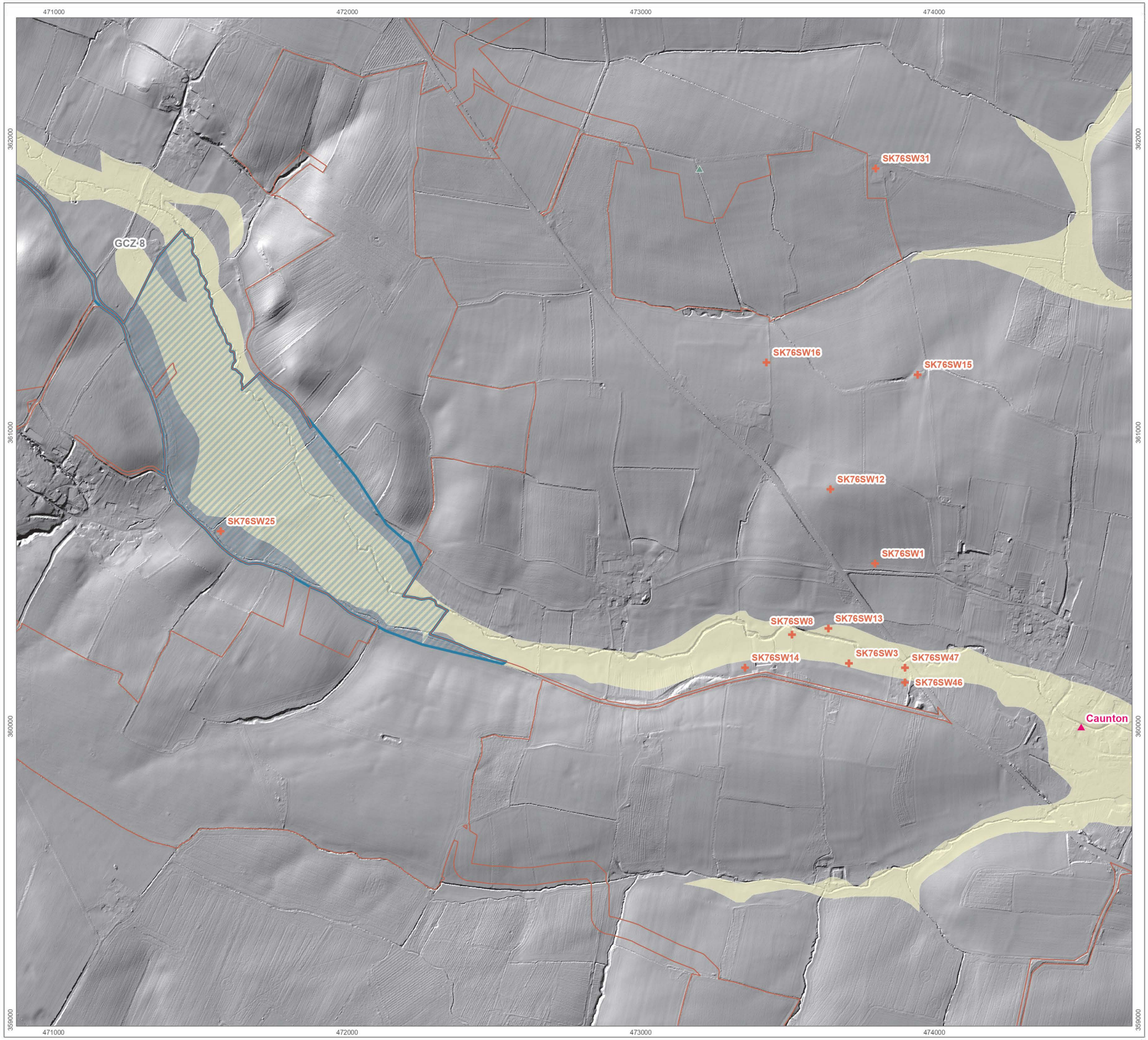
1:10,000 Scale @ A3

0 0.13 0.25 0.5 km

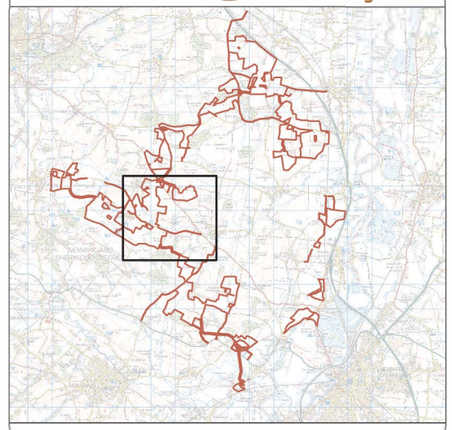
Ref: 276500-GDBA12	Date: 26/06/2025

Geoarchaeological Character Zone 7: Figure A11.3.12

Great North Road Solar and Biodiversity Park Environmental Statement



Solar & Biodiversity Park



- Order Limits
- TERPS
- PaMELA
- Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

- GCZ 8

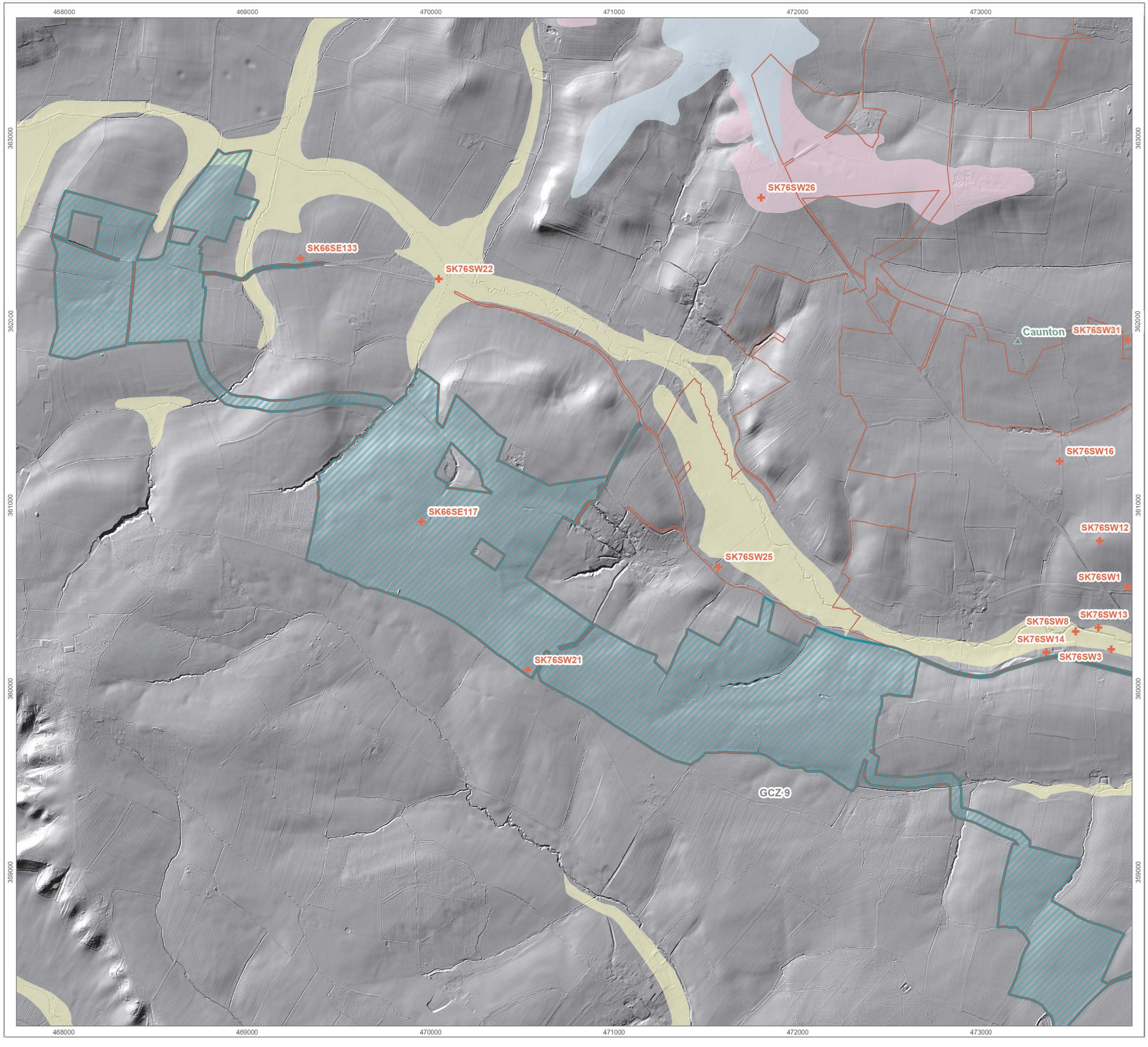
1:12,500 Scale @ A3

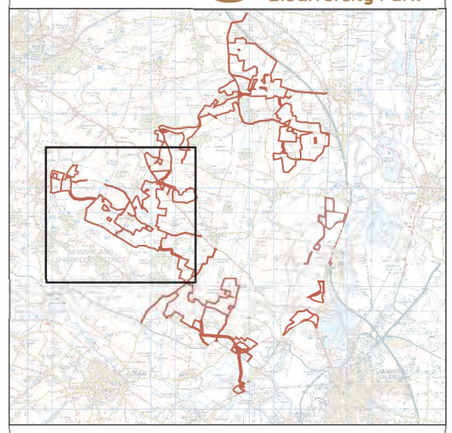
0 0.15 0.3 0.6 km

Ref: 276500-GDBA13	Date: 26/06/2025

Geoarchaeological Character Zone 8: Figure A11.3.13

Great North Road Solar and Biodiversity Park Environmental Statement





Order Limits
PaMELA
Borehole

BGS superficial deposits
- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ
- GCZ 9

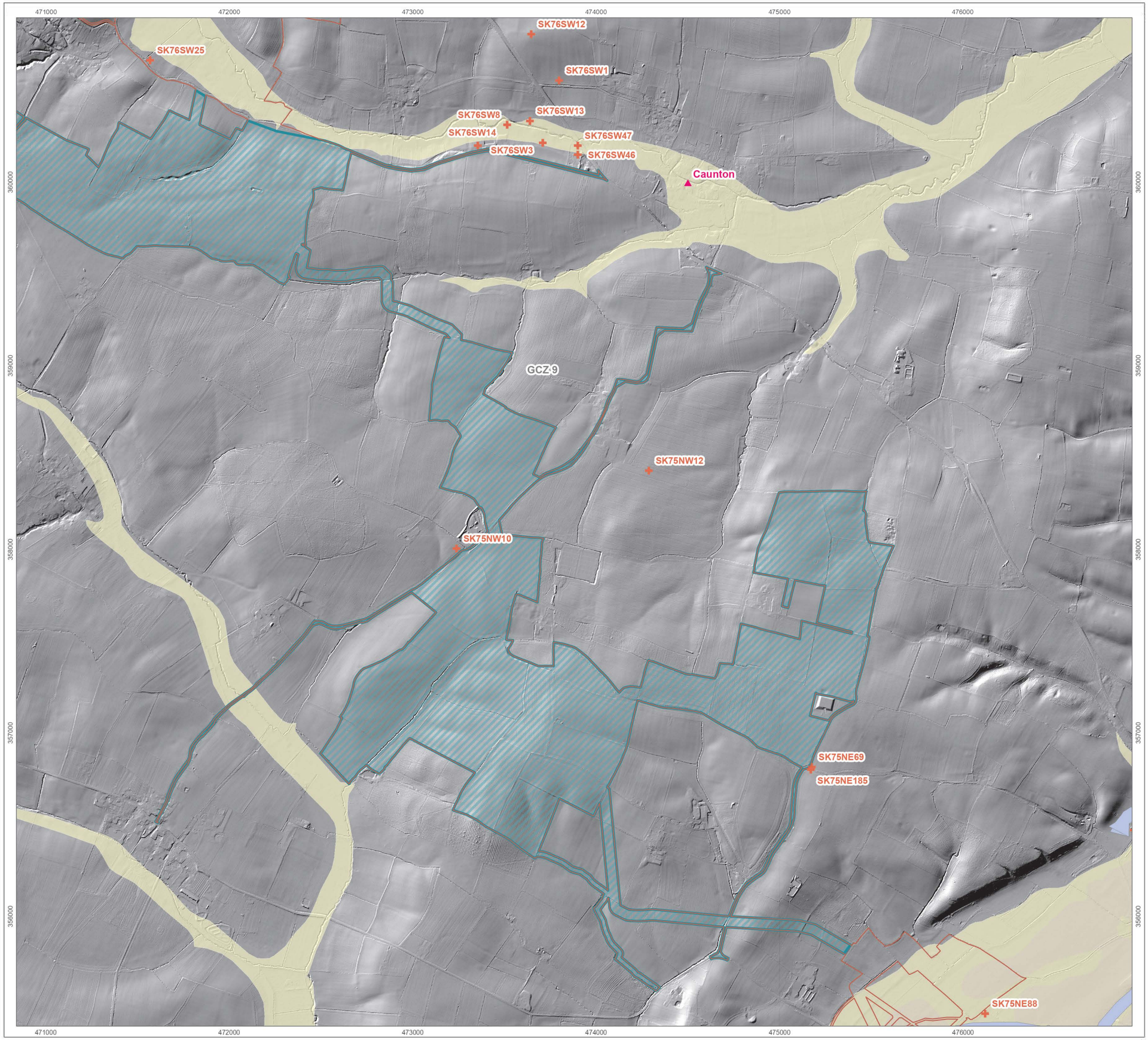
1:20,000 Scale @ A3

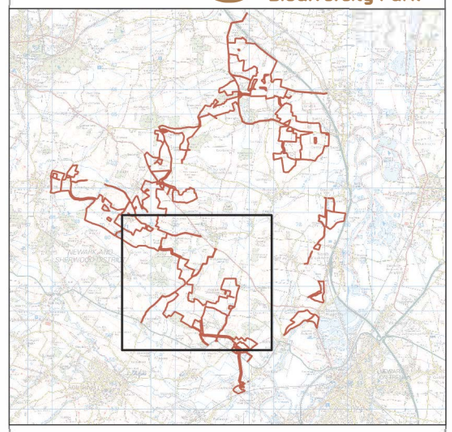
0 0.25 0.5 1 km

Ref: 276500-GDBA14a	Date: 26/06/2025

Geoarchaeological Character Zone 9: Figure A11.3.14a

Great North Road Solar and Biodiversity Park Environmental Statement





Order Limits
Palaeochannel
TERPS
Borehole

BGS superficial deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Holme pierrepont sand and gravel member - Sand and Gravel
- Scarle sand and gravel member - Sand and Gravel
- River terrace deposits - Sand and Gravel
- Balderton sand and gravel member - Sand and Gravel
- Eagle moor sand and gravel member - Sand and Gravel
- Till, mid pleistocene - Diamicton

GCZ

- GCZ 9

1:20,000 Scale @ A3

0 0.25 0.5 1 km

Ref: 276500-GDBA14b | Date: 26/06/2025

Geoarchaeological Character Zone 9: Figure A11.3.14b

Great North Road Solar and Biodiversity Park Environmental Statement