

A46 Newark Bypass

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6.8 Environmental Statement Archaeological Management Plan

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A46 Newark Bypass

Development Consent Order 202[x]

**ENVIRONMENTAL STATEMENT
ARCHAEOLOGICAL MANAGEMENT PLAN**

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1 Introduction

1.1 Purpose of this document

1.1.1 This Archaeological Management Plan (AMP) relates to an application made by National Highways (the Applicant to the Secretary of State for Transport via the Planning Inspectorate (the Inspectorate) under the Planning Act 2008 (the 2008 Act) for a Development Consent Order (DCO). If made the DCO would grant consent for the A46 Newark Bypass (the Scheme). A detailed description of the Scheme can be found in Chapter 2 (The Scheme) of the Environmental Statement (ES) **(TR010065/APP/6.1)**.

1.1.2 The purpose of this AMP is to:

- Support the assessment set out in Chapter 6 (Cultural Heritage) of the ES **(TR010065/APP/6.1)**.
- Summarise the known archaeological and historical baseline within the study areas and outline the archaeological potential for further unknown archaeological remains within the Order Limits.
- Set out the research priorities that have been identified using the East Midlands Historic Environment Research Framework (EMHERF).
- Detail the methods and approach for the Phase 1 and Phase 2 archaeological investigations, including the production of Written Schemes of Investigation (WSI) and technical reports required for each element of fieldwork.
- Present the approach to stakeholder engagement and consultation, project management, fieldwork methodology plus the post-excavation analysis and publication stages for investigations carried out during the pre-commencement period of the Scheme.
- Outline the scope and likely contents of the Phase 3 archaeological mitigation strategy which, in accordance with Requirement 9 of the draft DCO **(TR010065/APP/3.1)**, would detail the scope of the archaeological and built heritage investigations to be undertaken during the pre-commencement and construction stages of the Scheme.

1.1.3 The archaeological works detailed within this AMP would be developed and implemented through task-specific WSIs to be produced by the Archaeological Contractor, in accordance with Requirement 9 of the draft DCO **(TR010065/APP/3.1)**.

1.2 Phases of archaeological investigation

- 1.2.1 This section provides a summary of the phases of archaeological investigation, which are required to inform and support the Scheme. These phases are as follows:
- **Phase 1** of the AMP (included in this AMP) provides details on the preliminary archaeological surveys undertaken to inform the ES (**TR010065/APP/6.1**) baseline, which included geophysical survey, metal detector and field walking survey and geoarchaeological desk-based assessment (DBA).
 - **Phase 2** of the AMP (included in this AMP) adds details of the scope of intrusive fieldwork which includes geoarchaeological coring completed in June 2023 and test pitting and trial trench evaluation which commenced in September 2023 and was largely completed in November 2023. Outstanding areas will be undertaken in the first half of 2024.
 - **Phase 3** of the AMP (as secured by Requirement 9 of the draft DCO (**TR010065/APP/3.1**)), would be determined following the completion of Phase 2 intrusive fieldworks. Phase 3 of the AMP will set out the archaeological mitigation strategy required during the pre-commencement and construction stages of the Scheme. This is likely to comprise open area excavation, strip, map and sample excavation, geoarchaeological assessment, archaeological monitoring, and historic building recording as appropriate.
- 1.2.2 Further detailed information on each of the phases of archaeological investigation are contained within Chapters 4, 5 and 6 of this AMP.

1.3 Status of this document

- 1.3.1 Archaeological investigation is an iterative process relying on the results of one phase of work to inform the following phase. As such the results of the Phase 1 surveys have informed the scope of the Phase 2 investigations and in turn the results of the Phase 2 investigations will inform the Phase 3 archaeological mitigation strategy. Therefore, whilst enough information is available to understand the significance of the archaeological resource and its potential, a detailed description of the Phase 3 works cannot be produced until all results of Phase 2 works are known.
- 1.3.2 This iteration of the AMP details the Phase 1 preliminary surveys and Phase 2 Geoarchaeological Investigations completed to date. The Phase 2 Trial Trench evaluation is expected to be completed during the first half of 2024 at which point this document will be updated. This iteration has been prepared in consultation with relevant cultural heritage stakeholders, including: the Nottinghamshire County Council Senior Practitioner Archaeology; Newark & Sherwood District Council

Historic Environment Officer; and Historic England Team Leader (Development Advice) and Science Advisor for the Midlands Region.

- 1.3.3 In accordance with Requirement 9 of the draft DCO **(TR010065/APP/3.1)**, a future iteration of this AMP (referred to as Phase 3) will be prepared following the completion of the Phase 2 works. This future iteration would include a detailed archaeological mitigation strategy for all post consent archaeological investigations proposed to reduce the effect of the Scheme on the archaeological resource through protection/preservation of remains. Where remains cannot be preserved, the detailed archaeological mitigation strategy would set out the programme of archaeological investigation to offset significant effects on the resource. This detailed mitigation strategy would be developed in consultation with and approved by Nottinghamshire County Council and Newark & Sherwood District Council cultural heritage stakeholders and where relevant Historic England.
- 1.3.4 Phase 3 of this AMP would be a direct update to this iteration of the AMP following completion of the Phase 2 works.

1.4 Roles and responsibilities

- 1.4.1 Table 1-1 below details the roles and responsibilities required for the works outlined within this Phase 2 AMP.
- 1.4.2 Clear communication between all relevant parties would form a critical part of the delivery of the archaeological fieldwork.

Table 1-1: Roles and responsibilities

Role	Responsibilities
Client National Highways, or their representative (hereafter referred to as the Client's representative)	<ul style="list-style-type: none"> The Client will be responsible for providing details of National Highways Framework approved Archaeological Contractors to the Principal Contractor. The Client will be responsible for assuring the work undertaken by the Principal Contractor and Design Consultant.
Principal Contractor Skanska UK Construction Ltd (construction contractor for the Scheme)	<ul style="list-style-type: none"> The Principal Contractor will be responsible for the procurement of a National Highways approved Archaeological Contractor. The Principal Contractor will be responsible for the construction of the Scheme and implementation of all relevant health and safety policies and regulations. The Principal Contractor will provide plant and welfare facilities required by the Archaeological Contractor during the undertaking of the archaeological works outlined in the AMP.
Design Consultant Mott MacDonald	<ul style="list-style-type: none"> The Design Consultant will be responsible for the production of this AMP in consultation with the

Role	Responsibilities
	<p>Stakeholders (see definition of the Stakeholders below).</p> <ul style="list-style-type: none"> • The Design Consultant will be responsible for the management of the Archaeological Contractor during the archaeological works outlined in this AMP. • The Design Consultant will be responsible for the assurance of technical reports produced by the Archaeological Contractor. • The Design Consultant will act as the main point of contact for the Stakeholders, Principal Contractor and Archaeological Contractor for all heritage matters associated with the Scheme. The Stakeholders will be kept informed of the progress of the fieldwork via the Design Consultant to ensure that it is carried out to the required standard and specification as set out in this AMP and the task specific WSIs.
<p>Archaeological Contractor The ClfA Registered Organisation procured as part of the National Highways Framework to undertake archaeological fieldwork.</p>	<ul style="list-style-type: none"> • The appointed Archaeological Contractors will be responsible for the delivery of the program of archaeological works outlined within this AMP. This responsibility will include undertaking fieldwork as well as the preparation of task specific WSI, Risk Assessments (RAMS), post-excavation reporting as well as any associated publication. • The appointed Archaeological Contractor will be a Registered Organisation (RO) of the Chartered Institute for Archaeologists (ClfA). The fieldwork manager will have Member of the Chartered Institute for Archaeologists (MClfA) status or equivalent knowledge and experience. • The Archaeological Contractor will adhere to the specification outlined in this AMP and will be responsible for programming and staffing. • The Archaeological Contractor will be responsible for the delivery of toolbox talks to relevant site operatives during pre-commencement and construction activities.
<p>Stakeholders Nottinghamshire County Council Senior Practitioner Archaeology, Newark & Sherwood District Council Historic Environment Officer and Historic England Team Leader (Development Advice) and Science Advisor for the Midlands Region. As well as any relevant representatives of the Environment Agency and any other relevant statutory bodies</p>	<ul style="list-style-type: none"> • The Stakeholders will be responsible for approving task specific WSI's prior to the commencement of any archaeological works outlined within this AMP. • The Stakeholders will be responsible for monitoring the archaeological fieldwork outlined in this AMP. This will include attendance at both site and virtual meetings in order to review the fieldwork as it progresses. This will inform any related decisions. • The Stakeholders will be responsible for approving the technical reports produced for the archaeological works outlined in this AMP.

2 Archaeological background

2.1 Introduction

- 2.1.1 The archaeological and historical background for the Order Limits of the Scheme and associated 500 metre and 1 kilometre study areas are presented within Appendix 6.1 (Cultural Heritage Desk Based Assessment) (DBA) of the ES Appendices (**TR010065/APP/6.3**).
- 2.1.2 The evidence baseline presented within the DBA has been developed based on the following assessments which have been completed for the preparation of the DCO application and are included as technical appendices to Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**):
- Appendix D of the Cultural Heritage DBA - Fieldwalking survey report¹
 - Appendix E of the Cultural Heritage DBA - Metal detecting survey²
 - Appendix F of the Cultural Heritage DBA - Geophysical survey report³
 - Appendix G of the Cultural Heritage DBA - Geophysical survey report addendum⁴
 - Appendix H of the Cultural Heritage DBA - Geoarchaeological and archaeological monitoring report⁵
 - Appendix I of the Cultural Heritage DBA - Geoarchaeological desk-based assessment⁶
 - Appendix J of the Cultural Heritage DBA - Geotechnical watching brief report⁷
 - Appendix K of the Cultural Heritage DBA - Geoarchaeological coring report⁸
- 2.1.3 The information provided below presents a summary of the baseline presented within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**), including the relevant assessments produced during the archaeological fieldwork undertaken to inform the baseline for the Scheme.

¹ AMS (2023) Fieldwalking Survey Report of Lands along the A46 Newark Northern Bypass. February 2023

² AMS (2023) Metal Detecting Survey Report of Lands along the A46 Newark Bypass. February 2023

³ AMS (2022) Geophysical Survey Report of Lands along the A46 Newark Northern Bypass. February 2023.

⁴ AMS (2023) Addendum to Geophysical Survey Report of Lands along the A46 Newark Bypass. March 2023

⁵ York Archaeology (2022) A46 Newark North Bypass Nottinghamshire, Archaeological and geoarchaeological monitoring of ground investigations.

⁶ AMS (2023) Regional Delivery Partnership A46 Newark Bypass. Geoarchaeological Desk Based Assessment

⁷ AMS (2023) A46 Newark Bypass, GI Watching Brief Report. May 2023

⁸ AMS (2023) A46 Newark Bypass, Geoarchaeological Coring Report. July 2023

- 2.1.4 Related figures showing the location of heritage assets can be seen within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (TR010065/APP/6.3).

2.2 Archaeological and historic background

Palaeolithic and Mesolithic (500,000 – 4,000 BC)

- 2.2.1 The raised sand and gravel terraces of the River Trent, deposited during the Ice Age, provide free-draining soils, easy access to water and a vital communication route. These terraces have provided an attractive location for human habitation since the Palaeolithic.
- 2.2.2 Located within the 500 metre study area, partially within the southern extent of the Order Limits is the Late Upper Palaeolithic (13,000 to 9,500 years ago) open-air site of Farndon Fields (MM503). Analysis of artefacts recovered from here suggests a number of discrete areas of Late Upper Palaeolithic (LUP) occupation and industrial activity, such as flint knapping, around possible hearths.
- 2.2.3 Mesolithic activity is scarce within the Scheme, although surface lithic scatters have been recorded at Farndon Fields (MM502).

Neolithic and Early to Middle Bronze Age (4,000 to 1500 BC)

- 2.2.4 There is evidence of communities still following a nomadic lifestyle across the Trent Valley, with seasonal occupation evidenced at Farndon Fields (MM502). However, there is also evidence of more permanent occupation at Langford (MM505) with structures identified. Communities were also burying their dead in highly visible monuments, as demonstrated at Winthorpe Road, Newark (MM504) where a possible long barrow was identified.
- 2.2.5 Burial monuments dating to the Bronze Age, have been tentatively identified through geophysical survey associated with the Scheme at Langford Hall (MM026) and Newark Showground (MM938).

Later Bronze Age and Iron Age (1,150 BC to AD 43)

- 2.2.6 The late Bronze Age and Iron Age periods are characterised by a major shift in landscape organisation across the 500 metre study area. From around 450 BC, there is evidence that this study area was densely occupied, with enclosures, field systems and roundhouses across the area. Extensive enclosure complexes have been mapped across the Order Limits. Several are recorded at Averham and Kelham (for example MM659; MM515) and Winthorpe (MM541). The

complexes at Winthorpe comprise of small enclosures⁹, which were likely to have defined different areas of activity.

Romano-British period (AD 43 – 410)

2.2.7 Much of Britain came under Roman control after AD 43 and the Roman influence is well recorded within the archaeological record for the Scheme 500 metre study area. The River Trent was an important, strategic communication route and marked the western frontier of Roman rule during the 1st century AD. The Fosse Way (MM507) ran through the Scheme 500 metre study area and a number of forts and settlements, such as Ad Pontem and Crococalana (MM002), were established during this period. The tradition of rural settlement in the Iron Age continues into the Roman period. Within the Order Limits, enclosure complexes, such as those discussed above are likely to have been occupied into the Roman period.

Early medieval (Anglo-Saxon, AD 410 – 1066)

2.2.8 Following the withdrawal of Roman rule in AD 410, social, economic and political organisation broke down. The region fragmented into small kingdoms and large-scale immigration from the middle of the 5th century changed the political organisation of the region.

2.2.9 Evidence for occupation during this period within the Scheme 500 metre study area is fairly fragmentary. Occupation during this period is evidenced by a large cremation cemetery in Newark, dating to the 6th-7th centuries (MM522). Newark was established as a burh (a fortified settlement) in the 10th century and archaeological investigation has demonstrated evidence for activity during this period.

2.2.10 The Domesday Survey of 1086 often recorded settlements that were established during the early medieval period. Both Kelham and Averham are recorded, as well as Winthorpe. There is also evidence for early medieval settlement within the grounds of Kelham Hall (MM525).

High medieval (1066 to 1485)

2.2.11 Newark took advantage of the strategic location next to important communication routes and became a densely and permanently occupied centre of trade and industry during the medieval period, specifically for wool and cloth. It was fortified with a Castle (MM001) and town walls.

⁹ AMS 2022 Geophysical Survey Report of Lands along the A46 Newark Northern Bypass

- 2.2.12 Evidence for rural settlement is documented across the scheme 500meter study area. Within the Order Limits there is little evidence for medieval land organisation and archaeological evidence for occupation at this time is limited. However, both Averham and Kelham were occupied at this time and formed foci for dispersed farmsteads and hamlets during this period.

Post medieval (1485 – 1750)

- 2.2.13 During the post-medieval period, Newark became Nottinghamshire's second town. Its strategic position along the River Trent and the Fosse Way meant that Newark played a pivotal role during the Civil War (1642-1646). Newark is surrounded by the below ground and earthwork remains of offensive and defensive fieldworks which were raised during the Civil War, some of which extend into the Order Limits
- 2.2.14 This period is also marked by gradual change in the agrarian economy. This is mainly reflected in the reorganisation of the landscape, with the piecemeal enclosure of open fields, visible around rural settlements such as Averham and Kelham.

Modern (1750 – present)

- 2.2.15 Industry continued to develop in Newark. Cartographic evidence illustrates increased development of warehouses and wharfs. Newark became a centre for the brewing industry, reflected through the fragmentary remains of former breweries such as Castle Brewery (MM109) and Northgate Brewhouse (MM303).
- 2.2.16 During the 20th century, the Scheme 500 metre study area underwent extensive change, as agricultural practices were modernised and the landscape opened up to large scale industry, such as sand and gravel extraction. One of the most prominent industries in Newark during this time was Kelham Home Grown Sugar refinery (MM842), now known as British Sugar, which opened in 1921.

2.3 Archaeological potential

- 2.3.1 This section highlights the scenario of highest potential for the survival of unknown archaeological remains. The following summary provides an indication of the archaeological potential within the Order Limits. This has been considered during the assessment within the ES. Further detail is provided within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**).
- 2.3.2 Related figures showing the location of heritage assets can be seen within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices

(TR010065/APP/6.3). Figures showing the area numbers as referred to below can be seen within Appendix F: Trial Trenching Evaluation WSI contained within this AMP.

Palaeoenvironmental

- 2.3.3 Geoarchaeological investigations undertaken to inform the Scheme assessment (see Appendix H, I and K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**) identified superficial deposits belonging to the Holme Pierrepont Sand and Gravel Member within the Order Limits, specifically the area south of the Trent crossing, immediately north-east of Farndon. Combined with the nearby discovery of Late Upper Palaeolithic tools at Farndon (MM503) this small area has high potential to contain Palaeolithic and Mesolithic archaeological remains and palaeoenvironmental deposits.
- 2.3.4 The lower alluvial deposits of Pleistocene date recorded within the Order Limits have low potential for palaeoenvironmental material and archaeological remains to survive. The upper alluvial deposits have medium potential for organic remains to survive.
- 2.3.5 Palaeochannels are recorded across the Order Limits, which have high potential to preserve palaeoenvironmental remains.
- 2.3.6 Geoarchaeological investigations undertaken to inform the Scheme assessment (see Appendix H, I and K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**) have demonstrated that organic sediments survive in and around the mapped palaeochannel deposits within Areas 2, 8, 9, 14 and 18 of the Order Limits (Appendix F Trial Trenching Evaluation WSI of this AMP). These deposits have high potential to preserve multi-period waterlogged palaeoenvironmental organic matter and archaeological remains.

Palaeolithic and Mesolithic

- 2.3.7 The results of multiple phases of archaeological investigation at Farndon Fields have recorded hundreds of struck flints dating to the Palaeolithic (MM503), Mesolithic and Neolithic periods (MM502). The evidence suggests there is high potential for further unknown early prehistoric remains to be encountered, particularly within Area 40 of the Order Limits (Appendix F Trial Trenching Evaluation WSI of this AMP), which lies at the northern extent of Farndon Fields.

Neolithic, Bronze Age and Iron Age

- 2.3.8 There is a high concentration of evidence associated with possible late prehistoric settlement, agricultural activity and funerary monuments within Areas 20, 21, 24, 30 and 48 of the Order Limits

(Appendix F Trial Trenching Evaluation WSI of this AMP). These include the possible funerary activity with round barrows at Langford (MM937) and enclosures, field systems and settlements have also been identified at Kelham, Averham, Newark and Winthorpe.

- 2.3.9 This evidence suggests that there was a substantial human presence within the Scheme study area during the later prehistoric period. It is therefore considered that there is high potential for further archaeological remains associated with the late prehistoric period within Order Limits.

Roman

- 2.3.10 There is strong evidence for occupation during the Roman period, given the close proximity of the area to the Fosse Way (MM507) and known settlements at Newark (MM512) and Crococalana at Brough (MM002). The wider, rural, landscape was also populated during this period and it is likely that some of the possible Iron Age enclosures identified in Areas 20, 21, 24 and 48 of the Order Limits (Appendix F Trial Trenching Evaluation WSI of this AMP) at Kelham, Averham, Newark and Winthorpe continued to be utilised and occupied into the Roman period. It is therefore considered that there is high potential for further archaeological remains associated with the Roman period within the Order Limits.

Early medieval

- 2.3.11 The early medieval period saw the formation of many of the settlements that survive today within the Scheme 500 metre study area. Evidence for early medieval activity has been recorded within Newark, Kelham and Winthorpe. It is therefore considered that there is high potential for further archaeological remains associated with the early medieval period within the Order Limits.

High medieval

- 2.3.12 The early medieval settlements at Newark, Averham, Kelham and Winthorpe expanded during the high medieval period. Within the 500 metre study area at Newark, a number of buildings from this period survive and excavations within the town have revealed extensive archaeological remains. Medieval activity has also been identified at Kelham (MM530) and at Langford (MM529). The high concentration of medieval features and archaeological remains suggests substantial human activity during this period, and therefore there is high potential for further medieval remains within the Order Limits.

Post medieval

- 2.3.13 There is extensive evidence for post medieval agricultural, settlement and industrial activity within the Scheme 500 metre study area. Surrounding Newark a large number of below ground and earthwork remains of offensive and defensive English Civil War fieldworks, which collectively form the Newark Civil War landscape (MM964) have been extensively surveyed and recorded. These remains comprise a number of scheduled monuments, such as the Civil War redoubt 550m south-east of Valley Farm (MM007) which lies 5m north of the Order Limits. There are also a large number of non-designated assets associated with Civil War Activity such as the First (MM660) and Second (MM624) Lines of Circumvallation at Newark, which lie within the Order Limits. The high concentration of designated and non-designated heritage assets associated with the post medieval period suggests that there is high potential for further post medieval remains to be encountered within the Order Limits.

Modern

- 2.3.14 Within the Scheme 500 metre study area there is substantial evidence for archaeological remains associated with modern agricultural, settlement, transport and industrial activity. A number of 18th century halls with associated designed parklands survive such as Kelham Hall (MM018), Langford Hall (MM026) and Winthorpe Hall (MM027). One of the most prominent industries in Newark during this this period was Kelham Home Grown Sugar refinery (MM842), now known as British Sugar, which opened in 1921. During the Second World War RAF Winthorpe (MM848) opened, which is now the location of Newark Air Museum. Second World War FW3/22 pillboxes are recorded within the study area, both of which are located at Kelham (MM835; MM836). The high concentration of designated and non-designated heritage assets associated with the modern period, suggests that there is high potential for further archaeological remains from this period to be encountered within the Order Limits.

3 Research framework and agenda

3.1 Introduction

- 3.1.1 Consideration of research agendas and themes is key to understanding the potential value of archaeological remains. The broad principles of a number of existing research agenda will be applicable to the works set out in this AMP.
- 3.1.2 The research agenda is key to identifying the focus for the archaeological investigation and mitigation strategy, helping to identify sites that require further investigation. The purpose is to identify sites that can help answer the research questions set by the relevant frameworks.
- 3.1.3 The phased approach to the archaeological fieldwork has taken the research questions into account, utilising information from desk-based studies and previous phases. This has resulted in Scheme wide research questions, as well as those specific to each site. The research questions will be reviewed and updated throughout the Scheme and the strategy should be flexible. Research questions will be reviewed, and added to, during the following stages:
- Preparation of task specific WSIs
 - During fieldwork
 - During preparation of post-excavation assessment reports (where applicable)
- 3.1.4 This Chapter provides an overarching strategy, based primarily on the regional and thematic research agenda. Each site will have specific questions and the WSI will have updated research section and questions. Those presented here are not fixed and the preparation of WSI should be responsive to the Scheme.

3.2 Relevant agenda

- 3.2.1 The relevant research agenda for this AMP are:
- East Midlands Historic Environment Research Framework (EMHERF)¹⁰
 - Research and Conservation Framework for the British Palaeolithic¹¹

¹⁰ East Midlands Heritage (2012) East Midlands Historic Environment Research Framework [online] available at: [REDACTED] (last accessed December 2023).

¹¹ The Prehistoric Society & English Heritage (2008) Research and Conservation Framework for the British Palaeolithic [online] available at: [REDACTED] (last accessed December 2023).

- Understanding the British Iron Age: an agenda for action¹²

3.3 Overarching themes

- 3.3.1 Reviewing the baseline of the Order Limits has allowed a series of overarching themes (OT) to be defined, based on the known archaeological resource detailed within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**.
- 3.3.2 These themes are found within the EMHERF and are designed to overlap the traditional archaeological and historical periods. However, they are also useful to define the overarching themes for individual periods as well. Following a review of the baseline and the archaeological potential, the following overarching themes which are relevant for the Scheme are defined below:
- OT1: Pleistocene and Holocene environmental change
 - OT2: Hunter-gatherer subsistence strategies and mobility patterns
 - OT3: Development of agriculturally-based settlement patterns
 - OT4: The development of fields and field systems
 - OT5: The role of rivers as movement corridors, sources of power and socio-political boundaries
 - OT6: Development of prehistoric monument complexes
 - OT7: Development of funerary monuments and changing burial and memorial practices
 - OT8: Battlefield and skirmish sites
 - OT9: Development of territorial and administrative (for example, parish) boundaries.

3.4 Research questions by period

- 3.4.1 The Scheme may impact on archaeological remains relating to the Late Upper Palaeolithic, Bronze Age, Iron Age, Roman, early medieval, medieval and post-medieval periods (see Chapter 2 of this AMP). Within the overarching themes identified above, a series of period specific research questions from the EMHERF are outlined, which contribute to the overarching theme. A series of strategic objectives (SO) which can help answer these research questions are also outlined below.
- 3.4.2 Many of the research questions and strategic objectives relate to landscape-based approaches to the archaeological resource. This recognises the research potential of the scale of the Scheme.

¹² Champion, T.C., Haselgrove, C., Armit, I., Creighton, J. and Gwilt, A. (2001) Understanding the British Iron Age: an agenda for action. [online] available at: [\(PDF\) Understanding the British Iron Age: an agenda for action. A Report for the Iron Age Research Seminar and the Council of the Prehistoric Society \(researchgate.net\)](#) (last accessed December 2023).

Individual and groups of sites may also be able to contribute to more specific research questions, particularly regarding artefact, chronologies and application of scientific techniques. It is envisioned that these can be added and addressed as part of future phases of fieldwork and mitigation.

Palaeolithic

- 3.4.3 There is evidence for an LUP open-air site, with evidence of in situ activity located partially within the southern extent of the Order Limits at Farndon Fields. Evidence for Palaeolithic activity may also be found within the Order Limits, sealed below coversands and on areas of Holme Pierrepont sands and gravels at Winthorpe and Kelham. The coversands also have potential to preserve organic lenses and palaeoenvironmental material.
- 3.4.4 The Palaeolithic archaeological resource has the potential to contribute to OT1, OT2 and OT5.
- 3.4.5 The key Palaeolithic research questions (PRQ) are:
- PRQ1: How were Early Upper and Late Upper Palaeolithic sites distributed across the landscape, and what contrasts may be observed with earlier and later (Mesolithic) periods?
 - PRQ2: 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?
 - PRQ3: How best may we extend and enhance regional fieldwalking or test-pitting programmes as means of prospecting for open-air sites?
 - PRQ4: How can we maximise the research yield of Pleistocene sites investigated during developer-funded work?
- 3.4.6 The principal research objective for the Palaeolithic across England relates to the identification of *in situ* remains from the period, along with developing a reliable chronology. Artefactual finds are relatively rare and the development of geoarchaeological deposit models and environmental sampling can enhance the existing baseline.
- 3.4.7 The EMHEF encourages further investigation of Upper Palaeolithic open-air sites within the region (SO 1D). Identification of further sites within the Order Limits can help elucidate their character and spatial distribution (PRQ1). Analysis of any associated artefacts can also help identify patterns of movement of LUP communities (SO 1F). Farndon Fields is recognised as a key site within the EMHEF and analysis already carried out on artefacts from this site have indicated that some lithic material was sourced from over 200km away.
- 3.4.8 Geoarchaeological deposit models from the Scheme can also help determine if there is any evidence of the changing Pleistocene environment (SO 1G).

Early Bronze Age

- 3.4.9 There is potential evidence for round barrows within the Order Limits.
- 3.4.10 The Bronze Age archaeological resource has the potential to contribute to OT6 and OT7.
- 3.4.11 The key Bronze Age research questions (BARQ) are:
- BARQ1: Can we define more precisely the chronology of the major monument classes (causewayed enclosures, barrows and cairns etc), and how might this have varied spatially?
 - BARQ2: Why may monument complexes have developed, why were some short-lived and others of longer duration, and why do these incorporate such a wide variety of monument types?
 - BARQ3: How significant were river-crossing or confluence zones as foci for monument complexes?
 - BARQ4: How far can studies of burials, grave goods, house and barrow/cairn structures contribute to studies of status variations within and between communities?
- 3.4.12 The EMHEF encourages the identification of monument complexes (SO 3F), particularly as they are poorly known by comparison to other areas like Wessex. This is especially true of lowland areas where funerary monuments are normally only identified through remote sensing or, as in the case of the Order Limits, geophysical survey. The close proximity of the River Trent may have had a bearing on the location of round barrows (BARQ3).

Late Bronze Age and Iron Age

- 3.4.13 A number of enclosures, field systems and settlements have been identified across the Scheme 500 metre study area. This evidence suggests that there was a substantial human presence within the Order Limits during this period.
- 3.4.14 The Late Bronze Age and Iron Age archaeological resource has the potential to contribute to OT3 and OT4.
- 3.4.15 There is an opportunity to add a significant body of knowledge to the existing baseline, through work on the Scheme. The key late Bronze Age/Iron Age research questions (IARQ) are:
- IARQ1: What can we deduce about the morphology, spatial extent and functions of settlements, and in particular the processes underlying the development in some areas of enclosed occupation or activity foci?
 - IARQ2: Why were settlements increasingly enclosed during this period and to what extent may the progress of enclosure have varied regionally?

- IARQ3: How are the nucleated settlements related to one another and to other settlements of the period? In particular, is there evidence for a developing settlement hierarchy?
- IARQ4: Can we shed further light upon the development of field and boundary systems?
- IARQ5: What were the economic, social or political roles of the pit alignments and linear ditch systems that characterised many areas of the East Midlands?
- IARQ6: What may we deduce from studies of linear boundaries with respect to changes in the agrarian landscape?
- IARQ7: What may further analysis of burials and of settlement architecture and morphology contribute to studies of social and political organisation?

3.4.16 There is an opportunity to help answer a number of research questions through fieldwork carried out as part of the Scheme. Investigation of these settlements and field systems, could help add a significant body of knowledge regarding settlement patterns, functions (IARQ1), hierarchies (SO 4E; IARQ3) and social and political organization (IARQ7) at this time.

Roman

3.4.17 The extensive enclosure and field systems recorded within the Order Limits are likely to have been occupied into the Roman period. The Order Limits lies close to the major communication routes such as the River Trent and the Fosse Way and there is an opportunity to investigate the wider rural settlement patterns during this period.

3.4.18 The Roman archaeological resource has the potential to contribute to OT3, OT4 and OT5.

3.4.19 The key Roman period research questions (RRQ) are:

- RRQ1: How did the conquest impact upon rural settlements and landscapes?
- RRQ2: How did field and boundary systems relate to earlier systems of land allotment, and how did these boundary networks develop over time?
- RRQ3: Can we chart more closely the processes of agricultural intensification and expansion and development of field systems?
- RRQ4: To what extent may communication routes have been influenced by late Iron Age settlement patterns and routes of movement?

3.4.20 The scale of the Scheme means that a landscape based approach can be taken to investigate the landscape context of rural settlements (SO 5H). The archaeological resource within the Order Limits has the

potential to add to an existing body of work carried out across the wider Trent Valley (SO 5I).

Early medieval

- 3.4.21 Evidence for early medieval occupation across the Scheme metre study area is fairly fragmentary. However, Newark was occupied during this period and tentative evidence for activity at this time has been identified at Kelham Hall (MM018).
- 3.4.22 There is an opportunity to explore the role of existing communication routes during this period and any surviving archaeological evidence. The early medieval archaeological resource has the potential to contribute to OT3 and OT9.
- 3.4.23 The key early medieval research questions (EMRQ) are:
- EMRQ1: Can we identify social/political boundaries (for example, surviving linear earthworks and natural barriers) and/or estate centres?
 - EMRQ2: To what extent may rivers such as the Trent or Witham have served as major political and social boundaries during the Anglo-Saxon period?
 - EMRQ3: What impact may Germanic and Scandinavian immigration have had upon established rural settlement patterns, and how may place-name evidence contribute to studies of settlement evolution?
- 3.4.24 Although the current corpus of early medieval evidence for the Order Limits is small, there is an opportunity to investigate the role of the River Trent as a possible socio-political boundary at this time (SO 6F/6G). Investigation of earlier settlement sites may also help to determine whether these were occupied into this period, and what implications this has for reconstructing early medieval settlement patterns (SO 6A).

High medieval

- 3.4.25 Within the 500 metre study area, a number of settlements developed during this period, such as Kelham and Averham, whilst Newark became an important market town. The rural landscape was also extensively used agriculturally, with evidence for field boundaries and ridge and furrow.
- 3.4.26 The medieval archaeological resource has the opportunity to contribute to OT3, OT4 and OT9.
- 3.4.27 There is an opportunity to explore the archaeological resource relating to the medieval agricultural landscape. The key medieval research questions (MRQ) are:

- MRQ1: Can we clarify further the processes of settlement desertion and shrinkage, especially within zones of dispersed settlement?
- MRQ2: How did medieval manors and manorial estates develop from the Anglo-Saxon period?
- MRQ3: Can we shed further light upon the origins and development of the open-field system and its impact upon agricultural practices?

3.4.28 There is an opportunity to investigate the development of open field systems within the Order Limits (SO 7I; MRQ3). Land within the Order Limits has been subject to intensive agricultural activity, which has accelerated during the last century. Consequently, there is very little evidence of earthwork ridge and furrow although it has been detected as buried archaeological remains. The relationship with earlier systems of land allotment, such as those identified within the Scheme and tentatively dated to the Iron Age, can also be explored.

3.4.29 The archaeological resource within the Order Limits can also be explored alongside the documentary evidence, particularly relating to the development of medieval manors and the importance of agricultural activity for their continued economic success (MRQ2). Documentary evidence could also be examined for evidence relating to past settlement patterns and whether the villages at Kelham and Averham were larger in the past (MRQ1).

Post-medieval

3.4.30 Much of the land within the Order Limits remained agricultural in use during this period. However, during the Civil War, the area was utilised to lay down both offensive and defensive fieldworks during several sieges at Newark.

3.4.31 The post-medieval archaeological resource has the opportunity to contribute to OT3, OT4 and OT8.

3.4.32 There is an opportunity to determine the exact location of some of these Civil War fieldworks and confirm the accuracy of siegeworks mapping. The key questions for this period (PMRQ) are:

- PMRQ1: How can we improve our understanding of the early landscapes of enclosure and improvement and the interrelationship between arable, pasture, woodland, commons and waste?
- PMRQ2: How can we refine our knowledge of Civil War defences and siege works?

3.4.33 Documentary and mapping evidence shows that the agricultural landscape within the 500 meter study area was enclosed during this period. However, the intensification of this landscape during the 20th century means that evidence of this has been erased and is difficult to see past enclosure patterns. Archaeological investigation within the Order Limits offers an opportunity to identify these agricultural

improvements and help to date enclosure and refine the chronology for past landscape organization (SO 8E; PMRQ1).

- 3.4.34 The offensive and defensive fieldworks erected during the Civil War have been well mapped and recorded. However, whilst statutory protection is afforded to many of these with surviving above-ground remains, there is still some uncertainty around those surviving below ground. The course of the circumvallation lines and some fieldworks no longer survive above ground, and their exact location is not known. Archaeological investigation within the Order Limits offers an opportunity to explore whether any of these fieldworks survive archaeologically (SO 8J; PMRQ2).

Multi-period

- 3.4.35 The overarching themes were designed to take into account key research areas where the archaeological and historical periods overlapped. Archaeological investigation within the Order Limits, has the potential to enhance the existing knowledge base within these overarching themes.
- 3.4.36 Geoarchaeological work, combined with specific palaeoenvironmental sampling on individual sites, has the potential to document the changing environment throughout prehistory and through to the modern period (OT1).
- 3.4.37 Settlement patterns within the Order Limits should be examined holistically, to elucidate when enclosure complexes first developed and how these patterns changed. This could be examined archaeologically from the Iron Age through to the post-medieval period (OT3).
- 3.4.38 There is evidence for large scale landscape organisation dating to the Iron Age onwards within the Order Limits. There is an opportunity to investigate how field system patterns changed over time, right through to the post-medieval period (OT4).
- 3.4.39 The River Trent is a major feature close to the Order Limits and it has had a great influence on settlement patterns and landscape organisation. There is an opportunity to investigate how it was viewed as a landscape feature throughout different periods and also how it was utilised at various times (OT5).
- 3.4.40 No specific research questions are defined within the EMHEF for multi-period research themes. However, a number have been drawn up based on the known baseline for the Scheme (MRQ).
- MRQ1: Can the Pleistocene and Holocene environment be reconstructed for the Scheme area?
 - MRQ2: How has landscape organisation, including settlement patterns and field patterns changed from prehistory?
 - MRQ3: How has the role of the River Trent changed over time?

4 Phase 1: Preliminary surveys

4.1 Overview

- 4.1.1 The overall aim of the Phase 1 fieldwork was to inform the baseline contained within Chapter 6 (Cultural Heritage) of the ES (TR010065/APP/6.1). The survey techniques were agreed in advance with the Nottinghamshire County Council and Newark & Sherwood District Council Stakeholders and where relevant Historic England.
- 4.1.2 It was agreed with the heritage consultees that the fieldwork would:
- Inform the potential for, and presence of, archaeological assets to provide more in depth understanding of the risk to the archaeological resource within the Order Limits and potential impacts on this resource
 - Identify any opportunities to further research goals in local, regional and national frameworks
 - Identify any opportunities for future public engagement to promote and enhance the benefits of the Scheme
 - Provide detailed and comprehensive knowledge to be included within the ES (**TR010065/APP/6.1**) to inform Stakeholder decisions regarding further fieldwork
- 4.1.3 Phase 1 included geophysical, metal detector and field walking surveys as well as a desk-based analysis of existing geoarchaeological data. Each technique is described below, alongside a summary of the results, which are detailed further within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**).
- 4.1.4 Where the survey has informed the archaeological record, this has been incorporated into the baseline contained within Chapter 6 (Cultural Heritage) of the ES (**TR010065/APP/6.1**).
- 4.1.5 All WSI's produced by the appointed Archaeological Contractor for each survey type in Phase 1 were produced in consultation with and approved by the Nottinghamshire County Council and Newark & Sherwood District Council Stakeholders prior to commencement of the surveys. All Phase 1 WSIs prepared can be found within Appendices A-C of this AMP.

4.2 Geophysical survey

- 4.2.1 The aims of the geophysical survey was to identify any geophysical anomalies of possible archaeological origin to help characterise the nature, extent and potential significance of any known and unrecorded heritage assets. Geophysical survey is a non-intrusive method of

gathering early stage information on potential archaeology within an area and dependent on the results and their quality can provide information on the presence or absence of archaeology.

- 4.2.2 Geophysical survey comprised of high-resolution magnetic gradiometry (Magnetometry) was undertaken in two phases by the Archaeological Contractor between September 2022 and March 2023. The surveys were undertaken within the Order Limits specifically targeting the route of the Scheme and the Floodplain Compensation Areas (FCA). The task specific WSI produced for the geophysical survey is contained within Appendix A of this AMP.
- 4.2.3 Magnetometry was proposed as it was the fastest, most cost-effective method of surveying large areas of ground while producing effective results which can identify a wide range of archaeological features.
- 4.2.4 Areas of recorded alluvial deposits on the flood plain were not surveyed as the composition of alluvium gives distorted magnetic readings which could hide archaeological features cut into it. Earlier archaeological features covered by alluvium would be disguised by the magnetic readings and may be below the survey depth of the magnetometers.
- 4.2.5 The geophysical survey was undertaken using a cart system across all identified fields using gradiometer sensors to record the magnetic resistance of the ground up to approximately 1 metre below the surface. These readings are then translated into a greyscale image and processed using specialist software.
- 4.2.6 The technical reports produced for the geophysical survey are contained within Appendices F and G of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. A summary of the of the geophysical surveys is also included within Chapter 6 (Cultural Heritage) of the ES **(TR010065/APP/6.1)**.
- 4.2.7 In summary the geophysical survey identified multiple sites of archaeological potential and enabled a greater understanding of the archaeology of the area. A possible Neolithic or Early Bronze Age ring ditch and two barrows were identified to the south of Langford Hall. Possible, Iron Age, Roman and early medieval settlement sites were also identified around Winthorpe and Kelham.
- 4.2.8 In consultation with the Stakeholders a programme of archaeological trial trenching and test pitting was recommended to be undertaken as part of the Phase 2 archaeological fieldwork. The purpose of the trial trenching and test pitting is to further explore the archaeological potential identified within the geophysical survey reports contained within Appendices F and G of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. The scope of the trial trenching is outlined in Chapter 5 of this AMP, however, this will not change the assessment in the ES but will be used to inform the Phase 3 AMP.

4.3 Metal detector

- 4.3.1 The aim of the metal detector survey was to map artefacts which could help locate or negate the potential for archaeological remains. There was a particular focus on locating artefacts derived from the Civil War, as Newark was a key strategic location during the conflict.
- 4.3.2 Metal detector surveys were undertaken by the Archaeological Contractor between September 2022 and March 2023. The surveys were undertaken within the Order Limits specifically targeting known areas with potential for Civil War potential. These areas lie in proximity to designated and non-designated Civil War heritage assets as well as having potential for prehistoric archaeology. The task specific WSI produced for the metal detector survey is contained within Appendix B of this AMP.
- 4.3.3 The survey required clear ground to effectively use the metal detectors. The fields surveyed were systematically walked and any artefacts collected and recorded, with the location recorded by GPS.
- 4.3.4 The technical report produced for the metal detector survey is contained within Appendix E of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**). A summary of the of the metal detector survey is also included within Chapter 6 (Cultural Heritage) of the ES (**TR010065/APP/6.1**).
- 4.3.5 In summary the survey did not identify any areas of specific archaeological potential, although a number of finds relating to the Civil War era were recovered including unspent musket balls and a broken gunflint.

4.4 Field walking survey

- 4.4.1 The aim of the field walking survey exercise was to map artefacts which could help locate or negate the potential for archaeological remains. Any concentrations of lithic or other artefacts may suggest the presence of either archaeological deposits containing artefacts or the presence of related archaeological features below the ground surface.
- 4.4.2 Field walking survey was undertaken by the Archaeological Contractor in March 2023. The survey was undertaken within the Order Limits specifically targeting known areas with potential for lithic surface finds. These areas lie in proximity to areas known to have potential for prehistoric archaeology. The task specific WSI produced for the field walking survey is contained within Appendix C of this AMP.
- 4.4.3 This survey type requires ploughed and harrowed fields to be effective and is undertaken by the systematic walking of the field placing flags

where artefacts are noted. The flags locations are then recorded by GPS with the artefact being recovered and recorded.

- 4.4.4 The technical report produced for the field walking survey is contained within Appendix D of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. A summary of the fieldwalking survey is also included within Chapter 6 (Cultural Heritage) of the ES **(TR010065/APP/6.1)**.
- 4.4.5 In summary the survey did not identify any areas of specific archaeological potential, demonstrating only the deposition of post medieval pottery sherds as part of the agricultural practice of manuring.

4.5 Desk-based geoarchaeological review

- 4.5.1 A geoarchaeological DBA was undertaken by the Archaeological Contractor in January 2023. The assessment covered the Order Limits plus a 1 kilometre buffer. The DBA comprised a review of geological data, which included British Geological Survey (BGS) mapping, the results of previous geoarchaeological investigations within the study area and Geotechnical Investigation (GI) results gathered during Options Selection stage.
- 4.5.2 The purpose of the geoarchaeological DBA was to understand the geological deposits within the Order Limits; identify areas of archaeological potential which may be affected by the Scheme; and make recommendations for further site-based assessment to be carried out in Phase 2.
- 4.5.3 The geoarchaeological DBA report is contained within Appendix I of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. A summary of the of the DBA is also included within Chapter 6 (Cultural Heritage) of the ES **(TR010065/APP/6.1)**.
- 4.5.4 In summary the geoarchaeological DBA concluded that there was high potential for Late Upper Palaeolithic (LUP) material and associated deposits within the Holme Pierrepont Sand and Gravel member recorded within the Order Limits, particularly within Area 40, close to the previously recorded open-air site at Farndon. The DBA also established that there was high potential for organic sediments to survive in and around the mapped palaeochannels within the Order Limits. These deposits had high potential to preserve multi-period waterlogged palaeoenvironmental organic matter and archaeological remains.
- 4.5.5 In consultation with the Stakeholders a programme of further geoarchaeological assessment including coring and test pitting was recommended to be undertaken as part of the Phase 2 archaeological fieldwork. The purpose of the coring and test pitting is to further explore the archaeological potential identified within the

geoarchaeological DBA contained within Appendix I of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. The scope of the trial trenching and associated works is outlined in Chapter 5 of this AMP.

5 Phase 2: Archaeological fieldwork

5.1 Overview

- 5.1.1 The principle aim of the Phase 2 archaeological fieldwork is to further characterise the archaeological resource identified within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**, and to inform the scope of the Phase 3 archaeological mitigation strategy.
- 5.1.2 The scope of the Phase 2 archaeological fieldwork has been informed by:
- the results of the preliminary surveys carried out during Phase 1 (as detailed in Chapter 4 of this AMP)
 - the existing baseline and archaeological potential (as detailed within Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**)
 - key research questions identified from the EMHEF (as detailed in Chapter 3 of this AMP)
- 5.1.3 The Phase 2 archaeological fieldwork includes the following techniques:
- Archaeological Monitoring of GI within archaeologically sensitive areas of the Order Limits see Appendix H and J of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**.
 - Geoarchaeological coring see Appendix K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)** and geoarchaeological test pits see Section 5.4 of this AMP, designed to target areas of medium and high geoarchaeological potential. This included the area of Holme Pierrepont Sands and Gravel, where LUP activity is recorded, as well as palaeochannels where palaeoenvironmental potential is high (see Section 2.2 of this AMP).
 - Targeted trial trenching has been designed based on the results of the Phase 1 preliminary surveys that included geophysical survey, metal detecting and fieldwalking, detailed results of which can be seen in Appendix D, E, F and G of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**. Multiple sites of archaeological potential were identified across the Order Limits. This includes a possible Neolithic or Early Bronze Age ring ditch and two barrows, as well as Iron Age, Roman and early medieval settlement sites (see also Section 2.2 of this AMP).
- 5.1.4 The locations of trial trenches have been reviewed by the Design Consultant's Ecology Lead and have been adjusted to avoid any impact on local wildlife, so far as reasonably possible.

- 5.1.5 The survey techniques outlined within this Chapter were agreed in advance with the Nottinghamshire County Council and Newark & Sherwood District Council Stakeholders and where relevant Historic England.
- 5.1.6 All WSIs produced for the Phase 2 archaeological fieldwork have been produced in consultation with and approved by the Newark & Sherwood District Council and Nottinghamshire County Council Stakeholders. All Phase 2 WSIs prepared can be found within Appendices D-F of this AMP.

5.2 Archaeological Monitoring of Ground Investigation

- 5.2.1 A series of Ground Investigations (GI) were planned as part of the wider works for the Scheme, see Appendix H, I and K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**). Due to the high potential of archaeology being present within these locations they were monitored by a competent archaeologist with relevant geoarchaeological knowledge.
- 5.2.2 The competent archaeologist was present for the opening of all GI locations and observed the full excavation of each location.
- 5.2.3 Limited archaeological evidence was observed within the GI trial holes during the monitoring with only one organic deposit being identified.

5.3 Geoarchaeological investigation

- 5.3.1 The aims of the geoarchaeological assessment was to identify the potential for important geoarchaeological deposits across the floodplain of the Trent Valley and also to also identify where River Terrace Gravel islands may survive. This geology type is free draining and its association with water courses means it has formed an attractive location for human habitation, especially during prehistory. The purpose of the work is to understand and characterise Holocene and Pleistocene alluvial deposits and identify any trends of variation in deposits across the floodplain, including palaeochannels identified within Appendix H and J of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**).
- 5.3.2 The investigation was undertaken in May 2023 and comprised a programme of 38 purposive geoarchaeological boreholes with a sampling interval of approximately 250 metres. The task specific WSI produced for the geoarchaeological coring is contained within Appendix E of this AMP.
- 5.3.3 The aim of the boreholes targeting the alluvial deposits was to record sedimentary sequences to identify and characterise any variation trends across the floodplain. This included identifying any further

palaeochannels not previously recorded, such as those that may be deeply buried. The aim of the boreholes targeting the known palaeochannels was to identify and characterise possible archaeological material, as well as assess the palaeoenvironmental potential.

- 5.3.4 The technical report produced for the geoarchaeological coring is contained within Appendix K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**). A summary of the geophysical surveys is also included within Chapter 6 (Cultural Heritage) of the ES (**TR010065/APP/6.1**).
- 5.3.5 In summary six boreholes designed to target known paleochannels produced organic sediments, however, nine other boreholes targeting paleochannels failed to produce any organic material. In contrast seven organic deposits were recorded in borehole locations not indicated as being in paleochannels. Only one borehole located within the Kelham and Averham FCA produced a humified peat deposit. The remaining boreholes at Kelham either produced no organic material or were shown to be in the Holme Pierrepoint sands and gravels indicating that the paleochannels were further west than originally thought and unlikely to be impacted by the Scheme.
- 5.3.6 In consultation with the stakeholders it was agreed that samples recovered from the survey, in addition to viable samples taken during geoarchaeological monitoring along the route of the Scheme (see Appendix H of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices (**TR010065/APP/6.3**)), will be sent for radiocarbon dating and pollen testing to provide dating and environmental evidence.
- 5.3.7 Machine dug test pits, in addition to the coring, will also be undertaken as part of the Phase 2 archaeological fieldwork. These test pits will be positioned at the ends of the trial trenches located within the flood plain to test the palaeochannels providing further understanding of the nature and extent of these features (see Section 5.4 of this AMP). Optically Stimulated Luminescence (OSL) dating will be used as part of this aspect of geoarchaeological investigation.
- 5.3.8 This will provide the additional information in order to create a comprehensive deposit model and inform the precise location and depths of the geoarchaeological features, as well as allowing the development of specific mitigation plans for Phase 3.

5.4 Trial trench evaluation

- 5.4.1 This stage of evaluation will consist of a programme of archaeological evaluation in the form of trial trenching and test pitting, with additional fieldwalking and metal detecting fieldwalking. This field work commenced in August 2023 and will be completed during the first half

of 2024. The task specific WSI produced for the trial trench evaluation is contained within Appendix F of this AMP.

- 5.4.2 The aims of the trial trench evaluation are to define and gain a better understanding of the archaeology revealed by the Phase 1 surveys as well as testing those locations where no definitive archaeology was identified (see Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**).
- 5.4.3 The results of this work will allow for detailed and bespoke mitigation plans to be developed for the Phase 3 works.
- 5.4.4 The number and layout of trenches has been agreed with the Stakeholders and are detailed in the task specific WSI produced for the trial trench evaluation is contained within Appendix F of this AMP. Any additional trenches or significant deviation from the original trenching plan will need to be agreed with the Client, Design Consultant and Stakeholders and will then form part of the Phase 3 Archaeological Mitigation Strategy as changes may not be immediately implemented due to licence and access arrangements. Details of the trenches can be found within the task specific WSI, which forms Appendix F of this AMP.
- 5.4.5 Prior to work in any area commencing a toolbox talk will be given highlighting the potential finds in that area. A suitably qualified and experience archaeological and geoarchaeological specialist will be on hand to identify finds retrieved/deposits during this work. Details of the toolbox talk can be found within the task specific WSI, which forms Appendix F of this AMP.
- 5.4.6 All archaeological trial trenching will be carried out by the Archaeological Contractor in accordance with the WSI contained within Appendix F of this AMP, alongside national and local policies, and guidelines. This includes the ClfA Standard and Guidance for Archaeological Field Evaluation¹³.

Fieldwalking

- 5.4.7 Additional fieldwalking will be undertaken in areas of Holme Pierpont sands and gravels, where there is high potential for LUP activity to be preserved. This will be to ensure any prehistoric lithics are located prior to excavation and that any concentrations of artefacts are identified and recorded. It is noted that these locations are not generally suitable for fieldwalking being unploughed, however the known potential is great enough to warrant a search prior to excavation.

¹³ ClfA 2020 Standard and Guidance for Archaeological Field Evaluation [online] Available at: [\[REDACTED\]](#) (last accessed December 2023).

Hand dug test pits

- 5.4.8 Hand dug test pits will be excavated in areas of Holme Pierpont sands and gravels, where there is high potential for LUP activity to be preserved. The hand dug test pits will allow a detailed search of the area for these prehistoric lithics as well as any Civil War artefacts that may be present.
- 5.4.9 Following the topsoil strip, the spoil heaps should be hand sieved in order to search for any lithics. Chapter 7 and Appendix F of this AMP details further requirements for lithic sampling during excavation.

Metal detecting

- 5.4.10 Metal detecting will be undertaken in the areas of high Civil War potential prior to excavation of the trenches. Following the topsoil strip, the spoil heaps and subsoil will also be subject to metal detecting. Chapter 7 and Appendix F of this AMP details further requirements for metal detecting during hand excavation.

Trial trenching

- 5.4.11 In agreement with the Stakeholders the trial trench evaluation will take place across the Order Limits and will consist of 3% trenching in those areas where geophysical survey has taken place and 5% trenching in those areas which have not undergone geophysical survey. Based on this, a total of 355 trenches will be excavated, any alterations to this number will be considered and discussed with Stakeholders prior to deployment.
- 5.4.12 The trial trench evaluation will be undertaken in a phased approach relating to the required Environment Agency Flood Risk Activity Permits (FRAPs), landowner licences and additional considerations such as potential despoiling of land.
- The first stage of trenching will be focused on those areas outside of the floodplain
 - The second stage will be focused on those areas within the floodplain which require a FRAP. This stage is expected to follow straight on from the first stage
 - A third stage may be undertaken to complete trenching in areas that were inaccessible during the first two stages. This is likely to be undertaken later than the first two phases

Machine test pitting

- 5.4.1 In agreement with the Stakeholders, geoarchaeological test pits will be machine excavated at the end of each of the trial trenches located

within the flood plain to test and further understand the nature of palaeoenvironmental features identified within Appendix H and K of Appendix 6.1 (Cultural Heritage DBA) of the ES Appendices **(TR010065/APP/6.3)**.

6 Phase 3 – Outline Archaeological Mitigation Strategy

6.1 Overview

- 6.1.1 This Chapter presents the Outline Archaeological Mitigation Strategy and will be further developed and updated to form the Archaeological Mitigation Strategy for the Phase 3 of this AMP, following the completion of the Phase 2 test pitting and trial trenching evaluation and consultation with Stakeholders. In accordance with Requirement 9 of the draft DCO (**TR010065/APP/3.1**), the Archaeological Mitigation Strategy will be completed and agreed prior to commencement of the pre-commencement works.
- 6.1.2 The Archaeological Mitigation Strategy will detail the scope of archaeological investigations required during the pre-commencement and construction stages of the Scheme. This scope will be agreed with the Stakeholders on completion of the Phase 2 archaeological fieldwork (see Section 5 of this AMP).
- 6.1.3 The archaeological investigations detailed within the archaeological mitigation strategy will be undertaken through the means of appropriate task specific WSI's produced by the appointed Archaeological Contractor. The WSI's will detail the scope and methodology for archaeological recording and reporting of these investigations, deposition of the report with the relevant Historic Environment Record and deposition of the archive with a suitable public depository willing to receive it. All work will conform to the Phase 3 AMP (once produced) and associated task specific WSI's along with the related standards and guidance set out in Chapter 7 of this AMP.

6.2 Building monitoring

- 6.2.1 Vibration monitoring is required for four heritage assets in order to protect their special interest and heritage value.
- 6.2.2 The monitoring and survey requirements will also be secured in the First Iteration Environmental Management Plan (EMP) (**TR010065/APP/6.5**). Commitment CH2 of Table 3.2 Register of Environmental Actions and Commitments of the First Iteration EMP refer to structural monitoring for these heritage assets.
- 6.2.3 The heritage assets which require monitoring include:

Grade II Causeway Arches 500m north-west of level crossing (MM228)

- 6.2.4 This asset is required to be partially demolished and rebuilt (west side). The remaining section of arches (east side) dating to the 18th century is vulnerable to destabilisation as a result of these works. Therefore ‘three season’ monitoring will be required to establish a baseline before construction works begin; to monitor the range of movement during construction and ensure any vibration does not exceed an agreed threshold (in which case, works should cease and mitigation put in place); and post-works monitoring to ensure that any settlement is in line with the baseline readings.

Grade II Farndon Windmill (MM139)

- 6.2.5 This asset is in close proximity to a construction compound and the site of a new section of road bridge construction, requiring a crane and piling. The mill is missing its cap, leaving wall tops open to the elements, and with an unknown maintenance regime, it is to be assumed that the mill must be in poor to very bad condition. Therefore ‘three season’ monitoring will be required to establish a baseline before construction works begin; to monitor the range of movement during construction and ensure any vibration does not exceed an agreed threshold (in which case, works should cease and mitigation put in place); and post-works monitoring to ensure that any settlement is in line with the baseline readings.

Grade II* Concrete Footbridge across River Trent (MM038)

- 6.2.6 This asset is immediately adjacent to a temporary access route which will be used to reach a works compound required to construct a new section of road bridge. The quality or type of foundations to this bridge are unknown and the construction of the bridge is slender and of reinforced concrete now over 100 years old, which can be subject to considerable deterioration over time. The level of maintenance to and strength and condition of the bridge, is unknown. Therefore, ‘three season’ monitoring will be required to establish a baseline before construction works begin; to monitor the range of movement during construction and ensure any vibration does not exceed an agreed threshold (in which case, works should cease and mitigation put in place); and post-works monitoring to ensure that any settlement is in line with the baseline readings.

6.3 Condition Survey

- 6.3.1 In addition to vibration monitoring, a condition survey of the Grade II Causeway Arches 500m north-west of level crossing (MM228) is required.
- 6.3.2 This is in order to determine the assets structural and material condition prior to works commencing, as well as its foundation design. This will ensure that any remedial works to the structural condition of the building can be carried in accordance with the construction programme, and the information can be used to inform the rebuilding programme to ensure appropriate materials and methodology for the rebuilt (west) side.

6.4 Building recording

- 6.4.1 The Grade II Causeway Arches 500m north-west of level crossing (MM228) is to be subject to partial demolition as a result of the Scheme. Loss of historic fabric is required to be recorded prior to its loss in accordance with Historic England guidance. 'Understanding Historic Buildings: A guide to good recording practice'¹⁴.
- 6.4.2 This guidance states that in cases of dismantling prior to re-erection or proposed demolition, a detailed understanding of the fabric of the building is required and an assessment of the significance of the building and a record of what is to be lost is also required. This requires recording on the levels of 2-4 depending on the significance of the building, or the fabric to be lost.
- 6.4.3 In line with the guidance and in consultation with NCC and NSDC Stakeholders it has been determined that the Grade II Causeway Arches 500m north-west of level crossing (MM228) will be the subject of building recording commensurate with a Historic England Level 2 historic building survey. The methodology for the historic building recording will be set out in a task specific WSI to be produced by the appointed Archaeological Contractor and approved by the NCC and NSDC Stakeholders before the survey is undertaken.
- 6.4.4 The survey will completed prior to the commencement of any construction works (including any pre-commencement works) to the heritage asset and updated should new information be revealed during the course of the works.

¹⁴ Historic England, 2016. Understanding Historic Buildings: A Guide to Good Recording Practice. [Available online]: [Understanding Historic Buildings: A Guide to Good Recording Practice \(historicengland.org.uk\)](https://www.historicengland.org.uk). (last accessed December 2023),

6.5 Fencing

- 6.5.1 Temporary noise fencing will be erected for construction in appropriate locations including; grade II listed Farndon Windmill (MM139), grade II listed Lowwood (MM053), grade II listed Langford Hall (MM026) and the designated Conservation Area at Winthorpe (MM432).
- 6.5.2 Physical protection fencing will be erected for construction in appropriate locations including; areas of preservation in situ south of Farndon roundabout (MM503), the early medieval settlement at Winthorpe (MM876), and the Scheduled monuments Civil War redoubt 550m south east of Valley Farm (MM007) in close proximity to Cattle Market Roundabout and listed buildings Smeaton's Causeway Arches (MM228) and Farndon Windmill (MM139). Further fencing may be required in agreement with Stakeholders in areas of identified archaeology which are not anticipated to be directly impacted by construction activities.

6.6 Excavation

- 6.6.1 Areas which may require open area excavation have been identified through previous surveys as well as areas which may require archaeological monitoring however, specific methodologies and locations for these will be dependent on the results of the Phase 2 test pitting and trial trench evaluation.
- 6.6.2 All work will be undertaken according to task specific WSI's to be produced by the appointed Archaeological Contractor and approved by the Clients and Stakeholders and will be undertaken in accordance with all relevant ClfA and Historic England standards and Guidance as per Chapter 7 Overarching guidance and methodologies section of this document.

Additional trenching and hand test pitting

- 6.6.3 Any areas that were not accessible during the Phase 2 works may require an evaluation phase prior to further archaeological works. This may include trial trenching and hand test pitting. Currently area 52 (Appendix F Trial Trench Evaluation WSI of this AMP) is the only area which may require such works, however any other areas which are identified as inaccessible will be included within the AMP as the Phase 2 evaluation progresses.
- 6.6.4 All works will be undertaken according to a task specific WSI's to be produced by the Appointed Archaeological Contractor and approved by the Clients and Stakeholders and will be undertaken in accordance with the ClfA Standards and Guidance for evaluation¹³, as well as any

other relevant standards and guidance as identified in Chapter 7 of this document.

Open area excavation

- 6.6.5 It is anticipated that open area excavation will be undertaken in areas of high concentrations of archaeology or those areas of archaeology of high significance. Areas of open area excavation currently anticipated to include 20, 21, 22 23, 24, 26, 48 and 51 (Appendix F Trial Trench Evaluation WSI of this AMP).
- 6.6.6 This work comprises of the archaeological stripping of an area and the systematic excavation and recording of the features revealed. This normally includes excavating 10% of every linear feature and 50% of every pit or posthole, as per Section 7.3 of this AMP.
- 6.6.7 During the excavations any artefacts are removed, processed and analysed by experts. Samples of the excavated material are also taken to be analysed for environmental remains and smaller artefacts, as per Sections 7.4 and 7.5 of this AMP.
- 6.6.8 It is anticipated that an element of metal detecting will be undertaken as part of this work, both to protect against loss of artefacts through nighthawking¹³ and to ensure the full recovery of metal artefacts, particularly any from the Civil War era.
- 6.6.9 All works will be undertaken according to a task specific WSI's to be produced by the Appointed Archaeological Contractor and approved by the Clients and Stakeholders and will be undertaken in accordance with the ClfA Standards and Guidance for excavation¹⁵ as well as any other relevant standards and guidance as identified in Chapter 7 of this document.

Archaeological monitoring

- 6.6.10 Archaeological monitoring will take place in areas of lower concentrations of archaeological potential and/or those areas which will be minimally impacted, area 32 (Appendix F Trial Trench Evaluation WSI) has already been identified for this work.
- 6.6.11 The work will comprise the monitoring of the topsoil strip by a qualified and experienced archaeologist. The archaeologist will halt work if archaeology is identified and the features will be suitably excavated and recorded.
- 6.6.12 All works will be undertaken according to a task specific WSI's to be produced by the Appointed Archaeological Contractor and approved by the Clients and Stakeholders and will be undertaken in accordance

¹⁵ ClfA. 2020. Standard and guidance for archaeological excavation
https://www.archaeologists.net/sites/default/files/ClfAS&GExcavation_1.pdf

with the ClfA Standards and Guidance for an archaeological watching brief¹⁶ as well as any other relevant standards and guidance as identified in Chapter 7 of this document.

Community outreach

- 6.6.13 The excavation phase of works will provide opportunities for community outreach which could include open days, presentations and opportunities to take part in archaeological fieldwork. These opportunities will be developed prior to and during the Phase 3 works in consultation with Stakeholders, the Client and the Archaeological Contractor and according to the guidance and methodologies set out in Section 7.9.

6.7 Geoarchaeological assessment

- 6.7.1 Bespoke mitigation will be developed in areas of geoarchaeological potential, dependant on the results of the Phase 2 trial trench and geoarchaeological evaluation. It is anticipated this will be undertaken in areas of geoarchaeological potential including areas 2, 3 6, 7 – 9, 11 – 18, 22 and 52 (Appendix F Trial Trench Evaluation WSI).
- 6.7.2 This may include stripping the topsoil under archaeological supervision followed by the excavation of paleochannels and recording of cross sections of the channel. Monolith samples and further environmental sampling may also be required. This will allow the identification of any related archaeological activity and full sampling of the paleochannels as per section 7.3, 7.4 and 7.5 of this document.
- 6.7.3 Gridded mitigation may be required in areas of Holme Pierrepont Sands and Gravels in Areas 52, and 22 (Appendix F Trial Trench Evaluation WSI).
- 6.7.4 All works will be undertaken according to a task specific WSI's to be produced by the Appointed Archaeological Contractor and approved by the Clients and Stakeholders and will be undertaken in accordance with the Historic England Standards and Guidance for Geoarchaeology¹⁷ as well as any other relevant standards and guidance as identified in Chapter 7 of this document.

¹⁶ ClfA. 2020. Standard and guidance for an archaeological watching brief. [online] available at: [ClfAS&GWatchingbrief_2.pdf \(archaeologists.net\)](#) (last accessed December 2023)

¹⁷Historic England. 2015. Geoarchaeology Using Earth Sciences to Understand the Archaeological Record

6.8 Reporting and archiving

- 6.8.1 Weekly updates will be provided to all relevant groups (including the Client and Stakeholders) by the Archaeological Contractor throughout the Phase 3 works with any particularly significant results reported at the earliest opportunity. Photographs will be uploaded to a shared site on a minimum of a weekly basis.
- 6.8.2 Site visits for Stakeholders, Design Consultants, Principal Contractors and the Client shall be organised when appropriate and as required.
- 6.8.3 All fieldwork will be fully reported and archived as per ClfA standards and guidance (see Section 7.7 and 7.8). This will comprise of individual fieldwork reports in the first instance, with the potential for the production of publications based on any highly significant results.

7 Overarching guidance and methodologies

7.1 Introduction

7.1.1 This Chapter sets out the general methodology which should be followed for all phases of archaeological works associated with the Scheme. It also sets out the relevant policy and guidance which should be adhered to.

7.2 Health and safety

7.2.1 The health and safety requirements specific to this Scheme are detailed below and are followed for each archaeology survey that takes place:

- Appointed Archaeological Contractors prepare appropriate Risk Assessments and submit these to the Design Consultant and Principal Contractor for approval prior to starting on site.
- All staff involved in the fieldwork hold the applicable Construction Skills Certification Scheme (CSCS) qualification and a qualified first aider is present on site at all times. Any visitors to site conform to the specific health and safety standards.
- All staff wear appropriate health and safety Personal Protective Equipment (PPE) taking note of the type of work being undertaken and its prerequisites. All staff conform to the Principal Contractor's Health and Safety requirements including undertaking a site induction as well as a Safety Critical Medical if working within 5 meters of the live carriageway.
- The provision and maintenance of suitable and sufficient welfare facilities at appropriate locations for the duration of the works are arranged between the Archaeological Contractor and the Principal Contractor.

7.3 Recording

7.3.1 All archaeological remains will be recorded in accordance with best practice and guidance, including ClfA's standard and guidance on archaeological evaluation¹³ and standard and guidance on archaeological excavation¹⁵.

7.3.2 All excavated contexts should be fully recorded by detailed written context records.

7.3.3 Written and photographic records will be maintained at all sites, even where archaeological features have not been encountered, in order to

document the scope of works, their location and presence/absence of archaeological remains.

- 7.3.4 A born-digital approach should be adopted in the first instance. Records should be created and maintained on a Common Data Environment (CDE) which has sufficient security and back up procedures. The Archaeological Contractor's approach to digital recording should be outlined in the WSI, within a Data Management Plan (see Section 7.3 of this AMP).
- 7.3.5 Any written records should be completed in black or permanent ink and any drawings should be completed using a hard pencil (2H or 4H).
- 7.3.6 The record of archaeological investigations will include, at minimum:
- The site/trench codes as defined by the Archaeological Contractor
 - The location of the trenches
 - The date(s) of the evaluation
 - Personnel involved in the evaluation
 - A description of the evaluation works
 - Scope of evaluation works and depths, if applicable
 - A description where observation of archaeological features was obscured, including where and any reasoning
 - Location and description of any archaeological remains
 - Location and description of any modern deposits/remains
 - Areas and depths where archaeological remains were left in situ
- 7.3.7 On site recording of archaeological features will consist of:
- Completion of pro-forma record sheets, including the unique site code
 - Trench locations and the extent of excavated areas should be surveyed using a differential GPS. Features should be surveyed using a GNSS GPS.
 - Plans and sections of all exposed archaeological features and horizons, including the boundary with the natural geology. These should be done to an appropriate scale. A scale of 1:100 or 1:200 will be utilised to initially map all trenches and the exposed archaeology. These should then be linked to individual trench plans, with features planned at 1:20. All sections should be drawn at 1:10. All features should be accurately tied into the Ordnance Survey National Grid and Ordnance Datum.
 - Photography should be carried out in line with current industry best practice and any requirements from the local authority. A photographic record of the archaeological features, layers, structures etc, alongside an appropriate scale and accompanying register. Working shots should also be taken to establish the wider context and scale of the evaluation works. This should be with an SLR digital camera, with a minimum 16 megapixels quality, and capture RAW and JPEG data.
 - A record of the datum levels of archaeological deposits

- A record of any special/small finds
- Environmental sample register
- Indices of context records, drawings samples and photographs to be maintained and checked

7.4 Finds

7.4.1 Artefacts will be collected, stored and processed in accordance with standard methodologies and national guidelines, as well as local authority and receiving museum requirements. This includes:

- ClfA Standard and Guidance for the collection and documentation, conservation and research of archaeological materials¹⁸
- English Heritage 2006¹⁹
- Historic England 2010²⁰
- Historic England 2018²¹
- Historic England 2019²²
- ICON's professional standards and ethics 2014²³
- Society of Museum Archaeology 2020²⁴

Methodology

7.4.2 All finds shall be recorded by context with special, or small, finds being recorded three dimensionally and given a sequence of unique numbers. All finds should be collected and retained, however certain classes of material may be discarded after recording and a representative sample retained. However, this needs to be agreed with the receiving museum and relevant Stakeholder in advance.

7.4.3 Exposed finds will be lifted at the end of the working day. Where removal cannot be undertaken on the same day as exposure, suitable security measures will be taken to protect artefacts from theft or damage.

7.4.4 Provision for on-site conservation and finds treatment will be undertaken, where appropriate.

¹⁸ ClfA 2020. Standard and guidance for the collection, documentation, conservation and research of archaeological materials. [online] available at: ClfAS&GFinds_2.pdf (archaeologists.net) (last accessed December 2023).

¹⁹ Historic England 2006. Guidelines on the X-radiography of archaeological metalwork

²⁰ Historic England 2010 Waterlogged Wood Guidelines on the recording, sampling, conservation and curation of waterlogged wood

²¹ Historic England 2018a Waterlogged Organic Artefacts Guidelines on their Recovery, Analysis and Conservation

²² Historic England 2019. Animal Bones and Archaeology - Recovery to archive.

²³ ICON 2014. professional standards and ethics

²⁴ Society of Museum Archaeology 2020. Standards and Guidance in the Care of Archaeological Collections

- 7.4.5 The Archaeological Contractor is responsible for the protection of finds and artefacts both on site and during transportation to a post-excavation facility.

Recording

- 7.4.6 All finds recording on site will include as a minimum:
- The site/trench codes as defined by the Archaeological Contractor
 - The location of the evaluation works area
 - Context number in which the artefact(s) were found
 - Designated find number, if appropriate
 - Material type
 - Brief description of the artefact
- 7.4.7 All finds will be labelled and bagged or boxed, where possible, with attached identification tags in plastic bags and entered into an on-site finds register and numbered accordingly. Any finds that are too large to be bagged will be labelled in an appropriate and visible manner with a finds tag.
- 7.4.8 All lithic artefacts found within a definable scatter, with a maximum linear dimension (MLD) of 10mm will require 3D plotting prior to recovery and then individually bagged and recorded as registered finds. Non-tool fragments of less than the MLD should be bagged according to an appropriate spatial recording system consistent with the context they are found within.

Treasure

- 7.4.9 Any finds covered by the provisions of the Treasure Act²⁵ (1996, amended 2023) and Treasure (Designation) Order²⁶ (2002, amended 2023) will be moved to a safe place. Where removal cannot be undertaken on the same day as discovery, suitable security measures will be taken to protect the artefacts from theft or damage. This should be coordinated with the Client.
- 7.4.10 Any treasure finds must be reported to the coroner's office. They will also be reported to the local Finds Liaison Officer from the Portable Antiquities Scheme.

²⁵ Department for Culture, Media and Sport 2023. Treasure Act: Code of Practice

²⁶ Department for Culture, Media and Sport 2023. Treasure (Designation) Order

Human remains

- 7.4.11 No known burial sites are recorded within the Order Limits, however the evaluation work may result in the discovery of unexpected human remains.
- 7.4.12 It is illegal to remove human remains without a license from the Secretary of State, in accordance with Section 25 of the 1857 Burial Act. The following methodology will apply where human remains are encountered. All human remains will be treated in accordance with national and local policies and guidance, specifically:
- McKinley and Roberts, 1993. Excavation and post excavation treatment of cremated and inhumed human remains.²⁷
 - APABE, 2017. Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England. ²⁸
 - Historic England, 2018. The Role of the Human Osteologist in an Archaeological Fieldwork Project.²⁹
 - Mitchell and Brickley, 2017. Updated Guidelines to the Standards for Recording Human Remains³⁰
- 7.4.13 Where human remains are encountered, all excavation of the deposit(s) will cease and the Archaeological Contractor will inform the Design Consultant. Initially, the remains will be left in situ, covered and protected, pending discussions between the Archaeological Contractor, Design Consultant, the relevant Stakeholder and Client regarding the need for excavation/removal.
- 7.4.14 If the human remains are to be retained in situ, then they must be recorded as is and accurately located using a GPS so they can be located and treated appropriately during the mitigation phase.
- 7.4.15 If removal of human remains is deemed necessary, then the removal of human remains should be undertaken in accordance with Article 51 of the draft DCO **(TR010065/APP/3.1)**.
- 7.4.16 Human remains will be treated with dignity and respect at all times. It may be necessary to screen off human remains from public view. All articulated and disarticulated human remains, including structured burials and charnel, will be exposed to define their extent and then excavated and lifted in a logical and appropriate manner with the suitable tools. Each excavated individual will be bagged separately and permanently labelled as to content and cross referenced with the archaeological records of the excavation (APABE 2017). Different

²⁷ McKinley and Roberts, 1993. Excavation and post excavation treatment of cremated and inhumed human remains

²⁸ APABE, 2017. Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England

²⁹ Historic England, 2018. The Role of the Human Osteologist in an Archaeological Fieldwork Project

³⁰ Mitchell and Brickley, 2017. Updated Guidelines to the Standards for Recording Human Remains

- skeletal areas and bones from the left and right sides will be bagged separately (APABE 2017, Annex S3, 38) and all bags labelled.
- 7.4.17 Any exposed associated artefacts, including grave goods, will be recorded and removed at the end of the working day to limit the risk of theft and disturbance. If not possible, then security will be required and should be coordinated with the Client.
- 7.4.18 Samples may be taken from the fill around the head and around the torso and feet for the recovery of small bones/teeth and for the possibility of further scientific investigation (APABE 2017, Annex S3, 38). The sampling strategy should be designed by a suitably qualified and experienced Osteoarchaeologist.
- 7.4.19 Unstratified, disarticulated human remains will be rapidly screened when discovered. An Osteoarchaeologist should determine what the appropriate course of further investigation should be, in consultation with the Design Consultant.
- 7.4.20 All human remains should be bagged and boxed with an assigned identification number or code.
- 7.4.21 All applicable pro forma record forms, including context sheets and skeleton recording sheets, should be completed. Written descriptions should include details about the human remains and their surrounding context, including any information regarding truncation and completeness of the skeletal remains. The location of all skeletons should be accurately located on plans and mapped using measured photogrammetry and tied into the OS NGR.
- 7.4.22 Any photographs taken should be done in a sensitive manner. Only authorised photographs should be taken and a suitable scale should be visible in all photographs. These should conform to the minimum standards set out in Section 7.5 of this AMP.

7.5 Environmental sampling

Overview

- 7.5.1 All environmental sampling will be conducted in accordance with national, regional and local policies and guidance. All aspects of the collection, selection, processing, assessment and reporting on the environmental sampling shall be undertaken in accordance with the principles set out in Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation³¹ and with reference to the Association for Environmental

³¹ English Heritage, 2011. Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition)

Archaeology's Working Paper No. 2, Environmental Archaeology and Archaeological Evaluation³².

Methodology

- 7.5.2 Where archaeological remains are uncovered, individual contexts will be assessed for the suitability of environmental sampling. Bulk samples will be taken from appropriate contexts to assess archaeological features and the natural deposit sequence in which archaeological remains are discovered. Provision will be made for column and other samples to be taken, where appropriate.
- 7.5.3 The sampling strategy should be agreed upon in advance with the relevant Stakeholder and, where relevant, the Historic England Science Advisor. As a minimum, bulk samples will be taken for most archaeological contexts. Provision will also be made for column or other necessary sampling.
- 7.5.4 Bulk samples will be taken using 10L plastic, lidded tubs (with handles) or securely fastened strong polythene bags (double bagged). All sample tubs/bags will be appropriately and clearly labelled with site codes, context details and sample information using permanent ink.
- 7.5.5 Bulk samples of dry context will be taken in the range of 40L-60L as appropriate. Samples of wet (i.e. waterlogged) deposits should total 20L. Where the context is of a lower volume, 100% of the context will be sampled.
- 7.5.6 Monolith and Kubiena box samples should be taken where necessary to allow for specialist analysis of deposits. The location and depth should be accurately recorded, and all samples should be taken with a 50mm overlap where more than one monolith is required. Column samples should also be taken down the length of a section where appropriate. These samples should be neatly packed and secured with plastic and rubber bands. All samples will be appropriately and clearly labelled with site codes, context details and sample information using permanent ink.
- 7.5.7 In waterlogged conditions, it is possible that timbers will survive below ground. Where there is potential for timbers to be dated, they should be sampled following guidelines in *Waterlogged Wood: Guidelines to the Recording, Sampling, Conservation and Curation of Waterlogged Wood*. Should such remains be encountered, a specialist conservationist should be deployed to site to oversee the recovery, recording, and conservation of the remains.

³² Association for Environmental Archaeology, 2018. Working Paper No. 2, Environmental Archaeology and Archaeological Evaluation.

- 7.5.8 The Archaeological Contractor is responsible for the safekeeping of samples on-site and during transportation to the post-excavation processing facility.

7.6 Post Excavation

Overview

- 7.6.1 Where archaeological remains are encountered and finds recovered and samples taken, a post-excavation research strategy will be prepared by the Archaeological Contractor, following the completion of the Phase 2 fieldwork programme.

Finds

- 7.6.2 Artefacts will be cleaned and conserved, where necessary, to allow for identification and to accommodate further investigation.
- 7.6.3 Post-excavation storage will be secure and appropriate to the material and significance of the object. Analysis will be in line with national best practice guidelines for artefact conservation and may include x-radiography and consolidation as part of the process.

Human remains

- 7.6.4 Human remains should be reburied unless exceptional circumstances call for their retainment for future study and it is agreed with all relevant parties.
- 7.6.5 If subject to further study, analysis must be carried out by a trained osteologist. The remains must be treated in accordance with established guidelines (see Section 7.5 of this AMP). Preliminary assessment will be undertaken to evaluate the potential of the assemblage to yield further information.
- 7.6.6 If the skeletal assemblage is worthy of further study, then appropriate archiving and long-term storage procedures should be undertaken according to established guidelines (see Section 7.6 of this AMP).
- 7.6.7 As with pre-excavation processes, due consideration of the ethical treatment of any human remains should be taken into consideration during the post-excavation phase.

Environmental samples

- 7.6.8 The techniques employed for post-excavation analysis will be determined by a suitable experienced and qualified palaeoenvironmental specialist.

- 7.6.9 Processing and assessment of samples should be undertaken in line with an agreed environmental sampling strategy (as outlined in the Archaeological Contractor's WSI) and relevant guidance. Samples should be processed and assessed under the supervision of a palaeoenvironmental specialist.
- 7.6.10 Where appropriate, suitable samples for scientific dating will also be recovered, including from geoarchaeological cores. Dating techniques shall only be applied where required to meet the aims and objectives of the investigation and in consultation with the Design Consultant and, if relevant, the Historic England Science Advisor. The Archaeological Contractor shall make provision for submitting a justified proposal and number of samples for radiocarbon dating.
- 7.6.11 If suitable deposits exist, samples will be submitted for specialist assessment (pollen, diatom/ foraminifera) to identify the potential for past environmental reconstruction.
- 7.6.12 All processing, recording, cleaning, storage and conservation of samples shall be in accordance with the ClfA Standard and guidance for the collection, documentation, conservation and research of archaeological materials.

Digital Data

- 7.6.13 The Scheme Data Management Plan (DMP) should be adhered to for the creation, management and eventual deposition of digital data. The Archaeological Contractor will contact Archaeological Data Service (ADS) to discuss eventual data deposition, as well as estimated costs.
- 7.6.14 Any paper and written records created during fieldwork should be scanned and a digital copy created. ADS guidance on file types should be followed although PDF format is the current preferred type.
- 7.6.15 The Archaeological Contractor should maintain a working archive within a Common Data Environment (CDE). ADS standards and guidance will be followed regarding folder structures, appropriate file formats and file naming. In addition, ClfA's Dig Digital³³ will also be referred to.

7.7 Reporting

Overview

- 7.7.1 All reporting will be conducted in accordance with national, regional and local policies and guidance. Reports will be issued following the

³³ ClfA Toolkit for selecting archaeological archives [online] available at: <https://www.archaeologists.net/selection-toolkit> (last accessed December 2023).

agreed channels Archaeological Contractor – Design Consultant –
Principal Contractor – Stakeholders and Client.

Weekly reporting

7.7.2 It is expected that for all surveys a minimum of weekly updates will be provided by the Archaeological Contractor to the Design Consultant. This should be issued via email on the first day of each week throughout the fieldwork. It should include:

- Details of where archaeological fieldwork has taken place during the previous week
- Any archaeological features located
- Any significant finds and discoveries
- The progress against the agreed programme

7.7.3 In addition, the Archaeological Contractor is also expected to provide brief, ad hoc updates, at the request of the Design Consultant and/or Client.

7.7.4 It is anticipated that regular progress meetings will be held on site with the relevant Stakeholders during the course of fieldwork. These meetings shall be arranged by the Design Consultant and a programme of monitoring visits/meetings will be agreed upon prior to the commencement of fieldwork.

Reporting requirements for fieldwork

7.7.5 Upon completion of fieldwork, the Archaeological Contractor will prepare a fieldwork report within four to 12 weeks of completion. This will be dependent on the scope and nature, the results and any external specialist reports required, which are associated with the fieldwork. Should extensive and significant archaeological remains be encountered during fieldwork, then this timetable may be extended subject to agreement with the Design Consultant.

7.7.6 The Archaeological Contractor and the Design Consultant should agree on the reporting timescales once the fieldwork has been completed.

7.7.7 The report will adhere to national standards and will include the following, as a minimum:

- A non-technical summary
- Contents list
- List of tables, figures etc
- Introduction
- Summary of background
- Description and illustration of site location
- Geological and topographical background

- Archaeological and historical background, including previous, relevant archaeological interventions
- Aims and objectives
- Methodology
- Results
- Statement of significance regarding the archaeological resource and potential
- Assessment of results in terms of the Site-specific aims and wider context
- Conclusions and recommendations for appropriate further archaeological investigation and mitigation with reference to the specific aims and research agenda as set out in Chapter 4 of this AMP
- Statements regarding the archive
- Bibliography
- Acknowledgements
- Site matrix, if applicable
- Trench, context, find, drawing, photographic, environmental sample registers, as applicable
- General and detailed plans showing the location of the investigation areas accurately positioned on an OS base with grid co-ordinates
- Photographic archive
- A copy of the OASIS form

Geoarchaeological assessment

- 7.7.8 The geoarchaeological assessment also has its own specific additional minimum requirements which are listed below.
- 7.7.9 A preliminary interpretation of the soil and sediment characteristics of the cores will be made, including a summary of the stratigraphy that will characterise the deposit sequence and identify soil/sediment formation processes. The description of each deposit will include sediment type, inclusions, colour, bedding and nature of contacts to overlying and underlying units. The report will also include appropriate lithological diagrams.
- 7.7.10 An interim summary assessment report will be produced shortly after completion of the fieldwork in order to inform the design of any subsequent archaeological mitigation.
- 7.7.11 A final geoarchaeological assessment report shall be prepared and will include a complete lithological description, following standard sedimentary conventions and the Troels-Smith system and incorporating the results of specialist assessment and dating.
- 7.7.12 The final geoarchaeological assessment report will illustrate the sub-surface topography and shall characterise the sediments present on the site and indicate the potential of the core sample taken for

environmental reconstruction. If appropriate, it will include a fully justified and costed proposal for analysis and publication.

- 7.7.13 The geoarchaeological assessment will be placed within the context of any previous investigations and assessment work undertaken in the vicinity of each site to aid the interpretation of the deposit sequence.

Human Remains

- 7.7.14 Reporting of the excavation and/or removal of human remains will be incorporated into the relevant archaeological investigation report (see below), or independent report if the investigations have been carried out separately.

Report submission

- 7.7.15 Copies of the draft report will be sent to the Design Consultant for their review and onward transmission to the Client and relevant Stakeholders for comment. Final copies will also be deposited with the Nottinghamshire HER.
- 7.7.16 An OASIS form will be completed and appended to the report. A digital copy of the report will be deposited with the ADS.

Post investigation assessment

- 7.7.17 On completion of fieldwork, a methodology for processing, sampling and analysis of, where appropriate, artefacts, ecofacts, environmental samples and human remains recovered during the evaluation will be determined. This should be proportionate to the character and complexity of the data recorded and recovered. This will enable an informed decision to be made with regards to further archaeological mitigation, as well as the post-excavation processes for the data recovered for further analysis.
- 7.7.18 A draft interim post-excavation assessment report will be prepared and submitted for review by the Design Consultant. Following any necessary revisions, the Archaeological Contractor will submit a final version of the report to the Design Consultant for approval and dissemination to relevant Stakeholders and the Client.
- 7.7.19 The reporting will include, as a minimum:
- A non-technical summary
 - Introductory statements
 - Aims and objectives
 - Methodology
 - Results and conclusions
 - A table summarising the deposits, features, classes and number of artefacts encountered and spot dates of small/significant finds

- A synthesis of findings and research aims achieved to date
- Proposed further stages of archaeological analysis and reporting
- A synthesis of specific research aims that could be answered through the implementation of an updated design
- Recommendations for any appropriate and proportionate fieldwork to achieve the identified objectives
- Proposals for deposition of the complete archive

7.8 Archive

Overview

7.8.1 Data recorded and recovered during the course of fieldwork should be, where appropriate, copied, backed up and held securely in line with current good practice, until it can be deposited in the agreed, relevant recipient depository and repository³⁴. The recipient organisations should be identified by the Design Consultant, in consultation with the relevant Stakeholders. Details of the recipient organisations will be agreed before fieldwork commences.

Methodology

7.8.2 The methodology for archiving the physical (includes the documentary archive) and digital archives is included within this section.

7.8.3 All archiving will comply with national, regional and local standards and guidance including:

- Archaeological Archives Forum (AAF), Archaeological Archives: A Guide to best practice in creation, compilation, transfer and curation (2011)³⁵
- ClfA, Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (Updated 2020)³⁶
- Europae Archaeologia Consilium (EAC), A Standard and Guide to Best Practice for Archaeological Archiving in Europe (2015)³⁷
- Historic England, Management of Research Projects in the Historic Environment (MoRPHE) (2015)³⁸

³⁴ Repository generally refers to where digital data will be stored. A depository refers to where physical material will be stored

³⁵ Archaeological Archives Forum (AAF), 2011. Archaeological Archives: A Guide to best practice in creation, compilation, transfer and curation.

³⁶ ClfA, 2020. Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives.

³⁷ Europae Archaeologia Consilium (EAC), 2015. A Standard and Guide to Best Practice for Archaeological Archiving in Europe

³⁸ Historic England, 2015. Management of Research Projects in the Historic Environment (MoRPHE)

- Archaeological Data Service (ADS) guidance on archiving digital material³⁹
- ClfA and DigVentures, Dig Digital guidance should be considered with relation to digital archiving³³
- The ClfA toolkit for selecting archaeological archives (2019) should also be considered during archiving⁴⁰

Post-fieldwork requirements

- 7.8.4 Immediately upon completion of the finalised assessment report, the report and any data or other documentation produced during the post-excavation process shall be integrated into the site archive. The Archaeological Contractor shall store the archive in suitable conditions in a secure location until instructions are received from the Design Consultant for its deposition.
- 7.8.5 Upon completion of each phase, the landowner will be contacted regarding the preparation, ownership and deposition of the archive and finds. The local museum will also be contacted to ascertain whether deposition can be attained.
- 7.8.6 The Archaeological Contractor will have storage facilities in place to temporarily hold the archive for a period of one year following completion of fieldwork. This should be an appropriate period of time for archive preparation and deposition.

Physical archive

- 7.8.7 The physical archive includes all records and materials recovered during an archaeological project and identified for long-term preservation, including artefacts, ecofacts and other environmental remains, waste products and scientific samples. The documentary archive includes written and visual documentation generated during an archaeological works t including context records, plans and photographs.
- 7.8.8 The archive should be consolidated after completion of each phase of archaeological work, with records and finds collated and ordered as a permanent record which is accessible, stable and secure.
- 7.8.9 The physical archive should be appropriately labelled, including the site code and be consistent within the confines of the works. A contents list will also be included within the archive.

³⁹ Archaeological Data Service (ADS) guidance on archiving digital material

⁴⁰ ClfA Toolkit for selecting archaeological archives <https://www.archaeologists.net/selection-toolkit>

- 7.8.10 The documentary archive will also be securely copied as PDF/A files and deposited digitally, alongside born digital material (see Section 15.5), with the ADS.
- 7.8.11 Prior to the deposition of the material archive, all finds will be kept secure and clean, wherever possible. They will be recorded and catalogued and stored in suitable archive boxes or in conditions suitable to their material composition and size as per national guidelines.
- 7.8.12 All finds will be labelled, with reference to the accession number, and accompanied with catalogues and copies of specialist reports.
- 7.8.13 The retention, selection and dispersal of finds will be carried out after discussion with the receiving museum and relevant specialists prior to museum deposition.
- 7.8.14 In the case where finds are retained, landowner consent will be required to allow transfer of the finds. A Deed of Transfer will be drawn up by the relevant museum for signing by the landowner. The complete finds inventory and further finds information can be provided to the landowner, on request.
- 7.8.15 The Site archive will be deposited with the relevant museum within one year of the completion of all fieldwork (if no further work is required). It will then become publicly accessible.

Human remains

- 7.8.16 Archiving of the physical and digital records will comply with the methodology set out above.
- 7.8.17 Generally, human remains should be reinterred at an appropriate location within two years. This should be the case for human remains which will not be subject to further analysis. However, this time limit may be altered after consultation with the Ministry of Justice.

Digital archive

- 7.8.18 The Archaeological Contractor will complete OASIS records for each individual phase of archaeological works which result in a report, as soon as possible after the completion of the works. All applicable sections of the record should be completed.
- 7.8.19 A digital copy of the final report will be deposited with the ADS.
- 7.8.20 The creation, management and deposition of digital files should adhere to the DMP set out in the fieldwork WSI, as well as ADS standards and guidance (see Section 13.5 of this APM).
- 7.8.21 Not all digital data should be kept in perpetuity. Digital data should be subject to appraisal and selection, following ClfA's Selection Toolkit

and Dig Digital guidance. This should be included within the Archaeological Contractor's WSI.

- 7.8.22 The archived data will be in appropriate file formats, in accordance with ADS requirements, as well as any national and regional guidance. Agreed file formats should be recorded within the DMP.
- 7.8.23 Archives should be accessible as possible and the key principles within ADS Accessibility Guidance for Depositors⁴¹ should be followed.
- 7.8.24 The Archaeological Contractor and ADS should have a formal data agreement in place, with regards to the processing and securing personal information during archiving of digital data, in accordance with GDPR.

7.9 Public engagement and outreach

- 7.9.1 It is envisaged that most public outreach will take place during the Phase 3 works. The below outlines the potential public engagement and outreach for the phase 3 works. The commitment to public outreach will be set out in the relevant WSI's and where possible details of such outreach will also be included.
- 7.9.2 The archaeological programme for the Scheme has the potential to reveal evidence of human activity dating from the Late Upper Palaeolithic period. The archaeological works offer potential for a comprehensive outreach and interpretation programme. These could involve activities such as on-site events involving public tours of the archaeological excavation, through to online lectures regarding the work and permanent interpretation materials incorporated into public realm.
- 7.9.3 It is expected that the Archaeological Contractor will demonstrate a commitment to public outreach. They will be expected to provide information concerning how they will carry out public outreach, but also demonstrate any innovative approaches to engaging local communities.
- 7.9.4 The detailed design for an associated outreach strategy for the archaeological programme will be agreed upon by the Client, the Design Consultant, Principal Contractor, Archaeological Contractor, relevant Stakeholders and the recipient museum. The design will be focused around the results of the archaeological works and the wider context. It should be updated throughout the archaeological programme, to reflect the most up to date knowledge regarding the scheme's archaeological resource.

⁴¹ ADS 2021, Accessibility Guidelines for Depositors. Available at:

████████████████████ (last accessed December 2023).

7.9.5 The Archaeological Contractor is expected to:

- Appoint a community archaeological/public engagement officer who will lead on the development and implementation of a public outreach strategy for the lifetime of the archaeological works. Costs associated with this role must be included in tender responses and budgets
- Present the work to the public through a variety of formats. This could include on-site tours, open days during the fieldwork, lecture series, engagement with local schools etc. Any engagement with the public on active archaeological sites must be incorporated within the WSI and health and safety documentation.
- Produce a suite of materials and activities with which to engage the public. This could include interactive, hands on events like pop-up museums, artefact handling, artefact reconstruction events
- Produce synthetic, themed post-excavation outputs suitable for targeted audiences. This could take the form of slim volumes or digital outputs such as websites and apps.

7.9.6 Work closely with the Client to identify opportunities for interpretation and enhancement during detailed design. This could include incorporating interpretation materials into the public realm, commissioning artwork, and creating trails.

7.10 Communication and Monitoring

7.10.1 The Archaeological Contractor shall liaise directly with the Design Consultant in all instances concerning fieldwork and post-excavation phases, unless specifically requested otherwise. All consultation and site liaison with the Client and the relevant Stakeholders will be the responsibility of the Design Consultant unless otherwise stated. Any enquiries on the archaeological works from interested parties (including the media) should be referred to the Design Consultant who will inform the relevant parties.

7.10.2 All work will be undertaken in accordance with this AMP and the WSI prepared by the Archaeological Contractor in advance of the works and approved by the Design Consultant, the Client and the local authority Stakeholders. Any departures from this brief or working to the agreed WSI will be made explicit and agreed with all parties first.

7.10.3 The archaeological investigations will be monitored at regular intervals by the Design Consultant, the Client and the local authority Stakeholders. The Design Consultant will agree suitable monitoring dates with the Archaeological Contractor and notify the local authority Stakeholders in advance of the start of work on the site. Monitoring frequency will be agreed with the local authority Stakeholders.

A. Appendix: Geophysical Survey WSI

A46 Newark Northern Bypass, Nottinghamshire: Written Scheme of Investigation for an Archaeological Geophysical Survey



Archaeological
Management Solutions



Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery
Partnership Framework

B [REDACTED]

24 May 2022

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Archaeological Management Solutions

Fahy's Road, Kilrush, Co. Clare. V15 C780

T +353 (0)65 810 3001

**Disclaimer**

The results, conclusions and recommendations contained within this document are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the authors and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the document's completion.

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Abbreviations

Term	Description
ADS	Archaeological Data Service
AMS	Archaeological Management Solutions
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
CRA-V	Check Review Approve - Verify
DCO	Development Consent Order
EAR	Environmental Assessment Report
EIA	Environment Impact Assessment
GIS	Geographical Information System
GPS	Global Positioning System
GR	Grid Reference
HE	Highways England
HER	Historic Environment Record
HLC	Historic Landscape Characterisation
NH	National Highways
OSGB	Ordnance Survey Great Britain
PCF	Project Control Framework
PCF Stage 2	National Highways Project Control Framework Option Selection stage
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement
UKSO	UK Soil Observatory
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this report are georeferenced to OSGB 1936 National Grid coordinate reference system unless otherwise stated.

1 Introduction

1.1 Project Background

1.1.1 This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions Ltd (AMS) on behalf of Skanska Construction UK ('the Client') Ltd on behalf of National Highways Regional Delivery Partnership Framework in advance of a

geophysical survey on lands forming part of the A46 Newark Northern Bypass, Nottinghamshire. Mott MacDonald are acting as archaeological consultants on the project.

- 1.1.2 The A46 Newark Northern Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.
- 1.1.3 The scheme is the subject of a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.
- 1.1.4 The geophysical survey, involving high resolution magnetic gradiometry, will be implemented over twelve discrete areas along the northern section of the scheme and will cover a combined area of approximately 41.64ha.
- 1.1.5 The work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the Client.
- 1.1.6 The results of the survey will help inform the Environmental Impact Assessment to be submitted as part of the Development Consent Order (DCO) application for the proposed development. The results will also aid future archaeological trial trenching along the scheme.
- 1.1.7 The geophysical survey will be conducted alongside a programme of metal detecting and field walking surveys, for which a separate WSI has been prepared.

1.2 Purpose and Scope of this Assessment

- 1.2.1 This WSI sets out the aims of the geophysical survey, and the methods and standards that will be employed. It conforms to current best practice, as well as to the guidance outlined in the Chartered Institute for Archaeologists' (CIfA) standards and guidance for archaeological geophysical survey (CIfA 2014a) and European Archaeologiae Consilium recommendations (Schmidt *et al.* 2016).

1.3 Site Location

- 1.3.1 The geophysical survey will be implemented over twelve neighbouring fields of tillage and pasture (designated as 'Areas 20–31') that extend to the west and north of the Brownhills Roundabout, along the existing A1 and A46, and cover a combined area of approximately 41.64ha. (Table 1; Figure 1).

Table 1: Survey Areas

Area	Size (ha.)
20	7.97
21	7.47
22	4.47
23	2.48
24	1.98
25	1.83
26	4.9
27	1.91

Area	Size (ha.)
28	1.63
29	3.31
30	2.1
31	1.55

- 1.3.2 The underlying bedrock of the locality comprises Mercia Mudstone Group, an early Triassic lithostratigraphic group which is widespread in the English Midlands. Bedrock of this type is of fluvial, lacustrine and marine origin (BGS 2022). Within the area of the geophysical survey the superficial deposits consist of Holme Pierrepont sands and gravels (southwest of the A1), a small area with no mapped superficial deposits (immediately northeast of the A1) and Balderton sands and gravels to the Winthorpe Junction. Both of the sand and gravel geological formations are of fluvial origin, and date to the early to mid Quaternary.
- 1.3.3 The soils are classed as loamy and clayey floodplain soils in Areas 20 and 21; naturally wet, sandy and loams soils in Areas 22 to 24; and free draining, sandy soils in Areas 25 to 31 (UKSO 2022).

1.4 Archaeological Background

- 1.4.1 The EAR (Highways England 2021) noted evidence for settlement along the A46 extending back into prehistory. The Fosse Way Roman Road runs through the scheme area on a northeast–southwest alignment, linking Exeter to Lincoln, with additional Roman remains recorded elsewhere in the vicinity of the scheme. Later activity during the medieval period is indicated by the remains of Newark Castle, a twelfth-century scheduled monument (1003474) and a Grade I listed building (1196278), located in the centre of Newark by the River Trent. This area is also notable for the three separate sieges it was subjected to from 1643 to 1646, during the English Civil War. Indeed, eight of the twelve scheduled monuments, within the 1km area of the scheme, are defensive structures relating to the Civil War. Post-medieval buildings and structures are also present, illustrating the development of Newark during the seventeenth to twentieth centuries. The construction of the Grade II listed building Great North Road causeway arches was carried out from the 1760s and completed in 1770.
- 1.4.2 The earliest Ordnance Survey map of the area of the proposed scheme depicts land use at 1883. The majority of land northwest of the River Trent is regular field systems, typical of enclosure era land divisions. Comparison with current satellite imagery indicates relatively little amalgamation of fields has occurred since.

2 Project Objectives and Aims

2.1 Project Objectives

- 2.1.1 The principal objectives of the geophysical investigation are to:
- provide information on the location and extent of any potential geophysical anomalies,
 - assess the location and extent of known archaeological remains, and

- assess the presence or absence of archaeological features in areas where there are currently no records of archaeological remains.

2.2 Project Aims

2.2.1 The geophysical investigation aims to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey areas,
- accurately locate these anomalies and present the findings in map form,
- describe the anomalies and discuss their potential provenance in a written report,
- incorporate all of the above in a report to the Client and in a Site/Digital Archive.

3 Project Team

The geophysical survey will be conducted for AMS by Dr Ger Dowling, with one survey assistant.

4 Survey Methodology and Instrumentation

4.1 Methods

4.1.1 The geophysical survey will employ high resolution magnetic gradiometry. This technique measures changes in the magnetic properties of the soil and is widely used in modern investigations due to its ability to detect a broad range of subsurface archaeological remains, including ditches and pits, and industrial features associated with metalworking and pottery production.

4.2 Instrumentation

4.2.1 The magnetic survey will be conducted using a five-channel magnetometer system combined with cm-precision GPS (georeferenced to OSGB 1936 National Grid). Mounted on a non-magnetic cart that can be either hand-pushed or pulled by a quad bike, the system records magnetometer and GPS data simultaneously into a single data file. The data capture strategy will involve logging readings at 0.05m intervals along transects spaced 0.5m apart, with a maximum traverse width of 2.5m.

4.2.2 The magnetometer system will be linked to a Trimble R12 GNSS receiver with TSC3 controller, outputting in NMEA mode to ensure a high positional accuracy of each data point.

4.2.3 The sampling strategy produces a high-resolution dataset, giving clarity to any archaeological features detected. The highly accurate positioning of the survey data provides strong confidence when integrating the geophysical results with other datasets such as aerial imagery in GIS, and also ensures repeatability should further investigation of anomalies be required (e.g. test excavation).

4.2.4 A daily record of the survey will take the form of survey area photographs and field description notes.

5 Data Management, Processing and Interpretation

5.1 Survey data will be logged continuously to a laptop computer and archived daily to an external hard drive.

5.2 The collated magnetic data will be processed in the following way:

- Real-time positioning of magnetometer data based on GPS measurements
 - Processing (Zero Mean Transect) of collated magnetometer data
 - Gridding (nearest neighbour interpolation)
 - Interpolation of data to improve visual clarity
 - Export of georeferenced greyscale images at optimum visual range
- 5.3 The processed data will be imported into QGIS for final image production. Final geophysical datasets will be formatted as raster data models to enable subsequent geospatial analysis. All geophysical raster datasets will be digitally archived to best practice (e.g.; Schmidt and Ernenwein 2011; Archaeological Data Service 2021).

6 Programme

- 6.1. The geophysical survey for the A46 Newark Project is anticipated to take two weeks to complete, commencing 30 May 2022.

7 Safety, Health & Welfare at Work

- 7.1 All survey works will be carried out in accordance with current health and safety legislation. A project-specific Risk Assessment Method Statement (RAMS) will be in place at the commencement of on-site services. All staff will wear appropriate PPE.

8 Reporting

- 8.1 A draft report on the geophysical survey will be completed within four weeks of completion of the fieldwork. This report will be submitted to Mott MacDonald and Skanska UK Construction Ltd for review.
- 8.2 The report will include the following information:
- A non-technical summary (300 words maximum)
 - Background and aims of survey
 - Description of survey areas
 - Methods and instrumentation
 - Conditions of survey
 - Results in tabular and mapped format
 - Discussion and conclusions
 - References
 - Illustrations (processed greyscale images and interpretative plans)
 - Archive Location
 - Appendices (technical detail and supporting information)
- 8.3 Significant anomalies shall be described in tabular format under the following headings:
- Survey Area
 - National Grid reference
 - Form/nature of anomaly

- Possible source(s) of anomaly
- Interpretative discussion

8.4 Upon completion and approval of the final report, copies of the report will be issued to the Client, as well as the relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. An OASIS online record will be created, and a PDF version of the final report submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

9 Archive Storage and Curation

The project archive will be prepared in accordance with *A Guide to Good Practice: Geophysical Data in Archaeology* (Schmidt and Ernenwein 2011) and *ADS Guidelines for Depositors* (ADS 2021). The data formats for the raw data archive will be selected on this basis. The archive will be deposited within 6–12 months of project completion.

10 Copyright

The copyright of the report and archive will be retained by Archaeological Management Solutions Ltd under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The Client will be licensed to use each report for the purposes that it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to Archaeological Management Solutions Ltd for the purposes of archaeological research or development control within the planning process.

Where the project documentation or archive contains material that is non-AMS Consulting copyright, or the intellectual property of third parties, which AMS Consultancy are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* regarding copying and electronic dissemination of such material.

11 AMS Check, Review, Approve – Verify Procedure

9.1 AMS employ a Check, Review, Approve – Verify (CRA-V) procedure for all our reporting deliverables/outputs. This involves the originator (creator of the deliverable) sending the output to be checked once it has been completed. The checker undertakes a line-by-line check of the deliverable to ensure that it meets with requirements. The originator will then address the checker's comments. Once this task has been completed, the deliverable is resent to the checker for a second review before it is sent to a third person for approval. The approver will do an independent check to ensure that the deliverable meets the task brief. Any comments will be addressed prior to verification by the client.

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Figures

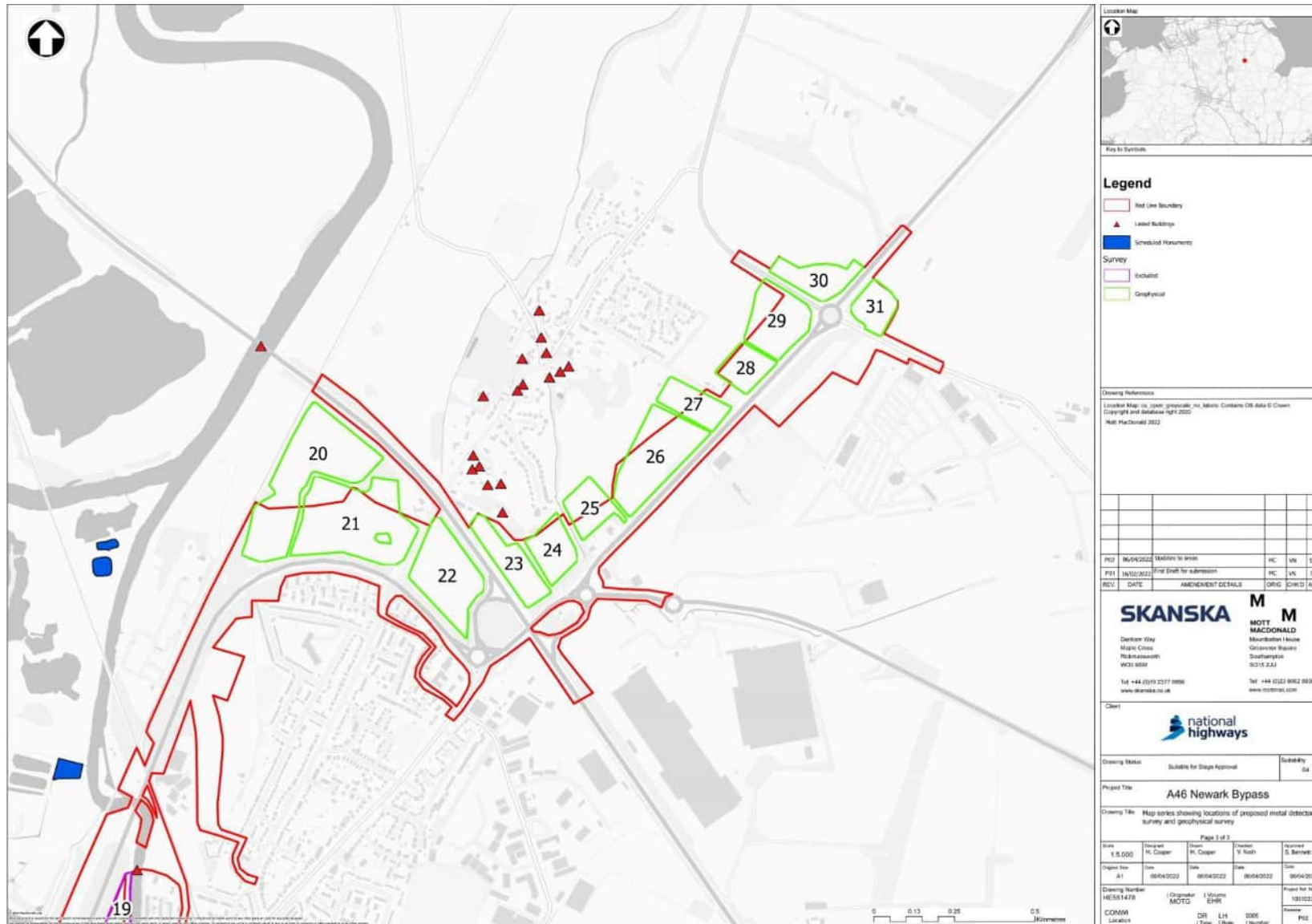


Figure 1: Location of the Survey Areas (Areas 20 – 31)

B. Appendix: Metal Detecting WSI

A46 Newark Northern Bypass, Nottinghamshire: Written Scheme of Investigation for Archaeological Metal Detecting



Archaeological
Management Solutions

**Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery
Partnership Framework**



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Archaeological Management Solutions

Fahy's Road, Kilrush, Co. Clare. V15 C780

T +353 (0)65 810 3001

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Abbreviations

Abbreviation	Definition
AMS	Archaeological Management Solutions
CIfA	Chartered Institute for Archaeologists
CP	Civil Parish
EAR	Environmental Assessment Report
OSGB36	Ordnance Survey Great Britain 1936 coordinate system
RTK DPGS	Real Time Kinematic Differential Global Positioning System
SM	Scheduled Monument
PCF	Project Stage Commencement
UKIC	United Kingdom Institute for Conservation
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this document use the OSGB36 coordinate reference system unless otherwise stated.

Introduction

Project Background

This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions (AMS) on behalf of Skanska Construction UK Ltd (Skanska) on behalf of National Highways Regional Delivery Partnership Framework in advance of a metal detection survey on lands forming part of the A46 Newark Northern Bypass, Nottinghamshire (Figure 1–Figure 3).

The A46 Newark Northern Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.

The scheme has been subject to a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.

Purpose and Scope of this Assessment

This WSI sets out the aims of the metal detection survey, and the methods and standards that will be employed. The survey shall conform to current best practice and shall be planned, managed, and undertaken in accordance with the requirements of this Specification and based on the guidance provided by:

- Standards and Guidance for archaeological field evaluation (ClfA 2014a);
- Standards and Guidance for the collection, documentation, conservation, and research of archaeological materials (ClfA 2014b);
- Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (ClfA 2014c);
- Code of conduct: professional ethics in archaeology (ClfA 2014d); and
- ClfA Policy: Use of Volunteers and Students (ClfA 2021).

The metal detection survey will be implemented over 16 discrete areas along the northern section of the scheme and will cover a combined area of approximately 69.67ha.

The work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the client. The specification details how the archaeological metal detecting survey, and subsequent reporting and archiving, shall be undertaken.

The results of the survey will help inform the Environmental Impact Assessment (EIA) to be submitted as part of the Development Consent Order (DCO) application for the proposed development. The results will also aid future archaeological trial trenching along the scheme.

The metal detection survey will be conducted alongside a programme of geophysical and field walking surveys, for which separate WSIs have been prepared (Dowling & Lancaster 2022; McKenna 2022).

The metal detecting will be undertaken by a team of archaeological metal detectorists working under the direct supervision of the Field Director.

Site Location

The metal detection survey will be implemented over 16 neighbouring fields (designated as 'Areas 2–4' and 'Areas 6–18' as numbered in the project specifications). These are located to the west and north of the River Trent in Averham CP and Newark CP, along the existing A46 and A617, and cover a combined area of approximately 69.6ha. (Table 1; Figure 1–Figure 3).

Table 1: Survey Areas

Area	Size (ha.)
2	14.46
3	6.87
4	25.44
6	11.88
7	2.34
8	1.46
9	0.57
10	0.25
11	0.81
12	0.87
13	0.40
14	0.76
15	0.54
16	0.67
17	0.47
18	1.79

The underlying bedrock of the locality comprises Mercia Mudstone Group, an early Triassic lithostratigraphic group which is widespread in the English Midlands. Bedrock of this type is of fluvial, lacustrine, and marine origin (British Geological Survey 2022). Within the area of the metal detection survey the bedrock consists of Gunthorpe Member mudstones (parts of Areas 2 and 3, Area 4 and Areas 7–18) and Edwalton Member mudstones (parts of Areas 2 and 3 and Area 6). The superficial

deposits over all of the areas are alluvium—clay, silt, sand, and gravel—formed from the River Trent, dating to the Quaternary period.

Archaeological Background

The following is an adapted summary of the archaeological background given in the EAR (Historic England 2021). Sites directly adjacent the areas of survey are listed near the end of this section and shown on Figure 2 and Figure 3. Please refer to the EAR (Historic England 2021) for location figures depicting sites mentioned in the wider area of the scheme.

General Archaeological Background

Palaeolithic

An Upper Palaeolithic site was identified through field walking in 1991 at Farndon Fields (M3571) near the southern end of the scheme (Harding et al. 2014). This is a very rare site type, and the survey team will be made aware of its presence and the potential for related remains.

Mesolithic

There are no known Mesolithic sites within the area of the scheme; however, excavations to the Staythorpe Power station—c.2.5km to the west alongside the River Trent—have revealed Mesolithic remains (Cooper 2006).

Neolithic and Early Bronze Age

Neolithic and Bronze Age flints (L11808) and burnt stone have been recovered from Farndon Fields and a Neolithic mortuary enclosure (M3612) was identified through aerial photography and subsequent excavation near the northern end of the scheme. A Neolithic and Early Bronze Age occupation site (L12214 and M18427) was identified under the Roman Fosse Way near Langford (L12214 and M18427).

Later Bronze Age and Iron Age

Remains of this age are considered rare in Nottinghamshire and are mainly known from isolated finds of bronze objects, such as palstaves from the River Trent (L8514 & L3039). Late Bronze Age and Iron Age pottery was recovered from excavations at Farndon Fields (L11810), and further Iron Age sherds were recovered at Crankley Point sewage works (L11013).

Romano-British Period

The Fosse Way Roman Road is presumed to have run along the same alignment as the current A46. It ran from Exeter to Lincoln, marked the limits of early Roman settlement and connected settlements and production centres. Concentrations of Roman material have been recorded at Farndon Fields and Newark Northgate, and trial trenching near Langford revealed the remains of the original Roman Road (L3737).

Early Medieval

Archaeological finds are rare; however, placename evidence attests to Anglo-Saxon settlements throughout the area of the scheme. A high-status female burial (M18359) was found south of the scheme at a cropmark on Winthorpe Road (Newmark-on-Trent) and another inhumation was found in a possible Neolithic barrow (M3612). Excavations of enclosures alongside the Roman road to the south (Newark-on-Trent to Widmerpool) suggest continued use into the Anglo-Saxon period.

Medieval

Newark-on-Trent emerged as a market town in the medieval period. The castle (1003474) in its centre was built in the early twelfth century by the Bishop of Lincoln and sits on the site of an earlier motte-and-bailey. There is also a medieval hospital and cemetery (St Leonard's: M3691), a moated site (near Dairy Farm: 1016051), a medieval settlement (Osmondthorpe at Northgate: M18367), a medieval road (M3093), a medieval bridge (M3214), a medieval building (at Northgate allotments: M3690) and many finds have been identified within the town during minor development works.

Post-medieval Period

There are many standing buildings, agricultural and industrial remains from the post-medieval period within the area of the scheme. However, the most significant remains are those relating to the English Civil War. Newark-on-Trent was subjected to three separate sieges from 1643 to 1646 during the Civil War and a series of defences and forts were built around the town. The following Civil War defences are within the area of the scheme:

- 1016020: Civil War town defences within the Friary Garden (Scheduled Monument);
- 1016046: Civil War redoubt 550m southeast of Valley Farm (Scheduled Monument);
- 1016048: Civil War redoubt 680m northwest of Dairy Farm (Scheduled Monument);
- 1016049: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016050: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016150: Queen's Sconce (Scheduled Monument);
- 1016152: Civil War redoubt 580m ENE of sugar refinery (Scheduled Monument);
- 1017402: Civil War Sconce 650m northwest of Devon Bridge (Scheduled Monument);
- 1008258: Hawton Moated site, fishpond, Civil War redoubt, and ridge and furrow (Scheduled Monument);
- L3733: Line of Village Defences at Winthorpe;
- L8532: Line of Rampart at Winthorpe;
- M3027: Fortified village at Farndon;
- M3114: Second Line of Circumvallation;

- M8401/L10511/L8470/L8442: Earthworks and line of First Circumvallation; and
- L3664: Civil War earthworks at Newark-on-Trent.

Following the Civil War, the castle was destroyed, and Newark-on-Trent returned to its role as a merchant town.

Newark-on-Trent was particularly known for its beer. Warwicks and Richardsons began brewing in 1766 and the Northgate Brewery (M3717) was built in 1871. The Brewery Office (1277425), Maltings (1196413) and almshouses (M3262) still stand, and the locations of others are known. Many improvements were made to the river and wharfs and warehouses were constructed. Newark Town Wharf (M3274) and Cow Lane Wharf (M3291) likely served the breweries. There are nine Grade II listed warehouses within the area of the scheme.

Post-medieval buildings and structures illustrating the development of Newark during the seventeenth to twentieth centuries are present. The construction of the Great North Road causeway arches (a Grade II listed building) was carried out from the 1760s and completed in 1770.

Modern (AD 1750–present)

Industrial uses continued and more breweries and warehouses were built post-1750. For example, the Kelham Home Grown Sugar refinery along Great North Road (now operating as British Sugar) was built in 1920.

The earliest Ordnance Survey map of the area of the proposed scheme depicts land use in 1883. Most of the land northwest of the River Trent is regular field systems, typical of enclosure-era land divisions. Comparison with current satellite imagery indicates little amalgamation of fields has occurred since.

Scheduled Monuments adjacent to the Survey Areas

Areas 1–7 are located north of the southern branch of the River Trent 4km northeast of the Battle of Stoke Registered Battlefield limits, southwest of Newark-on-Trent. Scheduled Monument (SM) 1017402—a Civil War Sconce—is located c.220m southeast of Area 7 and c.300m northeast of Area 6 (Figure 2).

Areas 8–18 are located 0.5–1km from Newark Castle. Area 8 is located to the immediately south of SM 1016048, Civil War redoubt. Area 18 is located to immediately south of SM 1016046, another Civil War redoubt.

Project Aims and Objectives

The principal objective of the metal detection survey is to map non-ferrous metal ‘hits’ that may help locate or negate any potential for underlying archaeological features. The metal detection investigation aims include:

- To identify and collect non-ferrous artefacts within the specified survey areas;
- Accurately locate those artefacts and present the findings in map form;
- Assess the artefacts found and describe them in a written report;
- Incorporate all of the above in a report to the Client;
- Create a digital site archive;
- Disseminate the results of the archaeological metal detecting survey through the deposition of a detailed report at the National Monuments Record of England; and
- Disseminate the results through one or more of the following means: via the A46 Newsletter, National Highways website, social media or through a press release. This work will be undertaken by the consultant and shall be based on the report prepared by the sub-consultant.

The metal detection survey will, as requested in the specification (Mott McDonald 2022), target the areas of known archaeological features such as Fosse Way, and nearby Civil War battlegrounds and Scheduled Monuments, and produce results by identifying and mapping find spots and clusters of find spots. This will, along with the geophysical and field walking surveys, indicate the potential presence of underlying archaeology. Confirming the exact location of potential underlying archaeology will contribute towards de-risking the project and may assist to determine further archaeological works during the next stage of the programme.

Key Personnel and Project Team

The metal detection survey will be conducted for AMS by a metal detecting expert (Bryn Gethin) with a team of at least five skilled detectorists, one survey assistant and an on-site Field Director (see Table 2 below).

Additional specialist staff from AOC Group may be required to assist with:

- Registered finds and metalwork
- Coins
- Conservation

Table 2: Project Team

Name	Role	Contact Details
[REDACTED]	Project Manager	E [REDACTED]
[REDACTED]	AMS Field Director Health and Safety Officer	[REDACTED]
[REDACTED]	Metal Detecting Lead	
[REDACTED]	Metal Detectorist Team Manager	
[REDACTED]	AMS Surveyor	

Survey Methodology and Instrumentation

Methods

The metal detection survey will occur on transects spaced 10m apart, reducing to 5m in areas of high density finds and areas adjacent to the two Scheduled Monuments. Detectorists will survey down the centre of the transects, scanning along both sides, providing full coverage along each transect. Each detectorist will be assigned a transect which will be systematically detected.

When a hit is registered, it will be investigated by pinpointing its location to within 5cm. Targets will only be retrieved where they lie in the topsoil layer in order to protect the integrity of any underlying archaeological features. Non-ferrous metal targets will be investigated using a small spade or trowel. Discriminating metal detectors are capable of identifying different metal types based on their metallic properties, usually by identifying a number that corresponds to a particular metal(s). In some cases, this can be clearly stated, such as 'ferrous' or 'lead', in other cases the responses may indicate several different types of response. This survey will discriminate against ferrous metals, allowing for the mapping of non-ferrous metals likely to be associated with the Civil War. Retrieved finds will be flagged, bagged and numbered.

It should be noted that it is not the intention to fully metal-detect the entire survey area. The methodology employed constitutes a sample of the material/metal type that likely survives in the Survey Areas and these areas should not be regarded as "cleared" of archaeological material.

Each detectorist will be provided with standard ziplock finds bags and a number of pin flags. Each significant find recovered will be bagged and the finder will write their initials on the bag. Each bag will then be pin flagged to the ground. Once each detectorist has finished their first transect then the finds can begin to be located using a Real Time Kinematic Differential Global Positioning System (RTK DGPS) and at this point the overseeing archaeologist will give each finds bag an individual number which will match a location point on the survey. Each bag will be collected at this point.

No finds or pin flags will ever be left overnight between survey days and the number of any transects left at the end of each day will be left to the minimum necessary for the accurate laying out and continuation of the work on the following day. No finds will be transported from the site by anyone except for staff members of AMS.

Metal detecting farmed fields inevitably yields assemblages containing buttons, coins, buckles and various fragments of modern detritus. It is not proposed to discard any objects unless they are clearly modern, such as post 1950s currency, shotgun cartridge ends, drinks cans, and bottle tops. These will be initially assessed on site and then kept in large scrap bags for each field covered by the survey to

be discarded at a later date after a final check to make certain they contain no significant objects. This method has previously been used during the battlefield survey at Bosworth and on all other organised surveys carried out by the team. All other objects will be bagged and numbered but may be discarded at a later date after discussions with the Mott MacDonald Archaeologist and the Newark and Sherwood District Archaeologist.

In the event of human remains, including cremations, being revealed these would be initially left *in situ* and an appropriate exclusion zone demarcated. Any significant or extensive remains will be subject to a separate WSI. If significant quantities of unexpected finds are recovered during the fieldwork (definition of 'unexpected' to be agreed with Mott MacDonald Archaeologist and the Newark and Sherwood District Archaeologist), it may be necessary to renegotiate additional analysis and reporting costs.

Instrumentation

Transects will be laid out using 2m cross-sight ranging poles and 50m/100m tapes to create base-lines which will be used to set up the 10m and occasional 5m transects. This method has been used on numerous metal detecting surveys, such as work on Bosworth battlefield for Leicestershire County Council, at Battle Abbey for English Heritage, and numerous surveys by the Battlefields Trust (such as Edgehill and Stow-on-the-Wold). The ends of the transects will be surveyed in using the RTK DGPS.

The metal detection survey will be conducted using high performance discriminating metal detectors such as Minelab X-Terra 305 or similar, set to non-ferrous mode. The frequent use of the land for farming purposes, together with its proximity to Newark, means that the potential for high levels of modern metal scattered throughout the survey area is high. In order to combat this, the survey will use the metal detectors discrimination capability to filter out ferrous material, seeking instead to target other metal responses, specifically lead, which would be indicative of conflict remains. Practitioners will also be vigilant for ferrous and non-ferrous contaminants indicative of green waste, which may or may not be spread across the survey areas as a fertilizer/soil conditioner (Gerrard et al. 2015). Such contaminants may prevent a metal detection assessment. If encountered at an early stage (indicated by a high frequency of metal hits across a given survey area), detectorists will decide if the survey is viable in that area.

Finds Management

Artefacts recovered from the survey will be retained, excluding objects of twentieth or twenty-first century in date, which will be recorded but not retained. The finds will be recorded, cleaned, conserved, marked, bagged and boxed in accordance with recording systems, practices and standards outlined in Preparation of Archaeological Archives: Selection, Retention and Dispersal of Archaeological Collections (SoMA 1993) and ClfA's Standard and guidance for the collection, documentation, conservation and research of archaeological materials (ClfA 2014b/2020) and their publication Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (ClfA 2014c), First Aid for Finds (Watkinson & Neal 1998), and the United Kingdom Institute for Conservation guideline documents (UKIC 1983 and 1990) as appropriate and any requirements of the local authority or final museum or archive. Finds will be stored in suitable facilities at AMS offices prior to final deposition to archives.

Finds covered by the Treasure Act (2003) and Treasure Order (2002), including but not limited to gold and silver, will be lifted and stored in a safe place. All information required under the Treasure Act (including finder, location, material, date, associated items etc.) will be reported to the relevant authorities including the coroner's office and the local finds liaison officer from the Portable Antiquities Scheme within fourteen days. Such finds will also be notified to Skanska. Where removal of the treasure cannot be carried out in safe and controlled manner on the same working day, suitable security measures will be taken to protect it from theft and/or damage.

Archive Deposition

All finds, photographs, drawings and paper archive records will be compiled into a comprehensive and fully cross-referenced archive in accordance with recognised best practice and the requirements of the local authority and/or museum (Walker 1990; ClfA 2014c, Brown 2011).

The site archive will be prepared in accordance with Historic England and ClfA guidelines and with any specific requirements of Newark and Sherwood District Council Museum Service. AMS will liaise with the local authority archaeology service and local archive and museum service to ensure the services are aware of the work and to obtain an accession code for the project from the archive and museum service.

AMS will liaise with Skanska in order to persuade landowners to transfer ownership of finds to the receiving repository prior to the fieldwork being initiated.

All recovered artefacts and other material will be cleaned, bagged and boxed in accordance with AMS procedures and the requirements of appropriate repository institutions, as detailed above under Finds Management.

All finds storage materials or packaging will be clearly marked with the assigned site code or accession number.

A non-retention policy for certain artefacts of low archaeological or academic significance or groups of unstratified finds will be followed. However, any non-retention policy will accord with the aims and objectives of the project, the requirements of the archaeological brief and the finds deposition requirements of the relevant repository.

Programme

The metal detecting survey for the A46 Newark Project is anticipated to take three to four weeks to complete, commencing 12 September 2022.

Land Access

AMS will liaise with Skanska regarding land access in order to achieve the programme. This may involve having to plan for specific arrangements by the landowner/tenant and ecological constraints for access. Prior notification of field access will be provided to the Skanska project ecologist in advance of fieldwork. AMS will liaise with the project ecologist and Skanska regarding works in these areas.

AMS will produce condition surveys before entry and after completion of the metal detecting surveys, including photographs. AMS will make an initial check to make sure that there are no ground conditions that would prevent a successful survey. The project team will always follow agreed access points and routes.

Monitoring

The responsibility for monitoring the progress of the project, to ensure adherence to the WSI and the maintenance of professional standards, lies with the local authority archaeological service. So that arrangements for monitoring can be made, the local authority archaeological service, Mott McDonald and Skanska will be notified of AMS's proposed programme to undertake the work and be given one week's notification, in writing, of the start date of the works.

The metal detecting survey will be available for monitoring visits by the local authority archaeology service, Skanska and Mott McDonald, who will have unrestricted access to the survey areas, survey records or any other information.

Verbal progress reports will be provided to Skanska and Mott McDonald upon request. Weekly written progress reports (via email each Monday) will be provided during the survey and will be sent on to the local authority archaeology service.

Safety, Health & Welfare at Work

All survey works will be carried out in accordance with current Health and Safety legislation. A project specific Risk Assessment Method Statement (RAMS) will be in place at the commencement of on-site services. All staff will wear appropriate Personal Protective Equipment (PPE).

Analysis and Reporting

A report on the metal detection survey will be completed within six weeks of completion of the fieldwork. This report will be submitted to Mott MacDonald and Skanska for review.

The report will include the following information:

- A non-technical summary (300 words maximum);
- Background and aims of survey;
- Description of survey areas;
- Methods and instrumentation;
- Conditions of survey;
- Results in tabular and mapped format (including XYZ location of each metal find, its identification and spot date if discernible);
- Discussion and conclusions;
- Further work to be carried out on assemblage prior to deposition;
- Illustrations (numbered findspots, thematic maps of metal types, photographs of a selection of finds);
- References; and
- Appendices (technical detail and supporting information).

The report will be subject to AMS's internal quality control procedures, which include technical review and copyediting.

Upon completion and approval of the final report, copies of the report will be issued to the client, as well as relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. An OASIS online record will be created, and a PDF version of the final report submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

Copyright

The copyright of the report and archive will be retained by AMS under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The client will be licensed to use each report for the purposes for which it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to AMS for the purposes of archaeological research or development control within the planning process.

Where the project documentation or archive contains material that is non-AMS copyright, or the intellectual property of third parties, which AMS are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 regarding copying and electronic dissemination of such material.

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Figures

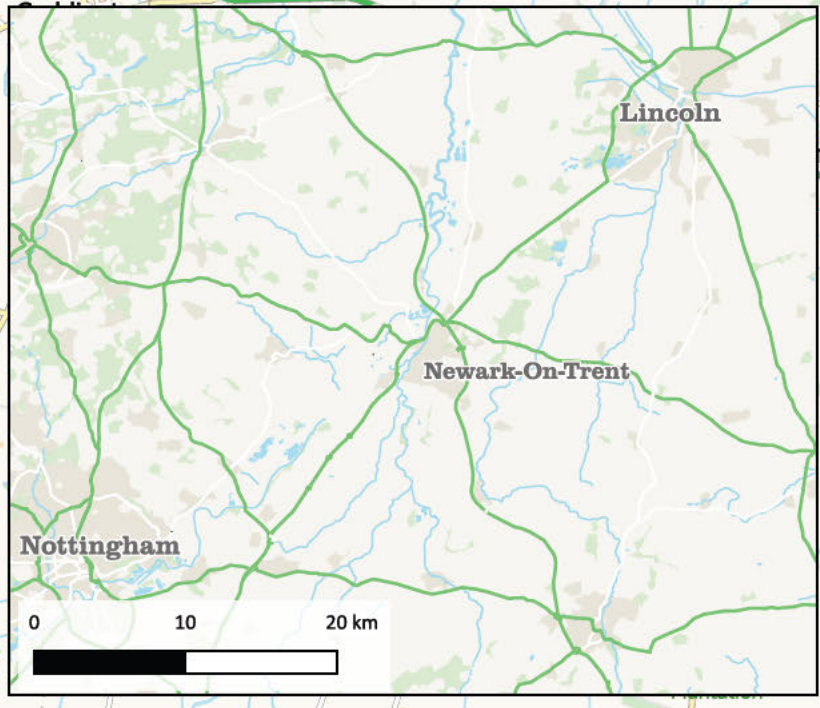
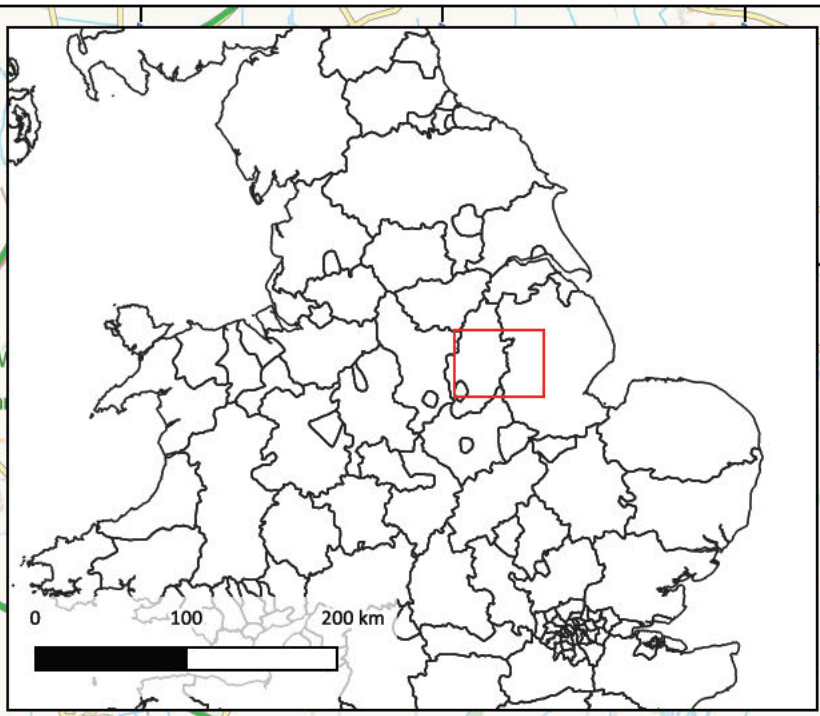
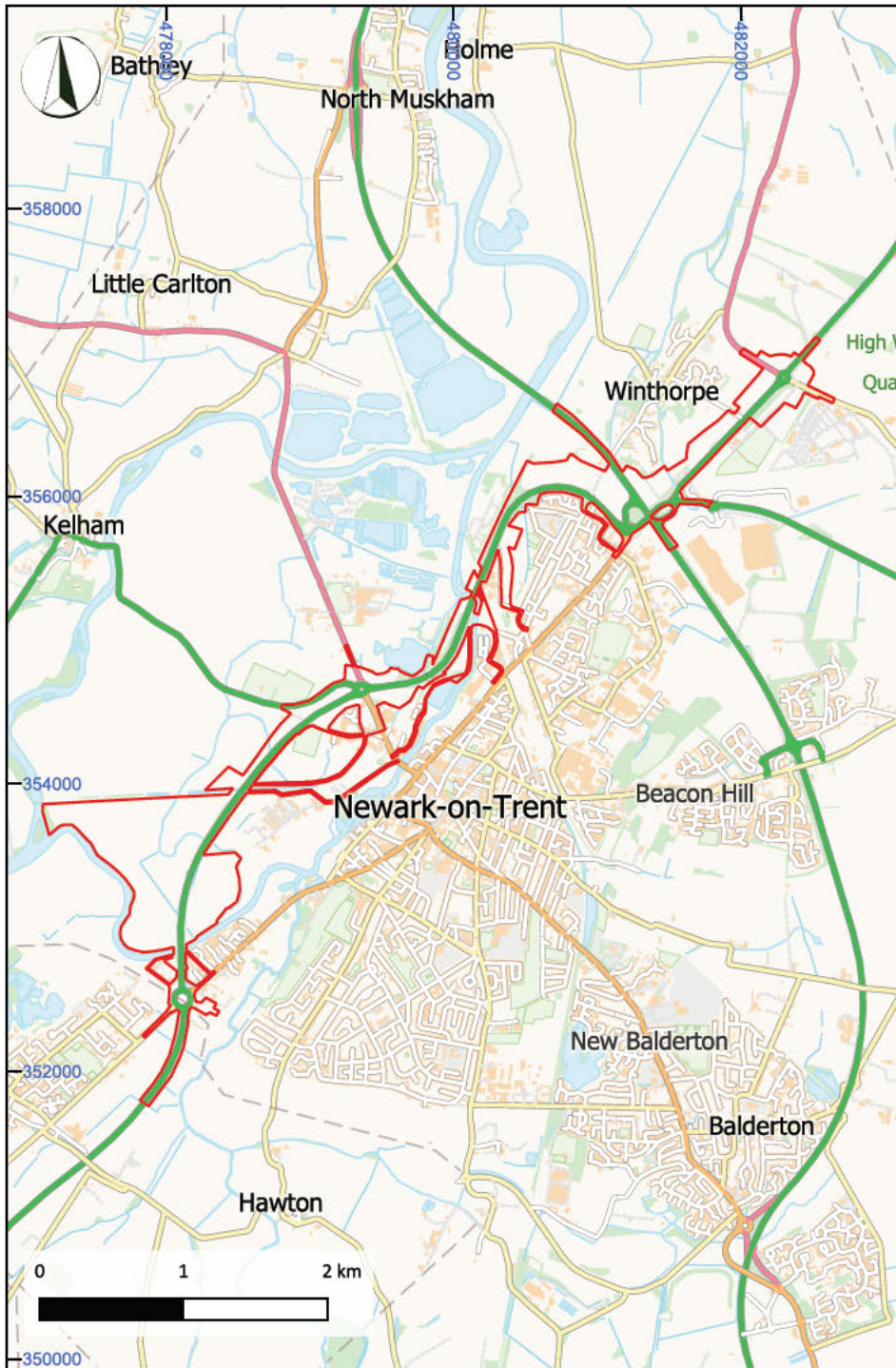


FIGURE 1

Title: Site Location

Project: A46 Newark Bypass

Client: Skanska

Job No: J3063-A

Scale: 1:50,000@A4

Date: 12/08/2022

Drawn by: LOC

Revision: 1.0

Key
 Site Boundary

Notes: OS Zoomstack ©
 Ordnance Survey



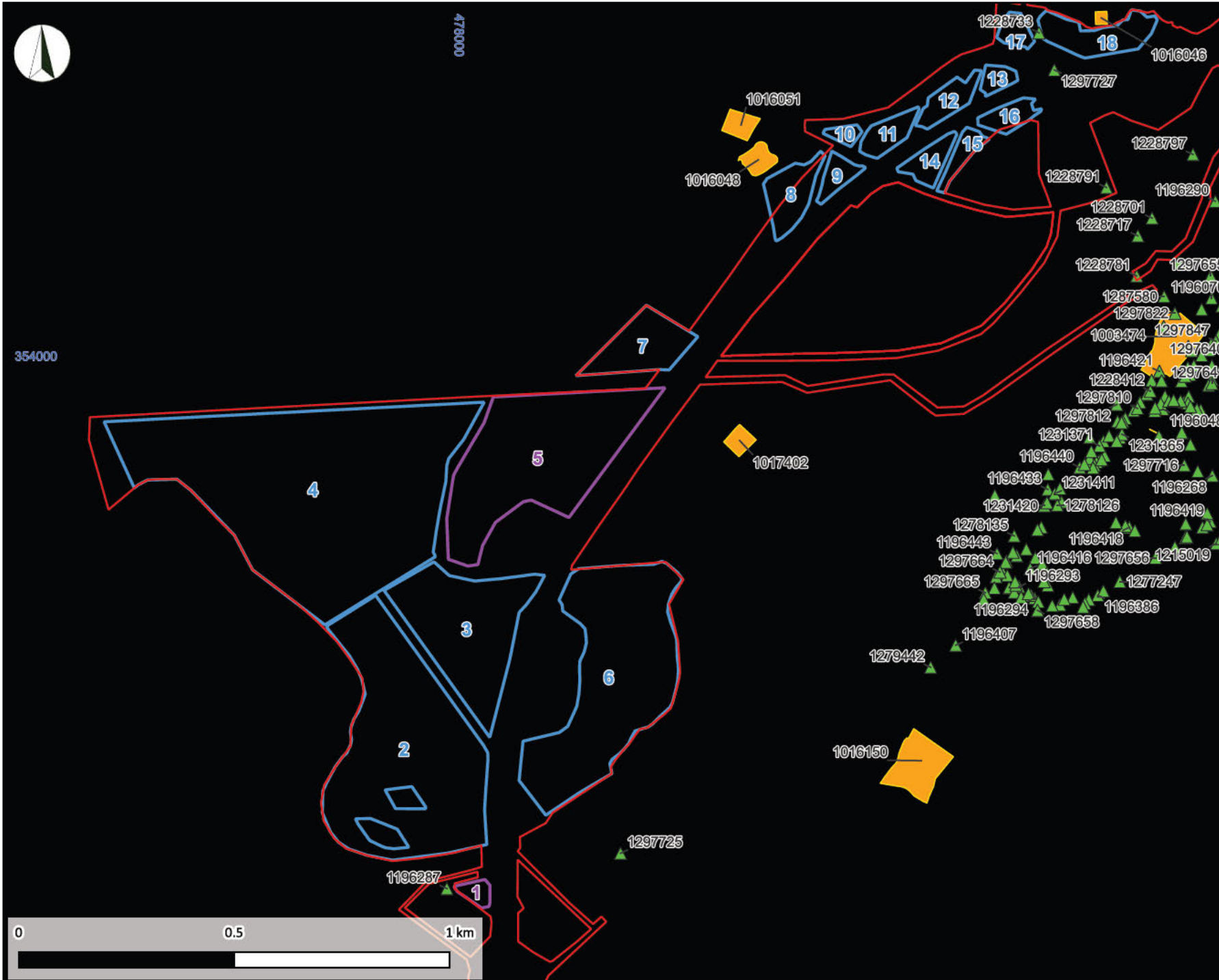


FIGURE 2

Title: Locations of proposed metal detecting and geophysical survey areas

Project: A46 Newark Bypass

Client: Skanska

Job No: J3063-A

Scale: 1:12,000 @A4

Date: 12/08/2022

Drawn by: LOC

Revision: 1.0

Key

- Site Boundary
- Scheduled Monuments
- ▲ Listed Buildings
- Excluded
- Metal Detecting and Field Walking

Notes: OS Zoomstack © Ordnance Survey



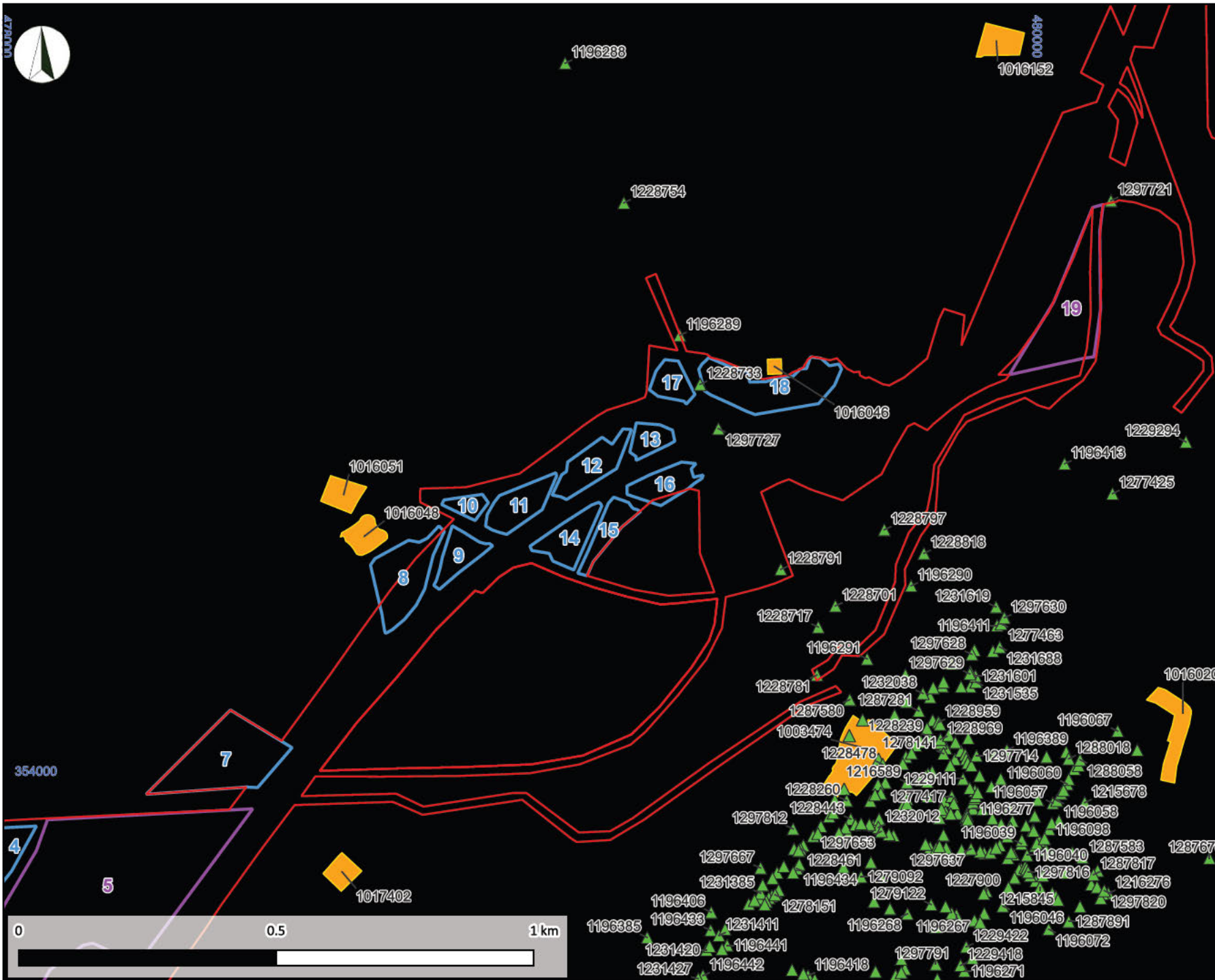


FIGURE 3

Title: Locations of proposed metal detecting and geophysical survey areas

Project: A46 Newark Bypass

Client: Skanska

Job No: J3063-A

Scale: 1:10,000 @A4

Date: 12/08/2022

Drawn by: LOC

Revision: 1.0

Key

- Site Boundary
- Scheduled Monuments
- Listed Buildings
- Excluded
- Metal Detecting and Field Walking

Notes: OS Zoomstack © Ordnance Survey

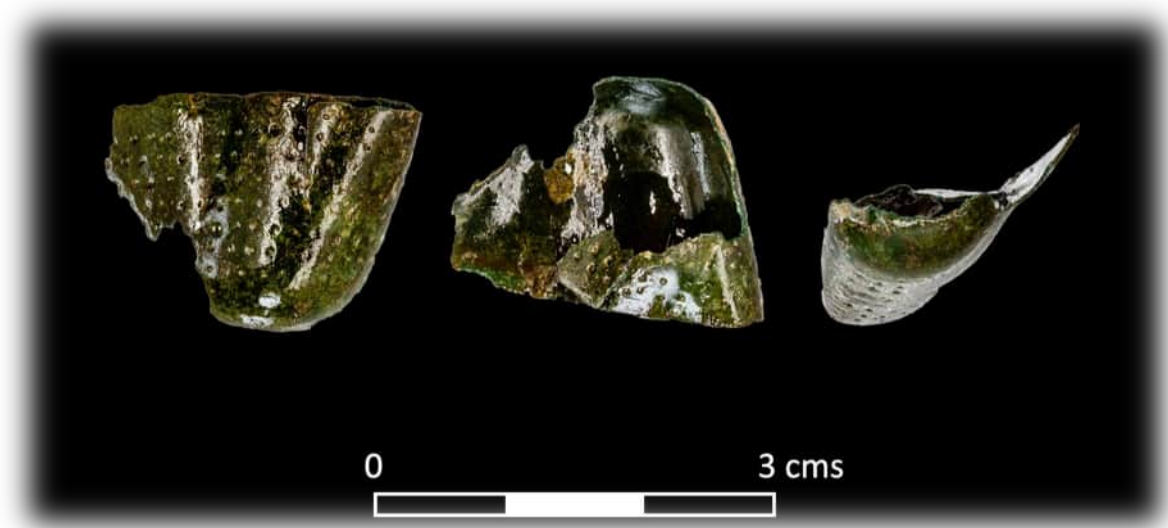


C. Appendix: Field Walking WSI

A46 Newark Northern Bypass, Nottinghamshire - Written Scheme of Investigation for Archaeological Field Walking Survey



Archaeological
Management Solutions



Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery
Partnership Framework

By

08 August 2022

TITLE PAGE

AMS Job No.: J3063-A

Project Name: Regional Delivery Partnership A46 Newark Bypass

Civil Parish Name(s): Averhsam CP, Newark CP

Grid Reference (OSGB36): 478807 / 354376

Report Status/Revision: 1.4

Revision Date: 08 August 2022

Report Author: [REDACTED]

Technical Reviewer: [REDACTED]

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File Name: A46 Newark Northern Bypass, Nottinghamshire - Written Scheme of Investigation for Archaeological Field Walking v.1.4

Cover Photo: A medieval copper-alloy thimble

Archaeological Management Solutions

Fahy's Road, Kilrush, Co. Clare. V15 C780

T +353 (0)65 810 3001

**Disclaimer**

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the author and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

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**NSAI**

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Abbreviations and Definitions

Abbreviation	Definition
AMS	Archaeological Management Solutions
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
DCO	Development Consent Order
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
H & S	Health and Safety
OSGB36	Ordnance Survey Great Britain 1936 coordinate system
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement
RTK DPGS	Real Time Kinematic Differential Global Positioning System
SAM	Scheduled Ancient Monument
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this report use the OSGB36 coordinate reference system unless otherwise stated.

1 Introduction

1.1 Project Background

This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions Ltd (AMS) on behalf of Skanska Construction UK Ltd on behalf of National Highways Regional Delivery Partnership Framework in advance of a fieldwalking survey on lands forming part of the A46 Newark Northern Bypass, Nottinghamshire (Figure 1).

The A46 Newark Northern Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.

The scheme has been subject to a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.

1.2 Purpose and Scope of this Assessment

This WSI sets out the aims of the field walking survey, and the methods and standards that will be employed. It conforms to current best practice, as well as to the guidance outlined in the Chartered Institute for Archaeologists' (CIfA) Standard and guidance for archaeological field evaluation (CIfA 2014) and Historic England's Our Portable Past (2018). The survey was designed to assist in defining the character and extent of any archaeological remains within the study area in conjunction with geophysical (Dowling & Lancaster 2022) and metal detecting survey (Bonsall 2022).

It is intended that the fieldwalking survey, will be implemented over 16 discrete areas, along the northern section of the scheme and will cover a combined area of approximately 69.67ha. The fieldwalking team will conduct a walk with 10% coverage. Following the specification (Mott Macdonald 2022), the survey is non-intrusive and is limited to the scanning and recording of finds in the field. There will be no surface collection.

The work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the client.

The results of the survey will help inform the Environmental Impact Assessment (EIA), to be submitted as part of the Development Consent Order (DCO) application for the proposed development. The results will also aid future archaeological trial trenching along the scheme.

The field walking survey will be conducted ahead of metal detection surveys, for which a separate WSI has been prepared. There will be an economy of scale benefit to undertake the field walking survey and the metal detecting survey in short succession reducing the costs and time involved.

1.3 Site Location

The field walking survey will be implemented over 16 fields (designated as 'Areas 2—4' and 'Areas 6—18' as numbered in the project specifications). These are located the west and north of the River Trent in Aversham CP and Newark CP, along the existing A46 and A617, and cover a combined area of approximately 69.67ha. (Table 1; Figure 2—3).

Table 1: Survey Areas

Area	Size (ha.)
2	14.46
3	6.87
4	25.44
6	11.88
7	2.34
8	1.46
9	0.57
10	0.25
11	0.81
12	0.87
13	0.40
14	0.76
15	0.54
16	0.67
17	0.47
18	1.79

The underlying bedrock of the locality comprises Mercia Mudstone Group, an early Triassic lithostratigraphic group that is widespread in the English Midlands. The bedrock of this type is of fluvial, lacustrine, and marine origin (BGS 2022). Within the area of the field walking survey the bedrock consists of Gunthorpe Member mudstones (parts of Areas 2 and 3, Area 4, and Areas 7–18) and Edwalton Member mudstones (parts of Areas 2 and 3 and Area 6). The superficial deposits over all areas are alluvium - clay, silt, sand, and gravel – formed from the River Trent, dating to the Quaternary period.

2 Archaeological Background

The following is an adapted summary of the archaeological background given in the EAR (Historic England 2021). Sites directly adjacent the areas of survey are listed near the end of this section and shown on Figures 2–3. Please refer to the EAR (Historic England 2021) for location figures depicting sites mentioned in the wider area of the scheme.

2.1 General Archaeological Background

Palaeolithic

An Upper Palaeolithic site was identified through field walking in 1991 at Farndon Fields (M3571) near the southern end of the scheme (Harding, Ellis and Grant 2014). This is a very rare site type, but the field walking team will be made aware of its presence and the potential for related remains.

Mesolithic

There are no known Mesolithic sites within the area of the scheme; however, excavations to the Staythorpe Power station – c.2.5km to the west alongside the River Trent – have revealed Mesolithic remains (Cooper 2006).

Neolithic and Early Bronze Age

Neolithic and Bronze Age flints (L11808) and burnt stone have been recovered from Farndon Fields and a Neolithic mortuary enclosure (M3612) was identified through aerial photography and subsequent excavation near the north end of the scheme. A Neolithic and Early Bronze Age occupation site (L12214 and M18427) was identified under the Roman Fosse Way near Langford (L12214 and M18427).

Later Bronze Age and Iron Age

Remains of this age are considered rare in Nottinghamshire and are mainly known from isolated finds of bronze objects, such as palstaves from the River Trent (L8514 & L3039). Late Bronze Age and Iron Age pottery was recovered from excavations at Farndon Fields (L11810), and further Iron Age sherds were recovered at Crankley Point sewage works (L11013).

Romano-British period

The Fosse Way Roman Road is presumed to have run along the same alignment as the current A46. It ran from Exeter to Lincoln, marked the limits of early Roman settlement and connected settlements and production centres. Concentrations of Roman material have been recorded at Farndon Fields and Newark Northgate, and trial trenching near Langford revealed the remains of the original Roman Road (L3737).

Early Medieval

Archaeological finds are rare; however, place-name evidence attests to Anglo-Saxon settlements throughout the area of the scheme. A high-status female burial (M18359) was found south of the scheme at a cropmark on Winthorpe Road (Newmark-on-Trent) and another inhumation was found in a possible Neolithic barrow (M3612). Excavations of enclosures alongside the Roman road to the south (Newark-on Trent to Widmerpool) suggest continued use into the Anglo-Saxon period.

Medieval

Newark-on-Trent emerged as a marked town in the medieval period. The castle (1003474) in its centre was built in the early 12th century by the Bishop of Lincoln and sits on the site of an earlier motte-and-bailey. There is also a medieval hospital and cemetery (St Leonard's: M3691, a moated site (near Dairy Farm: 1016051), a medieval settlement (Osmundthorpe at Northgate: M18367), a medieval road (M3093), a medieval bridge (M3214), a medieval building (at Northgate allotments: M3690) and many finds have been identified within the town during minor development works.

Post-medieval period

There are many standing buildings, agricultural and industrial remains from the post-medieval period within the area of the scheme. However, the most significant remains are those relating to the civil war.

Newark-on-Trent was subjected to three separate sieges from 1643 to 1646, during the English Civil War and a series of defences and forts were built around the town.

The following civil war defences are within the area of the scheme:

- 1016020: Civil War town defences within the Friary Garden (Scheduled Monument);
- 1016046: Civil War redoubt 550m south-east of Valley Farm (Scheduled Monument);
- 1016048: Civil War redoubt 680m north-west of Dairy Farm (Scheduled Monument);
- 1016049: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016050: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016150: Queen's Sconce (Scheduled Monument);
- 1016152: Civil War redoubt 580m ENE of sugar refinery (Scheduled Monument);
- 1017402: Civil War Sconce 650m north-west of Devon Bridge (Scheduled Monument);
- 1008258: Hawton Moated site, fishpond, Civil War redoubt, and ridge and furrow (Scheduled Monument);

- L3733: Line of Village Defences at Winthorpe;
- L8532: Line of Rampart at Winthorpe;
- M3027: Fortified village at Farndon;
- M3114: Second Line of Circumvallation;
- M8401/L10511/L8470/L8442: Earthworks and line of First Circumvallation;
- L3664: Civil War earthworks at Newark-on-Trent.

Following the Civil War, the castle was destroyed, and Newark-on-Trent returned to its role as a merchant town. Newark-on-Trent was particularly known for its beer. Warwicks and Richardsons began brewing in 1766 and the Northgate Brewery (M3717) was built in 1871). The Brewery Office (1277425), Maltings (1196413) and almshouses (M3262) still stand and the locations of others are known. Many improvements were made to the river and wharfs and warehouses were constructed. Newark Town Warf (M3274) and Cow Lane Warf (M3291) likely served the breweries. There are nine Grade II listed warehouses within the area of the scheme.

Post-medieval buildings and structures are present, illustrating the development of Newark during the 17th to 20th centuries. The construction of the Grade II listed building Great North Road causeway arches was carried out from 1760s and completed in 1770.

Modern (AD 1750–present)

Industrial uses continued and more breweries and warehouses were built. The Kelham Home Grown Sugar refinery, along Great North Road, (now operating as British Sugar) was built in 1920. The earliest Ordnance Survey map of the area of the proposed scheme depicts land use in 1883. Most of the land northwest of the River Trent is regular field systems, typical of enclosure-era land divisions. Comparison with current satellite imagery indicates little amalgamation of fields has occurred since.

2.2 Scheduled Ancient Monuments adjacent to the Areas of Fieldwalking

Areas 1—7 are located north of the southern branch of the River Trent. It is 4km northeast of the Battle of Stoke Registered Battlefield limits, southwest of Newark-on-Trent. SAM 1017402 – a Civil War Sconce - is located c.220m southeast of Area 7 and c.300m northeast of Area 6 (Figure 2).

Areas 8—18 are located 0.5—1km from Newark Castle. Area 8 is located to the immediately south of SAM 1016048, Civil War redoubt. Area 18 is located to immediately south of SAM 1016046, a Civil War redoubt.

3 Project Aims and Objectives

3.1 Project Aim

The principal aim of the field walking survey is to determine as far as reasonably possible the presence/absence, location, nature, extent, date, quality, and significance of any surface artifact clusters within the development area. This field walking survey will, as requested in the specification (Mott McDonald 2022), target the areas of known archaeological features such as Fosse Way, and nearby Civil War battlegrounds and scheduled monuments, and produce results by identifying find spots and clusters of find spots. This will, along with the Geophysical and metal-detecting surveys, indicate the potential presence of underlying archaeology. Confirming the exact location of underlying archaeology will contribute towards de-risking the project and may assist to determine further archaeological works during the next stage of the programme.

3.2 Project Objectives

The field walking investigation objectives include:

- to identify and quantify surface archaeological artefacts within the specified survey areas;
- accurately locate those artefacts and present the findings in map form;
- describe the artefacts in a written report;
- incorporate all of the above in a report to the Client; and
- create a digital site archive.

4 Project Team

The field walking survey will be conducted by AMS. It will be led by AMS Senior Archaeologist Tony Bartlett with one surveyor, one artefact specialist, and with five skilled archaeological technicians one of which will be the H&S specialist.

5 Field Walking Methodology

5.1 Methods

Fieldwalking that involves collection is considered intrusive (CIfA 2014, 12; Historic England 2018, 29) and is destructive as it removes part of the archaeological resource. As such, this non-intrusive survey will be restricted to the surface scanning and in field recording of artefacts.

The optimum condition for field walking is following ploughing and/or harrowing and some weathering. It is intended that the field walking survey will be conducted across 16 fields as listed in the project specifications (designated therein as 'Areas 2—4' and 'Areas 6—18'); however, only

those in a condition suitable for field walking will be walked. All categories of artefactual material will be recorded.

The sample unit will be the individual field. Each field will be numbered individually and sub-divided into 20m transects. The 20m transects will be designed in GIS (Geographic Information System), where they will be aligned on an orientation most appropriate to field dimensions. Using a survey-grade Leica GS07 GPS with Real-Time Kinematic (RTK) connectivity, the transects will then be laid out while also deploying intervisible field walking line guides with poles along the midpoint of each transect.

An archaeologist will walk each transect line checking 1m to either side - i.e. a 2m-wide corridor - thereby ensuring 10% coverage. The field walking archaeologist will mark all artefacts with a flag but will not collect objects.

A second archaeologist and a surveyor will follow over transects, recording the location and a brief description of the finds. Only those appraised as archaeologically significant will be included in the survey results. An artefact specialist will be on site daily to provide advice to the field walking team. The description and unique identifier of each find will be inputted into a database in the field.

5.2 Survey

The location of all finds will be surveyed using the Leica GS07 which can be mapped in GIS within the British National Grid (OSGB36) coordinate system. Undertaking finds analysis in GIS will help identify any potential hotspots of artefact densities and highlight these areas for further investigation. Should dense areas of finds be encountered the team may employ a 5m stint approach, where artefacts are recorded by type within a stint with the midpoint recorded by GPS.

6 Finds Management

As this is a non-intrusive survey no artefacts will be collected.

7 Programme

The field walking survey for the A46 Newark Project is anticipated to take 3 weeks to complete, but this is dependent on ploughed and harrowed ground. The anticipated start date is 5th September 2022.

8 Safety, Health & Welfare at Work

All survey works will be carried out in accordance with current H&S legislation. A project specific Risk Assessment Method Statement (RAMS) – will be in place at the commencement of on-site services. All staff will be inducted and briefed prior to commencing on-site work, have appropriate safety training, wear appropriate PPE and use sunscreen when necessary.

9 Reporting

A draft report on the field walking survey will be completed within four weeks of completion of the fieldwork. This report will be submitted to Mott MacDonald and Skanska UK Construction Ltd for review.

The report will include the following information:

- A non-technical summary (300 words maximum);
- Background and aims of survey;
- Description of survey areas;
- Methods and instrumentation;
- Conditions of survey;
- Results in tabular and mapped format;
- Discussion and conclusions;
- References;
- Illustrations (numbered findspots, thematic maps of find types);
- References;
- Archive Location; and
- Appendices (technical detail and supporting information).

Upon completion and approval of the final report, copies of the report will be issued to the client, as well as relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. An OASIS online record will be created, and a PDF version submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

10 Archive Storage and Curation

The project archive will be prepared in accordance with Archaeology Data Service's *Guides to Good Practice*¹ (online) and *ADS Guidelines for Depositors* (ADS 2021). It is envisaged that the archive will be deposited within 6–12 months of project completion.

¹ Available online @ [REDACTED] Accessed on 1 August 2022.

11 Copyright

The copyright of the report and archive will be retained by AMS under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The client will be licensed to use each report for the purposes that it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive license for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to AMS for the purposes of archaeological research or development control within the planning process.

Where the project documentation or archive contains material that is non-AMS copyright, or the intellectual property of third parties, which AMS are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 regarding copying and electronic dissemination of such material.

12 AMS Check, Review, Approve – Verify Procedure

AMS employ a Check, Review, Approve – Verify (CRA-V) procedure for all our reporting deliverables/outputs. This involves the originator (creator of the deliverable) sending the output to be checked once it has been completed. The checker undertakes a line-by-line check of the deliverable to ensure that it meets with requirements. The originator will then address the checker's comments. Once this task has been completed, the deliverable is resent to the checker for a second review before it is sent to a third person for approval. The approver will do an independent check to ensure that the deliverable meets the task brief. Any comments will be addressed prior to verification by the client.

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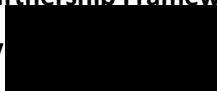
D. Appendix: Archaeological Watching Brief of GI Works WSI

A46 Newark Bypass, Nottinghamshire: Written Scheme of Investigation for Archaeological Watching Brief of Ground Investigation Works



Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery Partnership Framework

By



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AMS Cultural Heritage Consultancy Limited trading as Archaeological Management Solutions

Company Registration No. 721173

Fahy's Road, Kilrush, Co. Clare, V15 C780

York Hub, Popeshead Court Offices, Peter Lane, York, YO1 8SU

T: +44 1904 404849



Disclaimer

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the author and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion. All AMS deliverables are subject to quality assurance.

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Abbreviations

Abbreviation	Definition
AMS	Archaeological Management Solutions
CIFA	Chartered Institute for Archaeologists
CP	Civil Parish
EAR	Environmental Assessment Report
GI	Ground Investigation
HER	Historic Environment Record
OASIS	Online Access to Index of Archaeological Investigations
OSGB36	Ordnance Survey Great Britain 1936 coordinate system
PEA	Post-Excavation Assessment
SM	Scheduled Monument
PCF	Project Control Framework
TP	Trial Pit
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this document use the OSGB36 coordinate reference system unless otherwise stated.

Introduction

Project Background

This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions (AMS, the Archaeological Contractor) on behalf of Skanska Construction UK Ltd (Skanska) on behalf of National Highways Regional Delivery Partnership Framework in advance of an archaeological watching brief of the ground investigation (GI) works on lands forming part of the A46 Newark Bypass, Nottinghamshire (Figure 1–Figure 3).

The A46 Newark Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.

The scheme has been subject to a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.

Previous Archaeological Works

AMS have already carried out archaeological works for a Metal Detection Survey, a Walkover Survey and a Geophysical Survey on behalf of Skanska on lands forming part of the A46 Newark Bypass in September 2022, January and February 2023. A programme of geoarchaeological coring is ongoing. Further works relating to each of these surveys will be carried out in 2023.

Purpose and Scope of this Written Scheme of Investigation

The purpose of this WSI is to provide a detailed specification for the archaeological watching brief, and the methods and standards that will be employed. It conforms to current best practice, as well as to the guidance outlined in the Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for an Archaeological Watching Brief* (CIfA 2020a). The CIfA guidance defines the purpose of an archaeological watching brief as follows:

"[...] to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works [...];

...to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard" (CIfA 2020a).

The aims of the archaeological watching brief are:

- to identify the presence or absence of any buried archaeological remains;
- to identify, investigate and record any archaeological remains discovered during GI works to the extent possible by the methods put forward in this WSI;
- to determine (so far as is possible) the stratigraphic sequence and dating of features identified;
- to establish the preservation of any buried archaeological remains and provide a chronology of the archaeological phasing;
- to identify the need for, nature, scope and scale of further recording works that may be required; and,
- to disseminate the results through deposition of an ordered archive at the local museum, the deposition of a report at the local Historic Environment Record (HER), and completion of the Online Access to Index of Archaeological Investigations (OASIS) Project website.

The archaeological watching brief shall conform to current best practice and shall be planned, managed, and undertaken in accordance with the requirements of this Specification and based on the guidance provided by:

- *Standard and Guidance for an Archaeological Watching Brief* (ClfA 2020a);
- *Standard and Guidance for the Collection, Documentation, Conservation, and Research of Archaeological Materials* (ClfA 2014b);
- *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives* (ClfA 2014c);
- *Code of Conduct: Professional Ethics in Archaeology* (ClfA 2014d); and
- *ClfA Policy: Use of Volunteers and Students* (ClfA 2021).

The work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the Client. The specification details how the archaeological watching brief, and subsequent reporting and archiving, shall be undertaken.

The results of the archaeological watching brief will help inform the EIA to be submitted as part of the Development Consent Order application for the proposed development. The results will also aid future archaeological trial trenching along the scheme.

Site Location

The archaeological watching brief will be implemented over two distinct areas (Figure 1) along the proposed A46 Newark Bypass - in Kelham Lands (Figure 2) located to the north of the River Trent in Averham CP and; the area between the A46 and the A1 (Figure 3) to the south-east of the River Trent in Newark CP (Table 1; Figure 2 and Figure 3).

Table 1: GI Trial Pits

Trial Pit (TP)	Survey Area (Figures 2 & 3)
S3TP35	50
S3TP36	49
S3TP37	48
S3TP38	48
S3TP39	36
S3TP40	35
S3TP41	51
S3TP42	20
S3TP43	20
S3TP44	21

The underlying bedrock comprises Mercia Mudstone Group. All these formations are early Triassic in age. Bedrock of this type is of fluvial, lacustrine, and marine origin (British Geological Survey 2022).

The superficial deposits in the area of Trial Pits S3TP35 to S3TP41 are the Holme Pierrepont Sand and Gravel Member. The superficial deposits at S3TP42 to S3TP44 are on alluvium. Both formations date to the Quaternary.

Archaeological Background

The following is an adapted summary of the archaeological background given in the EAR (Highways England 2021) and succeeding surveys. The surveys undertaken consisted of geophysical survey over the northern section of the Scheme, and fieldwalking and metal detecting surveys in the southern section of the Scheme where it had been assessed that geophysical survey was unlikely to produce useful results. Please refer to the EAR (Highways England 2021) for location figures depicting sites mentioned in the wider area of the scheme.

General Archaeological Background

Palaeolithic

An Upper Palaeolithic site was identified through field walking in 1991 at Farndon Fields (M3571) near the southern end of the scheme (Harding *et al.* 2014). This is a very rare site type, and the survey team will be made aware of its presence and the potential for related remains.

Mesolithic

There are no known Mesolithic sites within the area of the scheme; however, excavations to the Staythorpe Power station—c.2.5km to the west alongside the River Trent—have revealed Mesolithic remains (Cooper 2006).

Neolithic and Early Bronze Age

Neolithic and Bronze Age flints (L11808) and burnt stone have been recovered from Farndon Fields and a Neolithic mortuary enclosure (M3612) was identified through aerial photography and subsequent excavation near the northern end of the scheme. A Neolithic and Early Bronze Age occupation site (L12214 and M18427) was identified under the Roman Fosse Way near Langford (L12214 and M18427). Bronze Age remains, including a possible burnt mound, have recently been uncovered in the vicinity of Kelham.

Later Bronze Age and Iron Age

Remains of this period are considered rare in Nottinghamshire and are mainly known from isolated finds of bronze objects, such as palstaves from the River Trent (L8514 & L3039): while these are not close to the area of the proposed coring, finds of this type may be expected within the flood plain area, given the known practice of depositing metalwork in bodies of water and wetlands during this period. Settlement evidence, such as the Late Bronze Age and Iron Age pottery recovered from excavations at Farndon Fields (L11810) and further Iron Age sherds recovered at Crankley Point sewage works (L11013), are more indicative of human activity off the floodplain. Finds of Bronze Age and Iron Age date have recently been uncovered in the area of Kelham.

Romano-British Period

The Fosse Way Roman Road is presumed to have run along the same alignment as the current A46. It ran from Exeter to Lincoln, marked the limits of early Roman settlement and connected settlements and production centres. Concentrations of Roman material have been recorded at Farndon Fields and Newark Northgate, and trial trenching near Langford revealed the remains of the original Roman Road (L3737). A small amount of Roman material has been recovered from the flood plain area during the metal detecting survey.

Early Medieval

Archaeological finds are rare; however, placename evidence attests to Anglo-Saxon settlements throughout the area of the scheme. A high-status female burial (M18359) was found south of the scheme at a cropmark on Winthorpe Road (Newmark-on-Trent) and another inhumation was found in a possible Neolithic barrow (M3612). Excavations of enclosures alongside the Roman road to the south (Newark-on-Trent to Widmerpool) suggest continued use into the Anglo-Saxon period.

Medieval

Newark-on-Trent emerged as a market town in the medieval period. The castle (1003474) in its centre was built in the early twelfth century by the Bishop of Lincoln and sits on the site of an earlier motte-and-bailey. There is also a medieval hospital and cemetery (St Leonard's: M3691), a moated site (near Dairy Farm: 1016051), a medieval settlement (Osmondthorpe at Northgate: M18367), a medieval road (M3093), a medieval bridge (M3214), a medieval building (at Northgate allotments: M3690) and many finds have been identified within the town during minor development works.

Post-medieval Period

There are many standing buildings, agricultural and industrial remains from the post-medieval period within the area of the scheme. However, the most significant remains are those relating to the English Civil War. Newark-on-Trent was subjected to three separate sieges from 1643 to 1646 during the Civil War and a series of defences and forts were built around the town. Following the Civil War, the castle was destroyed, and Newark-on-Trent returned to its role as a merchant town.

Newark-on-Trent was particularly known for its beer. Warwicks and Richardsons began brewing in 1766 and the Northgate Brewery (M3717) was built in 1871. The Brewery Office (1277425), Maltings (1196413) and almshouses (M3262) still stand, and the locations of others are known. Many improvements were made to the river and wharfs and warehouses were constructed. Newark Town Wharf (M3274) and Cow Lane Wharf (M3291) likely served the breweries. There are nine Grade II listed warehouses within the area of the scheme.

Post-medieval buildings and structures illustrating the development of Newark during the seventeenth to twentieth centuries are present. The construction of the Great North Road causeway arches (a Grade II listed building) was carried out from the 1760s and completed in 1770.

Modern (AD 1750–present)

Industrial uses continued and more breweries and warehouses were built post-1750. For example, the Kelham Home Grown Sugar refinery along Great North Road (now operating as British Sugar) was built in 1920.

The earliest Ordnance Survey map of the area of the proposed scheme depicts land use in 1883. Most of the land northwest of the River Trent is regular field systems, typical of enclosure-era land divisions. Comparison with current satellite imagery indicates little amalgamation of fields has occurred since.

Results of the Metal Detecting Survey

The metal detecting survey was undertaken in two phases. The first phase in September 2022 comprised the survey of fourteen fields, three under arable and eleven under pasture. The second phase was carried out in January 2023 and comprised two fields under arable.

A total of 115 significant metal finds were retrieved from the survey.

The earliest item identified within the area to be subject to geoarchaeological coring consists of the end of a possible Roman period solid copper alloy bracelet or bangle (Area 7).

Some objects, such as a large bulbous copper alloy vessel rim fragment (Area 2), other copper alloy vessel fragments (Area 2 and 3), a lead weight (Area 7), lead waste (Area 9, 14, 18) and a folded lead disc (Area 6) could be of medieval date.

Most objects recovered are well-preserved post-medieval items. Some such as seven musket-calibre balls (Area 7, 9, 10, 18) and a single pistol ball (Area 12) are likely to have been associated with the English Civil War and the sieges of Newark between 1642 and 1646. Several personal items, such as belt buckles (Area 7), may also originate from this period. The remainder of the material was eighteenth to twentieth century in date. All the coins recovered, 29 in total, were eighteenth to twentieth century in date.

Results of the Field Walking Survey

The fieldwalking survey was carried out in January 2023, immediately after the completion of the Phase 2 metal detecting survey (Gethin and Appleby 2023). Of the areas subject to geoarchaeological coring, it was only possible to survey Area 6.

The survey recovered a small quantity of medieval pottery, thirteenth to fourteenth century in date, a few fragments of clay tobacco pipe and a large amount of late eighteenth to the early twentieth-century pottery. Many of the artefacts are likely to have been spread over the fields along with manure from nearby farms or Newark itself.

The finds assemblage did not indicate the presence of any early underlying archaeological sites, nor did it include any significant concentration of finds with the potential to date to the English Civil War period.

Results of the Geophysical Survey

The geophysical survey comprised high-resolution magnetic gradiometry undertaken in two phases. During the first phase, undertaken in early September 2022, ten areas (20–24 & 29–32) encompassing c.36 ha surveyed (Dowling 2022). A second phase was undertaken in late February 2023 concentrating on the northern end of the Scheme (Areas 25–27, 29, 30, 33 & 34) and on potential flood compensation areas (Areas 48, 49 & 51). During the first phase, features of archaeological and potential archaeological interest were identified in at least seven areas. These include evidence for potential settlement and relict field systems in Areas 20, 21, 22 and 30, as well as a range of potential features and structures of possible archaeological interest in Areas 22, 28 and 29. Potential pits, ditches, drains and other tentative features were also mapped by the survey in some of the other areas investigated. During the second phase a series of small, conjoined enclosures (Area 48) were found in the Kelham area, which may correspond to an HER record. An additional rectilinear enclosure was mapped 75m⁵ west of this. To the south (Areas 51) also contained potential evidence of archaeological features. Many possible ditches/drains (Areas 25–27, 29, 30, 48, 49 & 51) and pit-type features (Areas 28, 48 & 51) were also detected, though natural, ferrous or agricultural origins for at least some of these features cannot be ruled out.

Specification for an Archaeological Watching Brief

Scope of Work

The works covered in this WSI relate to the archaeological monitoring of ten Trial Pits (TP) in advance of the A46 Newark Bypass (Figure 2 and Figure 3). AMS will undertake archaeological inspection works of this programme of trial pits. This archaeological watching brief will incorporate the following elements:

- The archaeological watching brief will take place during the machine excavation of ten Trial Pits (S3TP35 - S3TP44) (See Table 1).
- Monitoring the GI excavations and recording any archaeological observations as necessary.

Method for Archaeological Watching Brief

Stripping of topsoil and other overburden shall be undertaken by the GI Contractor operating under the continuous observation of a member of the Archaeological Contractor's archaeological staff.

Stripping of topsoil and other overburden shall remain subject to the oversight of the Archaeological Contractor and no GI operations may commence until they have issued in writing a 'clearance to proceed' to the GI Contractor in any specific area, defined by reference to plans. The Archaeological Contractor may issue such clearance in any of the following circumstances:

- they are satisfied that no remains of archaeological interest are present in the specified trial pit;
- they are satisfied that all remains of archaeological interest in the specified trial pit have been identified, investigated and recorded in accordance with the requirements of the WSI; or
- they are satisfied that, although there remains a possibility that unidentified archaeological remains are present in the specified trial pit, no further ground disturbance will take place that would result in the exposure or disturbance of those remains; and
- where written clearances to proceed are issued these will be kept on file and copies provided to the Client.

Investigation and Recording of Archaeological Remains

Where archaeological remains are identified which in the judgment of the Archaeological Contractor are of low density or complexity, and where they can reasonably do so without compromising the ongoing watching brief, the Archaeological Contractor shall investigate and record the remains according to the methodology in this section. Where this is not feasible because the remains are too complex or extensive to be investigated with the available resources or without compromising the ongoing watching brief, then the contingency arrangements set out below shall be implemented.

Unless otherwise agreed with the Skanska/Mott MacDonald, the Archaeological Contractor shall undertake archaeological excavation by hand of any archaeological remains identified in accordance with the following strategy:

- discrete negative features (less than 1m diameter): at least 50% by area in addition to all stratigraphic relationships;
- discrete negative features (more than 1m diameter): at least 50% by area in addition to all stratigraphic relationships;
- discrete negative features containing good assemblages: 100%;
- linear negative features: at least 50% by area within the GI trial pit;
- 100% of all cremations; and
- all wall lines and other similar features shall be recorded by plan and section. A section through wall and foundation trenches shall be excavated and recorded where feasible.

Hand-cleaning of features or selected areas shall be undertaken to clarify the extent of, or relationship between, features/deposits, as far as possible within the trial pit. Relationships between intersecting features shall be determined by hand-excavation. All hand-excavation shall be carried out in a stratigraphic manner.

All excavated contexts shall be fully recorded by a descriptive written context record for each stratigraphic unit, together with full photographic records and drawn plans and sections at appropriate scales.

All excavated features and deposits shall be recorded photographically using high resolution digital photography. Additional illustrative photographs shall be taken as appropriate. A high-resolution digital camera with a minimum resolution of ten megapixels shall be used for the production of colour images. Digital images shall be supplied in uncompressed TIFF format for long-term storage and accessibility.

All finds shall be recorded by context as a minimum, and significant finds shall be recorded individually. Soil or other samples for potential palaeoenvironmental analysis or scientific dating shall be collected from suitable contexts, including any waterlogged deposits, deposits visibly rich in charred or other organic materials or other deposits as appropriate, in accordance with best practice.

If any human remains are encountered, the Consultant, Client, the coroner and the local police shall be notified. Excavation and removal of the remains shall only occur after obtaining an appropriate licence from the Ministry of Justice. The Archaeological Contractor shall notify the Client within 24 hours of such a discovery. Any conditions in the Ministry of Justice Licence affecting the future deposition and curation of human remains shall be discussed with the Client and the recipient repository at the earliest opportunity.

All finds of potential archaeological value shall be retained and removed from the site; cleaned, catalogued and appropriately packaged. All recording, cleaning, storage and conservation of finds shall be in accordance with ClfA's *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials* (ClfA 2014b).

Should the need arise for environmental samples to be undertaken, then all aspects of the collection, selection, processing, assessment and reporting on those environmental samples shall be undertaken in accordance with the principles set out in *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2011).

Subject to this strategy and the agreement of the Client, samples to be collected from suitable deposits shall include:

- If possible, a sample from suitable deposits which will be as large as GI works permit up to a limit of 40–60l, though it is envisaged in a watching brief that the volume will be less. This sample will be used for wet-sieving;
- Where deposits of particular potential interest are identified, and on the advice of the relevant specialist, additional special samples shall be collected. These could include additional monoliths, or other small samples for other special analyses. Where waterlogged deposits are identified, more intensive sampling shall be undertaken subject to the agreement of the Client and on the advice of the relevant specialist.

Contingency Arrangements

Where archaeological remains are identified which, for whatever reason, cannot be properly investigated and recorded with the resources available on site without compromising the ongoing watching brief, then the Archaeological Contractor shall mark out the relevant trial pit in an appropriate manner and notify the Consultant. Further work shall not be permitted within the trial pit except if given clearance to do so by the Archaeological Contractor. All works within the marked-out area shall be suspended until completion of the archaeological investigation in that area.

Notification of discoveries as set out above shall be made within one working day of the discovery, and shall include a brief outline of what has been discovered. This notification will be issued to the Client who will inform the Curator.

After such notification, the Archaeological Contractor will initiate a call with the Client to determine the need for, nature and scope of any further archaeological investigation and recording works.

Site Archive

Adequate resources shall be provided during fieldwork to ensure that all records are checked and internally consistent. Archive consolidation shall be undertaken immediately following the conclusion of fieldwork. The site record shall be checked, cross-referenced and indexed as necessary. All retained

finds shall be cleaned, conserved, marked and packaged as necessary to maintain the archive prior to transfer. All retained finds shall be assessed and recorded using pro-forma recording sheets, by suitably qualified and experienced staff. Initial artefact dating shall be integrated with the site matrix. The archiving and post-excavation work shall be undertaken in accordance with the requirements of CIfA's *Standard and Guidance for an Archaeological Watching Brief* (CIfA 2020a). The integrity of the primary field records shall be preserved and the Archaeological Contractor shall create security copies in digital format of all primary field records.

Post-Excavation Assessment and Reporting

A Post-Excavation Assessment (PEA) will be produced. Where no additional phases of investigations are required it is possible that the PEA may be adequate to disseminate the results of the investigations. This shall be agreed with the Curator, Consultant and Client.

The PEA shall clearly acknowledge the role of the Consultant and Client and show the logo of the Client on the front cover. The report shall be prepared in line with *CIfA Standard and Guidance for an Archaeological Watching Brief* (CIfA 2020a) and shall include as appropriate:

- a non-technical summary;
- site code and project number;
- planning reference number;
- dates when the investigations took place;
- a description of the background to and circumstances of the work;
- a brief description of the previously known archaeology of each site;
- a description of the methodology used;
- an objective description of the results;
- a specialist assessment of each category of data;
- details of archive location and destination (with accession number, where known), together with a catalogue of what is contained in that archive;
- an assessment of the archaeological significance of the deposits identified, in relation to other sites in the region;
- a conclusion with recommendations for further post-excavation work, if required;
- a statement of the storage and curation requirements for each category of data;
- general and detailed plans at appropriate scales, showing the location of each site accurately positioned on an up-to-date Ordnance Survey base;
- plans of each site at appropriate scales, with keys and north points;
- detailed plans and sections of individual features where necessary;
- all scales used on any drawings should be standard scales such as would appear on a normal scale ruler;
- a complete matrix for each site;
- a copy of the specification and/or project design, and
- references and bibliography of all sources used.

Each category of data and material recovered by the investigations (site records/stratigraphic data, each category of artefact or other find, each category of palaeoenvironmental/economic evidence, any other data) shall be examined and assessed by a suitably qualified and experienced archaeologist

or specialist. During the assessment specialists shall make recommendations regarding the discard and retention of material.

The assessment of all samples shall be undertaken in accordance with the guidance provided by English Heritage (2011). After instruction from the Consultant, the Archaeological Contractor shall start processing and assessing samples as soon as the investigation works starts to both inform the onsite sampling strategy and also to reduce the number of samples to be processed after the investigations. Any samples remaining after the investigations shall be prioritised (such as those from key deposits) for processing and assessment.

If necessary and possible to achieve the aims and objectives of the PEA, dating evidence shall be obtained by the application of radiocarbon, dendrochronological or other scientific dating techniques.

One copy of a complete draft assessment report, or additional appendix, shall be submitted in the first instance for review/checking by the Consultant. In finalising the report, the Archaeological Contractor shall take into account any comments and remedy any faults identified by the Consultant or Curator. The finalised assessment report shall be submitted to the Consultant within five working days of receipt of the comments on the draft report.

Immediately upon completion of the finalised assessment report, the report and any data or other documentation produced during the post-excavation process shall be integrated into the site archive. The Archaeological Contractor shall store the archive in suitable conditions in a secure location until instructions are received from the Consultant for its deposition in an agreed final repository or other transfer.

Five bound copies and a digital copy in PDF format of the final PEA shall be issued to the Client. After instruction from the Consultant, copies of the report (and digital copies of the archive) will be issued by the Archaeological Contractor as detailed below:

- A hard copy and a digital copy of the report and archive in PDF format to the HER.
- Copies of all reports in Microsoft Word.
- All drawings generated by the Archaeological Contractor will be georeferenced, and digitised archaeological trial pit plans shall be provided to the Consultant as AutoCAD drawings (.dwg) and in an ArcView compatible format.

Where further archaeological investigations are required, the Consultant will agree the scope and programme with the Client and Curator.

Key Personnel and Project Team

The archaeological watching brief will be conducted an experienced member of AMS field staff.

Table 2: Project Team

Name	Role	Contact Details
[REDACTED]	Project Manager	Email: [REDACTED]
[REDACTED]	AMS Project Officer	Tel: [REDACTED]

Programme

The GI works for the A46 Newark Bypass are due to commence 9 May 2023. The programme for excavation of trial pits requiring an archaeological watching brief is anticipated to take between 3 to 4 days to complete.

Safety, Health & Welfare at Work

The archaeological watching brief will be carried out in accordance with current health and safety legislation and the requirements of the GI Contractor and Client. A project-specific Risk Assessment Method Statement (RAMS) will be in place at the commencement of on-site services. All staff will wear appropriate Personal Protective Equipment (PPE).

AMS site staff shall be Construction Skills Certification Scheme (CSCS) cardholders.

Reporting

A draft preliminary report on the watching brief will be completed within two weeks of completion of the fieldwork. This report will be submitted for a two-cycle review by the Client before finalisation. A first draft will be reviewed by Skanska, who will then forward the draft to the client and curator for comments. The finalised report will be compiled, with any resulting comments accounted for and errors remedied. After instruction from Skanska, a hard and digital (in pdf. format) copy of the final archaeological watching brief report will be issued to Skanska. Skanska will forward the report to ECC and Place Services. The digital copy will be in pdf. format and contain all text, images and plans present in the hard copy in a single file.

The report will include the following information at a minimum:

- Executive summary (300 words maximum);
- Introduction and project background;
- Archaeological background;
- Aims and objectives;
- Methodology (equipment, data collection, processing and interpretation);
- Results and discussion;
- Conclusions;
- Bibliography;
- Illustrations;
- Archive Location; and
- Appendices (technical detail and supporting information).

The report will be subject to AMS's internal quality control procedures, which include technical review and copyediting.

Upon completion and approval of the final report, copies of the report will be issued to the Client, as well as the relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer, following instruction from the Client. An OASIS online record will be created, and a PDF version of the final report submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

Archive Storage and Curation

All finds, photographs, drawings and paper archive records will be compiled into a comprehensive and fully cross-referenced archive in accordance with recognised best practice and the requirements of the local authority and/or museum (Historic England 2015, ClfA 2020b, Brown 2011). AMS will seek to secure the transfer of the ownership of artefacts to the receiving museum and inform the Client of the process.

The site archive will be prepared in accordance with relevant national guidelines (Walker 1990, Brown 2011, ClfA 2020b) and with any specific requirements of the Principal Historic Environment Consultant at Place Services. AMS will liaise with the local archive and museum service to ensure the service are aware of the work and to obtain an accession code for the project from the archive and museum service. The archive will be deposited within 6–12 months of project completion, following instruction from the Client. The Archaeological Contractor will be required to confirm when the deposition of the archive has been completed.

Copyright

The copyright of the report and archive will be retained by AMS under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The Client will be licensed to use each report for the purposes for which it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to AMS for the purposes of archaeological research or development control within the planning process.

Where the project documentation or archive contains material that is non-AMS copyright, or the intellectual property of third parties, which AMS are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* regarding copying and electronic dissemination of such material.

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Figures

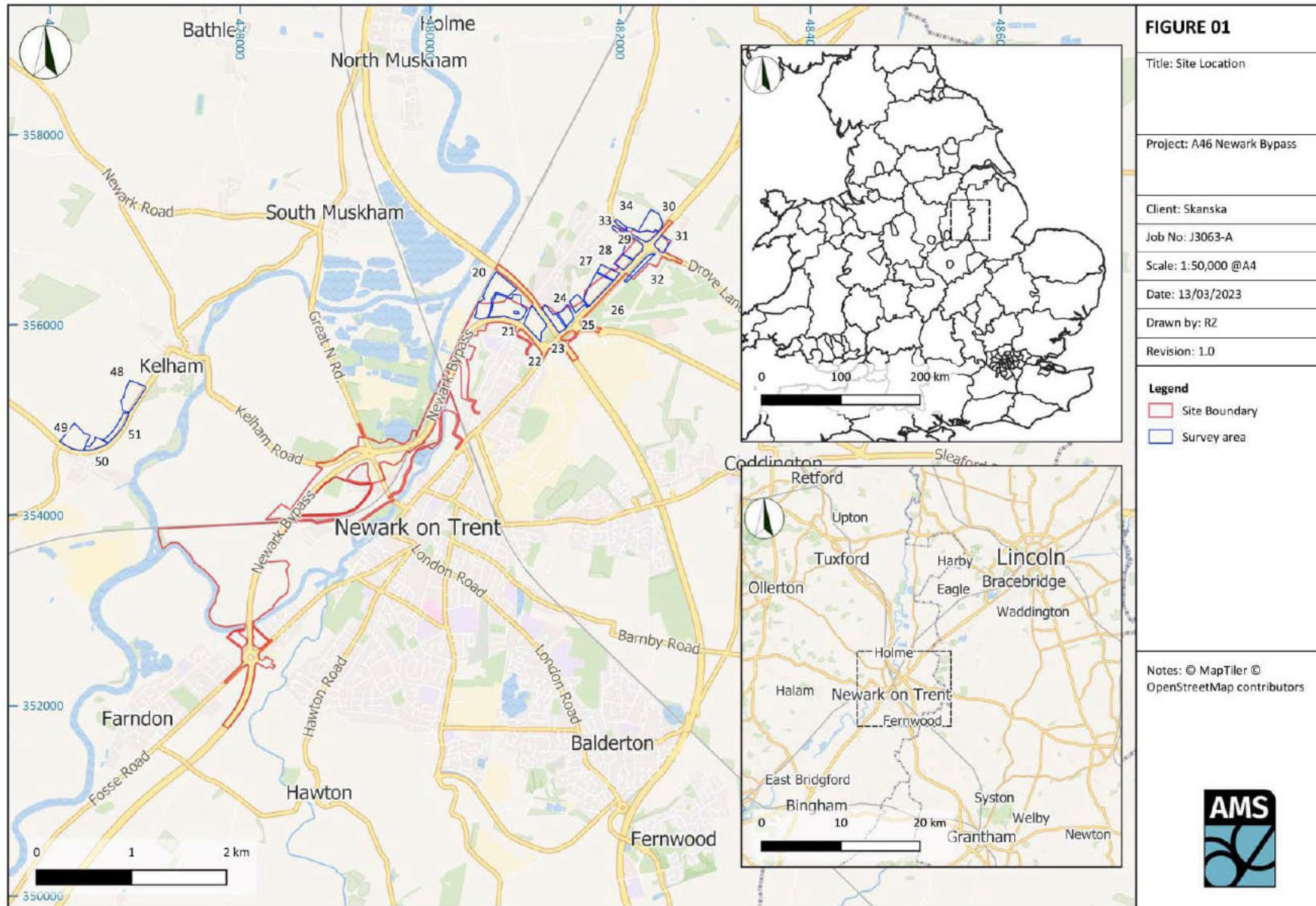
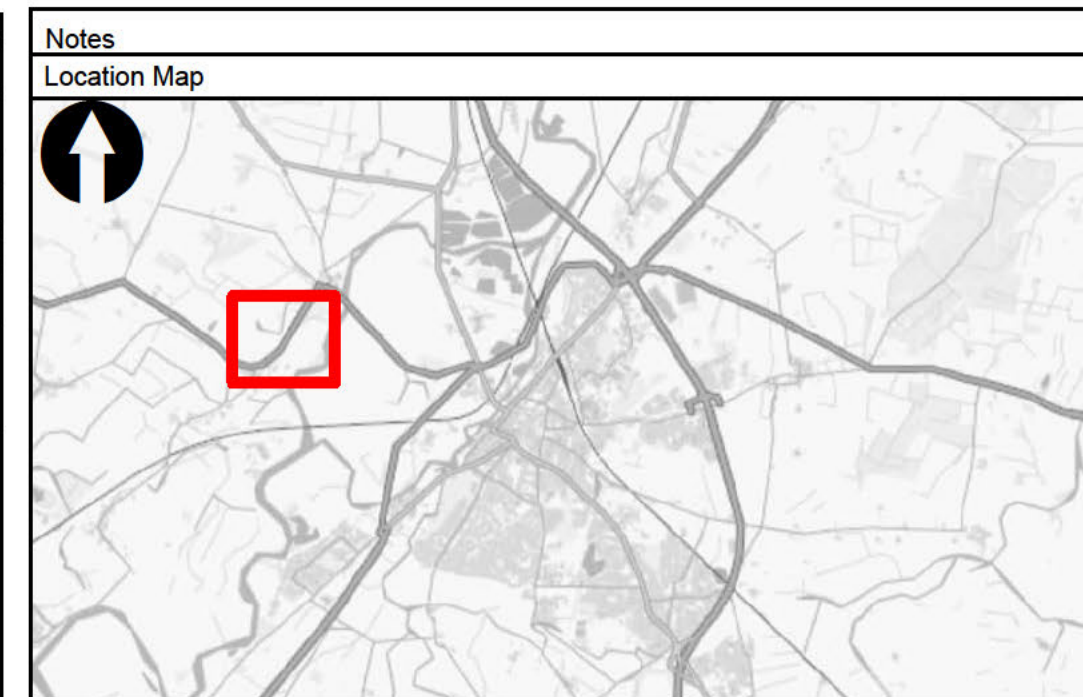
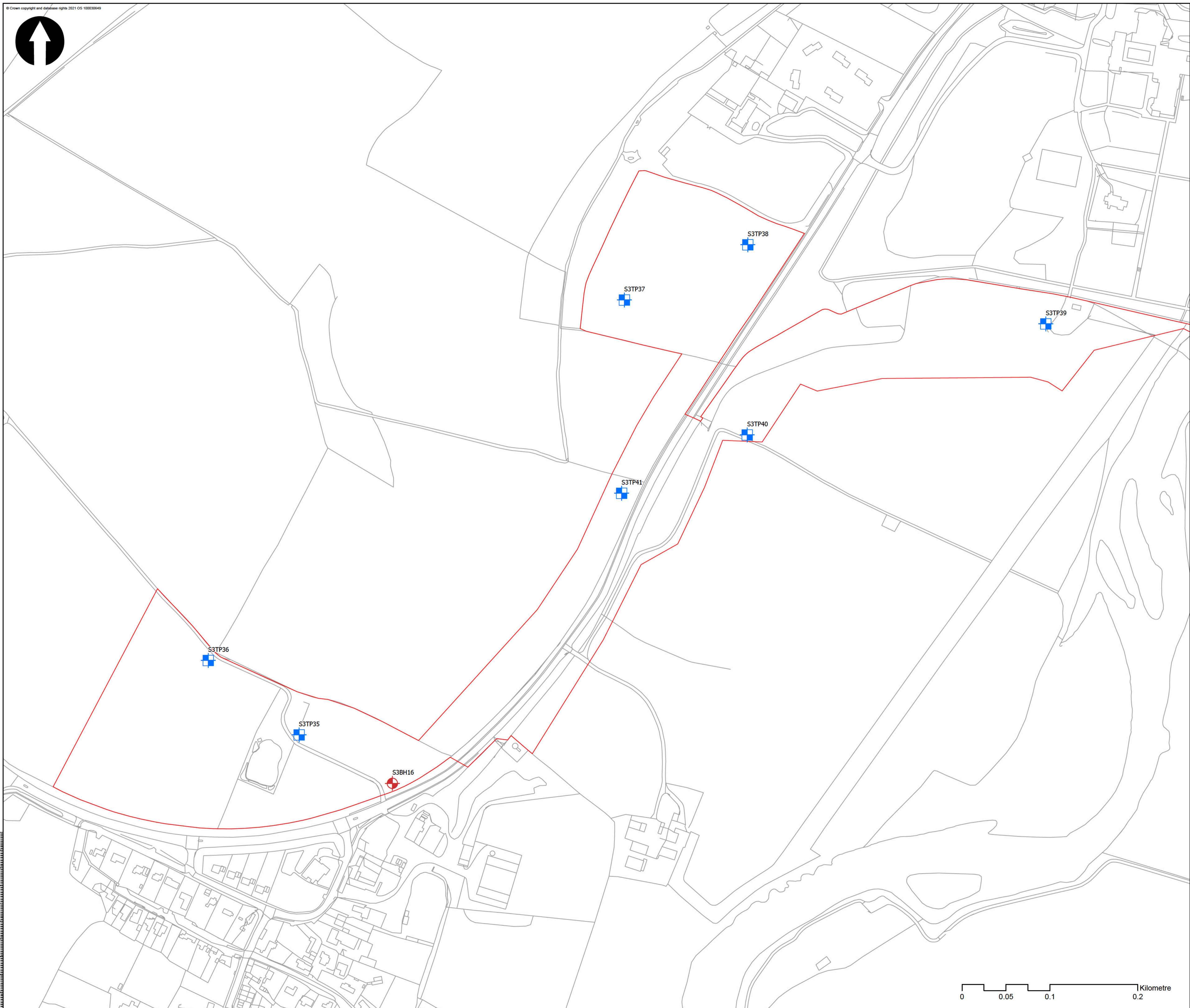
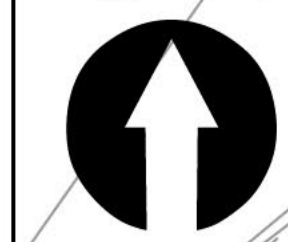


Figure 1: Site location map.



Key to Symbols

Location Type

	BH
	TP

Drawing References

Location Map: os_open_greyscale_no_labels: Contains OS data © Crown Copyright and database right 2020

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
P01	15/03/23	PHASE 3 GI	AC	AW	

<p>SKANSKA</p> <p>Denham Way Maple Cross Rickmansworth WD3 9SW</p> <p>Tel: +44 (0)19 2377 6666 www.skanska.co.uk</p>	<p>M M MOTT MACDONALD</p> <p>Mountbatten House Grosvenor Square Southampton SO15 2JU</p> <p>Tel: +44 (0)23 8062 8800 www.mottmac.com</p>
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Client

Drawing Status	Suitable for Stage Approval	Status	S4
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Project Title

A46 Newark Bypass

Drawing Title

Stage 3 Phase 3 Ground Investigation
Exploratory Hole Location Plan
Sheet 2 of 3

Scale	1:1000	Designed	Drawn	Checked	Approved
Original Size	A1	Date	Date	Date	Date
Drawing Number	HE PIN	Originator	Volume	Project Ref. No.	100103345
Location		Type	Role	Number	Revision P01

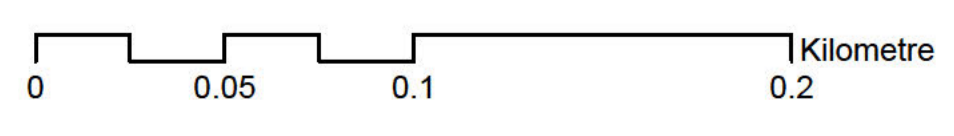
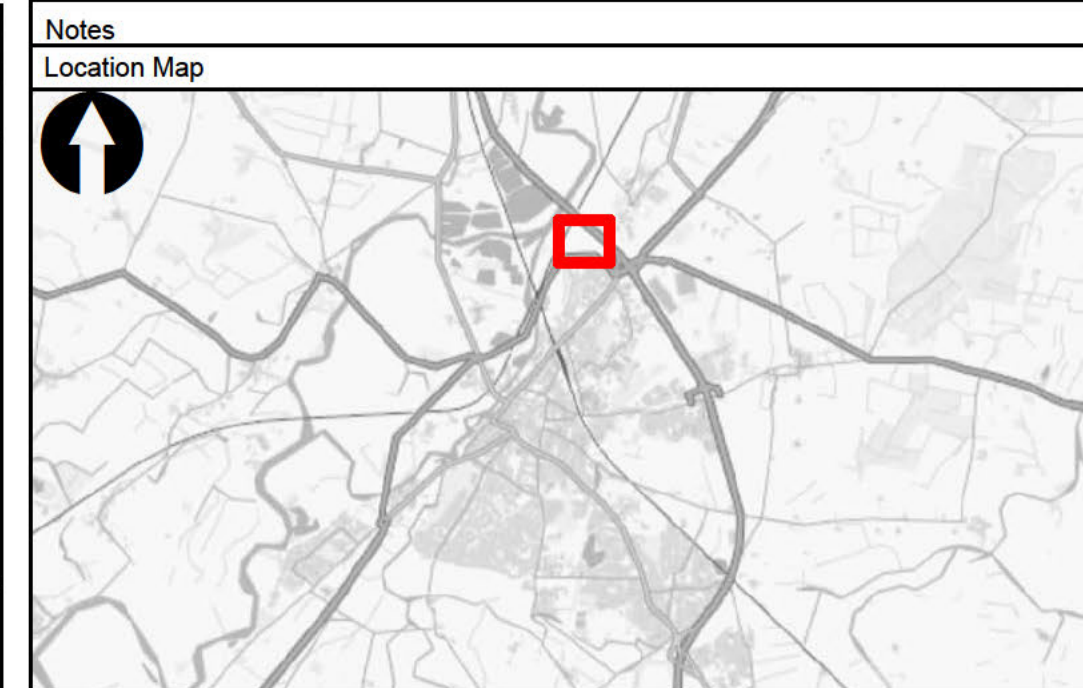
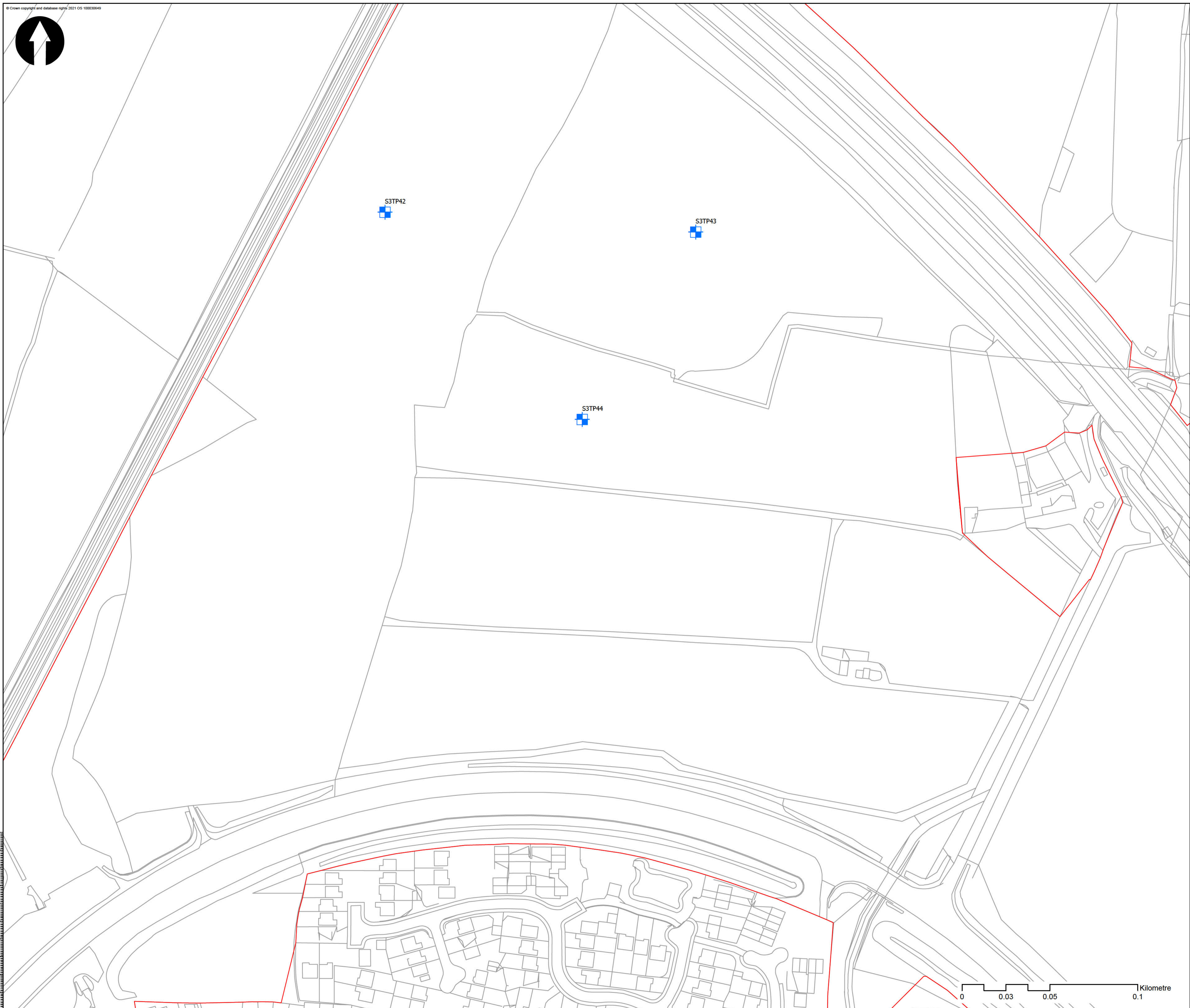


Figure 2: Trial Pit locations Kelham.



Notes

Location Map

Key to Symbols

Location Type

	BH
	TP

Drawing References

Location Map: os_open_greyscale_no_labels: Contains OS data © Crown Copyright and database right 2020

P01	15/03/23	PHASE 3 GI	AC	AW	
REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D

SKANSKA	M	M
Denham Way Maple Cross Rickmansworth WD3 9SW	MOTT MACDONALD Mountbatten House Grosvenor Square Southampton SO15 2JU	Tel: +44 (0)23 8062 8800 www.mottmac.com
Tel: +44 (0)19 2377 6666 www.skanska.co.uk		



Drawing Status	Suitable for Stage Approval	Status	S4
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Project Title: A46 Newark Bypass

Drawing Title: Stage 3 Phase 3 Ground Investigation Exploratory Hole Location Plan Sheet 3 of 3

Scale	Designed	Drawn	Checked	Approved
1:1000				

Original Size	Date	Date	Date	Date
A1				

Drawing Number	Originator	Volume	Project Ref. No.
HE PIN			100103345
Location	Type	Role	Number
			P01

Figure 3: Trial Pit locations between A46 and A1

E. Appendix: Geoarchaeological Coring WSI

A46 Newark Bypass, Nottinghamshire - Written Scheme of Investigation for Geoarchaeological Coring



Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery Partnership Framework

By [REDACTED]

2 May 2023

TITLE PAGE

AMS Job No.: J3063-A

Project Name: Regional Delivery Partnership A46 Newark Bypass

Civil Parish Name(s): Averham CP, Newark CP

Grid Reference (OSGB36): 478807 / 354376

Report Status/Revision: 1.2

Revision Date: 2 May 2023

Report Author: [REDACTED]

Technical Reviewer: [REDACTED]

Approved By: [REDACTED]

File Name: A46 Newark Bypass, Nottinghamshire - Written Scheme of Investigation for Geoarchaeological Coring_v1

Archaeological Management Solutions

Fahy's Road, Kilrush, Co. Clare. V15 C780

T +353 (0)65 810 3001

**Disclaimer**

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the author and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

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**NSAI**

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Abbreviations and Definitions

Abbreviation	Definition
AMS	Archaeological Management Solutions
BGS	British Geological Survey
Cifa	Chartered Institute for Archaeologists
DBA	Desk-Based Assessment
DCO	Development Consent Order
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
H & S	Health and Safety
OSGB36	Ordnance Survey Great Britain 1936 coordinate system
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement
RTK DPGS	Real Time Kinematic Differential Global Positioning System
SM	Scheduled Monument
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this report use the OSGB36 coordinate reference system unless otherwise stated.

Acknowledgments

AMS gratefully acknowledge the advice received from Dr Andy Howard (Landscape Research Management) and Kris Krawiec (York Archaeology).

1 Introduction

1.1 Project Background

This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions (AMS) on behalf of Skanska Construction UK Ltd, on behalf of National Highways Regional Delivery Partnership Framework in advance of geoarchaeological coring, forming part of the works undertaken to inform the EIAR for the A46 Newark Bypass, Nottinghamshire (Figure 1).

The A46 Newark Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.

The scheme has been subject to a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.

Prior to this phase of assessment, geophysical (Dowling 2022 and 2023), fieldwalking (Gethin 2023) and metal detection surveys (Bartlett & McKenna 2022) and a geoarchaeological desk-based assessment (Lancaster 2023) were carried out. A programme of archaeological trial trenching is to be carried out and this will also have a geoarchaeological component.

1.2 Purpose and Scope of this Assessment

This WSI sets out the aims of the geoarchaeological coring, and the methods and standards that will be employed. It conforms to current best practice, as well as to the guidance outlined in the Chartered Institute for Archaeologists' (CIfA) Standard and guidance for archaeological field evaluation (CIfA 2014). The trenching and test pitting follows geophysical (Dowling 2022), fieldwalking (Gethin 2023) and metal detection surveys (Bartlett & McKenna 2022). A geoarchaeological desk-based assessment (Lancaster 2023) and the design of trenches has taken the survey results into account.

It is intended that the geoarchaeological coring will be implemented across the section of the proposed scheme that crosses the flood plain of the Trent, and a limited part of the flood compensation areas in the vicinity of Kelham. The coring will be used to assess the archaeological and palaeoenvironmental potential of the alluvial deposits that form the superficial geological deposits of this area (Lancaster 2023). The coring will be complemented by geoarchaeological test pitting that will be undertaken, as part of the trial trenching, on soils derived from the Holme Pierrepont Sands and Gravels. These are to be undertaken to check the geoarchaeological potential of these areas: works

on the section of the A46 to the south revealed deposits of Late Upper Palaeolithic material on soils derived from this geological unit. The geoarchaeological test pitting will be carried out as part of the evaluation trenching programme, and the relevant methodological information and location of geoarchaeological test pits is detailed in the relevant WSI. The coring work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the Archaeological Consultant, the Curator and the Client.

The results of the survey will help inform the Environmental Impact Assessment (EIA), to be submitted as part of the Development Consent Order (DCO) application for the proposed development. The results will also aid future archaeological trial trenching along the scheme.

1.3 Site Location

The geoarchaeological coring will be implemented over 15 fields (designated as Areas 2, 3, 6, 7-12, 14-16, and 18 (Table 1; Figures 2–3). Areas 2, 3, 6-12, 14-16, 18 are located in the flood plain of the Trent. Areas 51 and 48 are located in areas of alluvium between Kelham and Averham. The alluvial deposits in Areas 51 and 48 are probable palaeochannels, constrained within Pleistocene terrace material.

The underlying bedrock of the locality comprises Mercia Mudstone Group, an early Triassic lithostratigraphic group that is widespread in the English Midlands. The bedrock of this type is of fluvial, lacustrine and marine origin (BGS 2022). Over most of the areas to be trenched this geological unit is not further differentiated (Areas 9-12, 14-16, 18, 40 and 48). Where it has been differentiated consists either of Gunthorpe Member mudstones (Areas 3, 6-8) or Edwalton Member mudstones (Area 2). Within the floodplain of the River Trent the superficial deposits are alluvium - clay, silt, sand, and gravel, dating to the Quaternary period. The broad trend of the alluvial deposits is for silts and clays to form the upper part of the deposit sequence and sands and gravels to form the lower part. The geoarchaeological desk-based assessment has tentatively assigned the upper deposits to the Holocene and the lower deposits to the Pleistocene.

1.4 The Proposed Geoarchaeological Strategy

This phase of the evaluation will comprise 38 boreholes (typically 2m – 10m deep). These have been positioned on the basis of two purposes. One set are located in order to record sedimentary sequences at an appropriate level of coverage of the alluvial deposits and to allow for their characterisation and to identify any trends of variation over the area of the flood plain, such as prevalence of more deeply buried palaeochannels that may either not be visible in lidar data or underly the already identified palaeochannels, within the proposed development. The other set have been selected order to sample potential palaeochannels that have been identified during the geoarchaeological desk-based

assessment, including those identified in a large scale mapping exercise previously undertaken in the region (Malone and Stein 2015), which have been re-examined to check the identifications. For all boreholes an additional point of recording is to identify possible archaeological material, potentially including preserved wood, either from naturally fallen trees or worked wood from boats or structures. The boreholes and their principal purpose for investigation are given in Appendix 1.

1.5 Changes to this Written Scheme of Investigation

Should changes to the methodology outlined below be required, they will first be agreed with the Consultant (Skanska and Mott MacDonald) and Curator (the Newark and Sherwood District Council Heritage Officer).

2 Geoarchaeological and Archaeological Background

The following is an adapted summary of the archaeological background given in the EAR (Highways England 2021) and succeeding surveys. The surveys undertaken consisted of geophysical survey over the northern section of the Scheme, and fieldwalking and metal detecting surveys in the southern section of the Scheme where it had been assessed that geophysical survey was unlikely to produce useful results. Please refer to the EAR (Highways England 2021) for location figures depicting sites mentioned in the wider area of the scheme.

2.1 General Archaeological Background

2.1.1 *Palaeolithic and Mesolithic*

There are no known sites of Palaeolithic or Mesolithic age within the area of the scheme subject of the geoarchaeological coring: it is probable that materials of this age are either deeply buried or have been eroded away/reworked by the action of the river. Outside of the floodplain area there are known Late Upper Palaeolithic finds, notably at Farndon. Areas potentially affected by the scheme that may have potential for similar remains will be addressed in the Trial Trenching and Geoarchaeological Test Pitting works.

2.1.2 *Neolithic and Early Bronze Age*

There are no known sites from this period within the floodplain section of the scheme, though Neolithic and Bronze Age material has been recovered from higher ground in the area. Flints (L11808) and burnt stone were recovered from Farndon Fields and sites such as a Neolithic mortuary enclosure (M3612) near the north end of the scheme, as well as a Neolithic and Early Bronze Age occupation site (L12214 and M18427) was identified under the Roman Fosse Way near Langford (L12214 and M18427). Outside of the floodplain, near the probable palaeochannels near Kelham, there have been recent finds of Neolithic pits.

2.1.3 *Later Bronze Age and Iron Age*

Remains of this period are considered rare in Nottinghamshire and are mainly known from isolated finds of bronze objects, such as palstaves from the River Trent (L8514 & L3039): while these are not close to the area of the proposed coring, finds of this type may be expected within the flood plain area, given the known practice of depositing metalwork in bodies of water and wetlands during this period. Settlement evidence, such as the Late Bronze Age and Iron Age pottery recovered from excavations at Farndon Fields (L11810) and further Iron Age sherds recovered at Crankley Point sewage works (L11013), are more indicative of human activity off the floodplain. Finds of Bronze Age

and Iron Age date have recently been uncovered in the area of Kelham, in the near vicinity of the proposed coring at Kelham.

2.1.4 Romano-British period

The Fosse Way Roman Road is presumed to have run along the same alignment as the current A46. It ran from Exeter to Lincoln, and marked the limits of early Roman settlement and connected settlements and production centres. Concentrations of Roman material have been recorded at Farndon Fields and Newark Northgate, and trial trenching near Langford revealed the remains of the original Roman Road (L3737). A small amount of Roman material has been recovered from the flood plain area during the metal detecting survey (See 2.3).

2.1.5 Early Medieval and Medieval

Early Medieval archaeological finds are rare; however, place-name evidence attests to Anglo-Saxon settlements throughout the area of the scheme. Some sites have been found in nearby areas off the flood plain: a high-status female burial (M18359) was found south of the scheme at a cropmark on Winthorpe Road (Newmark-on-Trent) and another Anglo-Saxon inhumation was found inserted in a possible Neolithic barrow (M3612). Excavations of enclosures alongside the Roman road to the south (Newark-on Trent to Widmerpool) suggest continued use into the Anglo-Saxon period.

Newark-on-Trent emerged as a market town in the medieval period. Assets from this period include the castle (1003474) hospital and cemetery (St Leonard's: M3691), a moated site (near Dairy Farm: 1016051), a medieval settlement (Osmundthorpe at Northgate: M18367), a medieval road (M3093), a medieval bridge (M3214), a medieval building (at Northgate allotments: M3690) and many finds that have been identified within the town during minor development works. Medieval finds were recovered during the fieldwalking and metal detecting surveys (see 2.2 and 2.3 below).

2.1.6 Post-medieval period

While there are many standing buildings, agricultural and industrial remains from the post-medieval period within the area of the scheme, relatively few of these are located on the alluvial deposits associated with the floodplain of the Trent. Of those that are, the most notable are the remains relating to the three sieges Newark was subjected to in the First English Civil War. These consist of five Civil War redoubts - 550m south-east of Valley Farm (SM1016046), 680m north-west of Dairy Farm (SM 1016048), 580m ENE of sugar refinery (SM 1016152) and two on Crankley Point (SM 1016049 and SM 1016050), as well as the Earthworks and line of First Circumvallation (M8401/L10511/L8470/L8442).

2.1.7 Modern (AD 1750–present)

Industrial uses continued and more breweries and warehouses were built. The Kelham Home Grown Sugar refinery, along Great North Road, (now operating as British Sugar) was built in 1920. The earliest Ordnance Survey map of the area of the proposed scheme depicts land use in 1883. Most of the land northwest of the River Trent is regular field systems, typical of enclosure-era land divisions. Comparison with current satellite imagery indicates little amalgamation of fields has occurred since.

2.2 Geoarchaeological Background

Across the area of the current floodplain, the alluvial deposits can be broadly divided into two elements. The lower alluvial deposits dominated by sands and gravels, interpreted as the remains of a braided river outwash system of broadly Pleistocene date, means that the potential for *in situ* remains of human activity are low. Coarse sediments of this type generally preserve palaeoenvironmental material poorly, and much material is likely to be re-worked.

The other element is the upper alluvial deposits, dominated by fine grained sediments. These are more likely to be of Holocene date in their initial deposition. The change to a somewhat lower energy pattern of deposition during the Holocene probably reflects the effect of relative sea level rise, which effectively reduced the gradient of the Trent, leading to lower transport capacity, partial infilling of channels and an increased tendency to flooding. The river form would have changed to an anastomosing environment, potentially with multiple channels. While anastomosing rivers have more stable channels than braided systems, these may still change whether through channel shift or avulsion events. Changes in channel course may be reflected in the presence of palaeochannels within the floodplain area, which may be identified by lithological changes, such as the presence of coarser sediments located within fine sediment units. The fine mineral component and organic content of these sediments are indicative of slow or still water, potentially areas that were only periodically wet, potentially including features such as oxbow lakes, or depressions left in the outwash surfaces. These have probably, for the most part, been subject to frequent re-working and therefore little material of archaeological or palaeoenvironmental potential is likely to survive in most deposits. There are, however, two main situations where material of archaeological or palaeoenvironmental significance may survive. The first would be the survival of large organic artefacts or sections of structural elements such as bridges or mill dams. While these may not be strictly *in situ*, the intrinsic informational value of such items would still be high. The relatively thin depth of the fine-grained deposits, combined with the fluctuating water table suggests that the potential for such items to survive within the area of the proposed scheme is relatively low, but such remains would be of notable significance. The other situation would be where surviving discrete palaeochannels or other infilled fluvial features are found.

These have the potential to preserve considerable palaeoenvironmental material, including pollen and insects that can be used to reconstruct the local environments, including potentially detecting the impact of human activity on the environment. Such features may also contain organic artefacts if anoxic conditions obtain within them. The geoarchaeological desk-based assessment (DBA) has identified potential palaeochannels within the footprint of the proposed scheme. While the upper parts of the Holocene alluvial deposits may have been subject to periodic desiccation and oxidation, there is still the potential for some of the more robust palaeoenvironmental material such as pollen to survive, and within deeper parts of this facies more anoxic conditions may preserve more organic material.

2.3 Results of the Metal Detecting Survey

The metal detecting survey was undertaken in two phases. The first phase in September 2022 comprised the survey of fourteen fields, three under arable and eleven under pasture. The second phase was carried out in January 2023 and comprised two fields under arable.

A total of 115 significant metal finds were retrieved from the survey.

The earliest item identified within the area to be subject to geoarchaeological coring consists of the end of a possible Roman period solid copper alloy bracelet or bangle (Area 7).

Some objects, such as a large bulbous copper alloy vessel rim fragment (Area 2), other copper alloy vessel fragments (Area 2 and 3), a lead weight (Area 7), lead waste (Area 9, 14, 18) and a folded lead disc (Area 6) could be of medieval date.

Most objects recovered are well-preserved post-medieval items. Some such as seven musket-calibre balls (Area 7, 9, 10, 18) and a single pistol ball (Area 12) are likely to have been associated with the English Civil War and the sieges of Newark between 1642 and 1646. Several personal items, such as belt buckles (Area 7), may also originate from this period. The remainder of the material was eighteenth to twentieth century in date. All the coins recovered, 29 in total, were eighteenth to twentieth century in date.

2.4 Results of the Field Walking Survey

The fieldwalking survey was carried out in January 2023, immediately after the completion of the Phase 2 metal detecting survey (Gethin and Appleby 2023). Of the areas subject to geoarchaeological coring, it was only possible to survey Area 6.

The survey recovered a small quantity of medieval pottery, thirteenth to fourteenth century in date, a few fragments of clay tobacco pipe and a large amount of late eighteenth to the early twentieth-

century pottery. Many of the artefacts are likely to have been spread over the fields along with manure from nearby farms or Newark itself.

The finds assemblage did not indicate the presence of any early underlying archaeological sites, nor did it include any significant concentration of finds with the potential to date to the English Civil War period.

3 Project Aims and Objectives

3.1 Project Aim

The work is intended to provide data to inform the Environmental Impact Assessment, and to feed into any consequent mitigation strategy. The principal aim of the geoarchaeological coring is to characterise, as far as reasonably possible, the deposit sequence within the floodplain section of the scheme and the alluvial deposits near Kelham. This will concentrate on nature, extent, date, and potential significance of any palaeoenvironmental or geoarchaeological materials within the development area.

This aim will enable the potential value of the deposits in addressing some of the overarching agenda themes presented in the East Midlands Historic Environment Research Framework to be assessed ([East Midlands Historic Environment Research Framework - East Midlands Historic Environment Research Framework \(researchframeworks.org\)](https://www.researchframeworks.org/)). Those identified as relevant include:

- 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 soil development and geomorphic processes (notably alluviation, colluviation and aeolian deposition);

Few of the specific strategic research objectives closely relate to the evidence types that coring is likely to produce, though Strategic Objective 1D 'Further Investigate Upper Palaeolithic (Period 5) open-air sites in the East Midlands' is relevant. This latter Strategic Objective is also relevant to the other geoarchaeological investigations that will take place as part of the archaeological trial trenching.

3.2 Project Objectives

The test trenching objectives include:

- to identify, characterise and quantify sub-surface geoarchaeological units;

- undertake detailed descriptions of the sedimentary sequence;
- assess the potential recover samples to provide dates and environmental evidence;
- update the deposit model for the scheme;
- incorporate all of the above in a report to the Client; and
- create a physical and digital site archive.

The planned geoarchaeological cores will be taken under the supervision of an experienced geoarchaeologist. The boreholes will be drilled to the base of the alluvial sequence where possible.

4 Project Team

The geoarchaeological coring will be overseen by AMS. It will be led by AMS Geoarchaeologist Dr Steve Lancaster with an assisting geoarchaeologist, surveyor, and the drilling crews. Expert advice from acknowledged experts in the geoarchaeology of the region will also be sought.

5 Methodology

5.1 Geoarchaeological Coring Methods

5.1.1 Standards

All work will be conducted in accordance with the Chartered Institute for Archaeologists' *Code of Conduct and Standard and Guidance for Archaeological Field Evaluations*, and will take cognizance of Historic England's guidance for geoarchaeology and environmental archaeology (2015a and 2015b).

5.1.2 Pre-commencement

Skanska will provide up to date service plans and before ground is broken in each area, service plans will be checked to ensure that groundworks can be conducted safely.

Access points, refuelling points, locations for compounds and welfare will all be agreed with the client prior to the commencement of works. Skanska will inform AMS of any specific landowner requests in advance of the works.

A photographic record of pre-commencement ground conditions will be taken of each area and access points prior to commencement in that area.

5.1.3 Ecological Considerations

AMS will liaise with Mott MacDonald and Skanska to ensure that any ecological exclusion zones are demarcated, and the sampling area will be signed off by a project ecologist before the commencement

of work. A project ecologist will attend to brief and observe the team undertaking the geoarchaeological coring as necessary.

5.1.4 Coring methodology

The outline location of all boreholes have been agreed with the consultant, Martyn Cooper of Mott MacDonald (See Figure 3). These have been determined on the basis of achieving a sufficient spread of cores to characterise the sedimentary sequence within the coring area, including the targeting of known or suspected palaeochannels. These have been identified through the desk-based assessment undertaken by AMS (Lancaster 2023). It is currently envisaged that boreholes will be drilled at 38 separate positions. The numbers of cores are summarised by field in Table 1. A full list forms Appendix 1.

Table 1: List of areas in which geoarchaeological coring.

Field Number	Number of Boreholes
2	6
3	3
6	10
7	3
8	2
9	1
10	1
11	1
12	1
14	1
15	1
16	1
18	2
51	2
48	3

Borehole locations will be marked out by an AMS surveyor with a Leica GS07. The precise locations for drilling will be determined by the geoarchaeologist in the field.

Each location will be scanned using a CAT4+ and Genny and then a narrow hand dug spade pit will be dug to a depth of 1m immediately next to the coring location to ensure no buried services are present. The hand excavation will be under archaeological supervision.

Boreholes will be drilled with an appropriate scale rig, from the current ground surface to the top of the underlying bedrock geology. Sediment cores will be recovered in plastic liners. Continuous samples will be collected through the deposit sequence. The samples will be approximately 100mm in diameter, though narrower cores may be retrieved where deposit density or stoniness prevents using a 100mm diameter cutting edge. The number of cores and a basic record concerning the sediment characteristics that can be observed at the ends of the cores will be made on site by the attending geoarchaeologist.

While it is envisaged that the proposed number of boreholes will be sufficient to provide the evidence required for the EIA, it is acknowledged that further coring work may be required, particularly to inform the detailed design of any mitigation plan. Such works would form a further stage of investigations. Such works would be agreed between Mott MacDonald, Skanska and Sherwood District Council, with the input of Nottinghamshire County Council Archaeology Service and Historic England.

All cores that have achieved a reasonable level of material retention will be retained. Cores that are unsuitable for further description due to sediment consistency or loss will be discarded after basic recording. Reasons for discard will also be recorded.

The borehole locations will be reinstated using a material approved by Skanska.

5.1.5 Recording

All feature extents, section points and other locational data will be surveyed in by an AMS surveyor using a Leica GS07 in a manner which can be mapped in GIS within the British National Grid (OSGB36) coordinate system.

The units of the sedimentary sequence recorded in each core will be fully described off-site, following the principles established by the Soil Survey of England and Wales (Hodgson 1976), suitably modified for geoarchaeological work. Characteristics that will be described will include matrix colour and colour variation, soil texture, including the presence and character of coarse and very coarse clasts, which may include components such as stone, ceramic, wood and bone, deposit structure and degree of structural development, and lower boundary form and distinctiveness.

The photographic record will be digital photography, consisting of detailed photographs of individual cores and overlapping core sections to ensure sufficient detail and resolution. Images of at least 10MPx will be generated and will be of sufficient quality and in non-proprietary formats to ensure they are suitable for archive purposes. Suitable photographic scales will be used for these photographs.

6 Post-Excavation Assessment

The retained cores will be assessed for their potential for sub-sampling for environmental analyses, including pollen, insect, plant macrofossils and radiocarbon dating. Where suitable materials for further assessment are identified, these will be noted in the interim report, and recommendations made regarding the specific units to be sampled and the types of assessment to be undertaken.

Recommendations for sampling and handling paleoenvironmental and geoarchaeological materials will follow guidelines produced by Historic England (Historic England 2008, 2011a, 2011b, 2015). Where necessary, the project team will consult Historic England's Scientific Advisor on environmental sampling and dating. Specialists will be consulted where non-standard sampling is required.

7 Programme

The fieldwork element of the geoarchaeological coring for the A46 Newark Project is anticipated to take 2-3 weeks to complete, subject to timely access being arranged. The anticipated start date is 3 May 2023. Detailed core description, assessment and reporting should take another 4-5 weeks: it is envisaged that this element of work will follow on directly from the fieldwork.

8 Safety, Health & Welfare at Work

All work conducted by AMS is in accordance with AMS's Health and Safety Plan, which ensures adherence to the Health and Safety at Work Act 1974 and other relevant legislation. A project specific Risk Assessment Method Statement (RAMS) – will be in place at the commencement of on-site services. This document will highlight the potential hazards, who may be affected and the appropriate preventative measures to be taken. The RAMS will be reviewed and updated throughout the work. All staff will be inducted and briefed prior to commencing on-site work, and have appropriate safety training. Site specific risks and constraints on working will be reviewed and controlled through dynamic risk assessment.

9 Reporting

9.1 Interim report

An interim report for the geoarchaeological coring will be produced immediately after fieldwork. This will summarise in tabular form the geoarchaeological findings, other quantitative data (such as the number of units identified) and be accompanied by a plan of the borehole locations. This report will identify areas of concern or interest that may justify further fieldwork in order to inform the mitigation strategy for the programme.

9.2 Preliminary coring report

A draft report on the geoarchaeological coring will be completed within five weeks of completion of the fieldwork. This report will be submitted to Mott MacDonald and Skanska UK Construction Ltd for review.

The report will include the following information:

- A non-technical summary (300 words maximum);
- Background and aims of geoarchaeological coring;
- Description of the areas cored;
- Methodology;
- Results;
- Discussion and conclusions, including assessment of potential and updated deposit model;
- Recommendations;
- References;
- Figures (plans of borehole locations);
- Plates (site photographs and core photographs);
- Archive Location and quantity (digital, paper, and artefactual);
- Bibliography; and
- Appendices (technical detail and supporting information).

Digital copies of the completed draft preliminary assessment report will be submitted in both Word and PDF format to Mott MacDonald and Skanska for comment. When the amendments of the draft report have been agreed, Mott MacDonald will submit a copy of the draft report to the Newark and Sherwood District Council Heritage Officer. In finalising the report the comments of Mott MacDonald and the relevant stakeholders, via the Newark and Sherwood District Council Heritage Officer will be taken into account.

The final version of the report will be submitted to Mott MacDonald and Skanska within four weeks of the receipt of comments on the draft report.

Upon completion and approval of the report, copies of the report will be issued to the client, as well as relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. An OASIS online record will be created, and a PDF version submitted. Subject to contractual obligations

on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

9.3 Final coring report

Should further assessment work be recommended at the preliminary reporting stage, a further report will be compiled, incorporating the findings of the specialist assessments undertaken, including any palaeoenvironmental, artefactual and dating results. It is envisaged that results from the geoarchaeological test pitting programme will also be available by this stage, and these will also be referenced as relevant. The scope and content of this report will be agreed with Mott MacDonald and Skanska in consultation with the relevant stakeholders, via the Newark and Sherwood District Council Heritage Officer.

10 Archive Storage and Curation

All finds, photographs, drawings and paper archive records will be compiled into a comprehensive and fully cross-referenced archive in accordance with Archaeology Data Service's *Guides to Good Practice*¹ (online) and *ADS Guidelines for Depositors* (ADS 2021). It is envisaged that the archive will be deposited within 6–12 months of project completion.

If any artefacts are recovered from the borehole survey they will be retained unless otherwise agreed with the Consultant, Contractor and Newark and Sherwood District Council Heritage Officer for further analysis during the reporting phase of the archaeological mitigation of the main construction phase.

11 Copyright

The copyright of the report and archive will be retained by AMS under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The client will be licensed to use each report for the purposes that it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive license for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to AMS for the purposes of archaeological research or development control within the planning process.

¹ Available online @ [REDACTED] Accessed on 20 March 2023.

Where the project documentation or archive contains material that is non-AMS copyright, or the intellectual property of third parties, which AMS can provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 regarding copying and electronic dissemination of such material.

12 AMS Check, Review, Approve – Verify Procedure

AMS employ a Check, Review, Approve – Verify (CRA-V) procedure for all our reporting deliverables/outputs. This involves the originator (creator of the deliverable) sending the output to be checked once it has been completed. The checker undertakes a line-by-line check of the deliverable to ensure that it meets with requirements. The originator will then address the checker's comments. Once this task has been completed, the deliverable is resent to the checker for a second review before it is sent to a third person for approval. The approver will do an independent check to ensure that the deliverable meets the task brief. Any comments will be addressed prior to verification by the client.

13 References

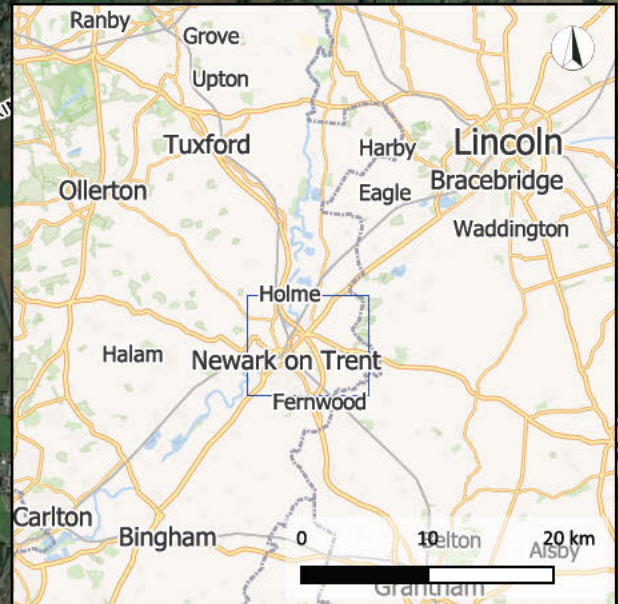
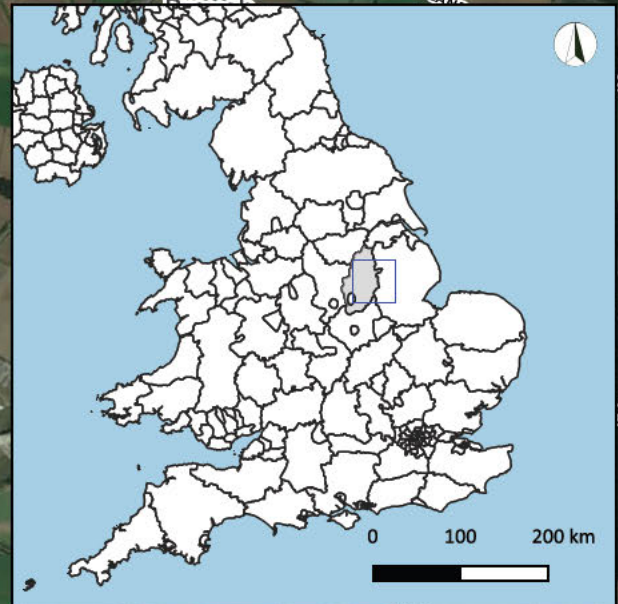
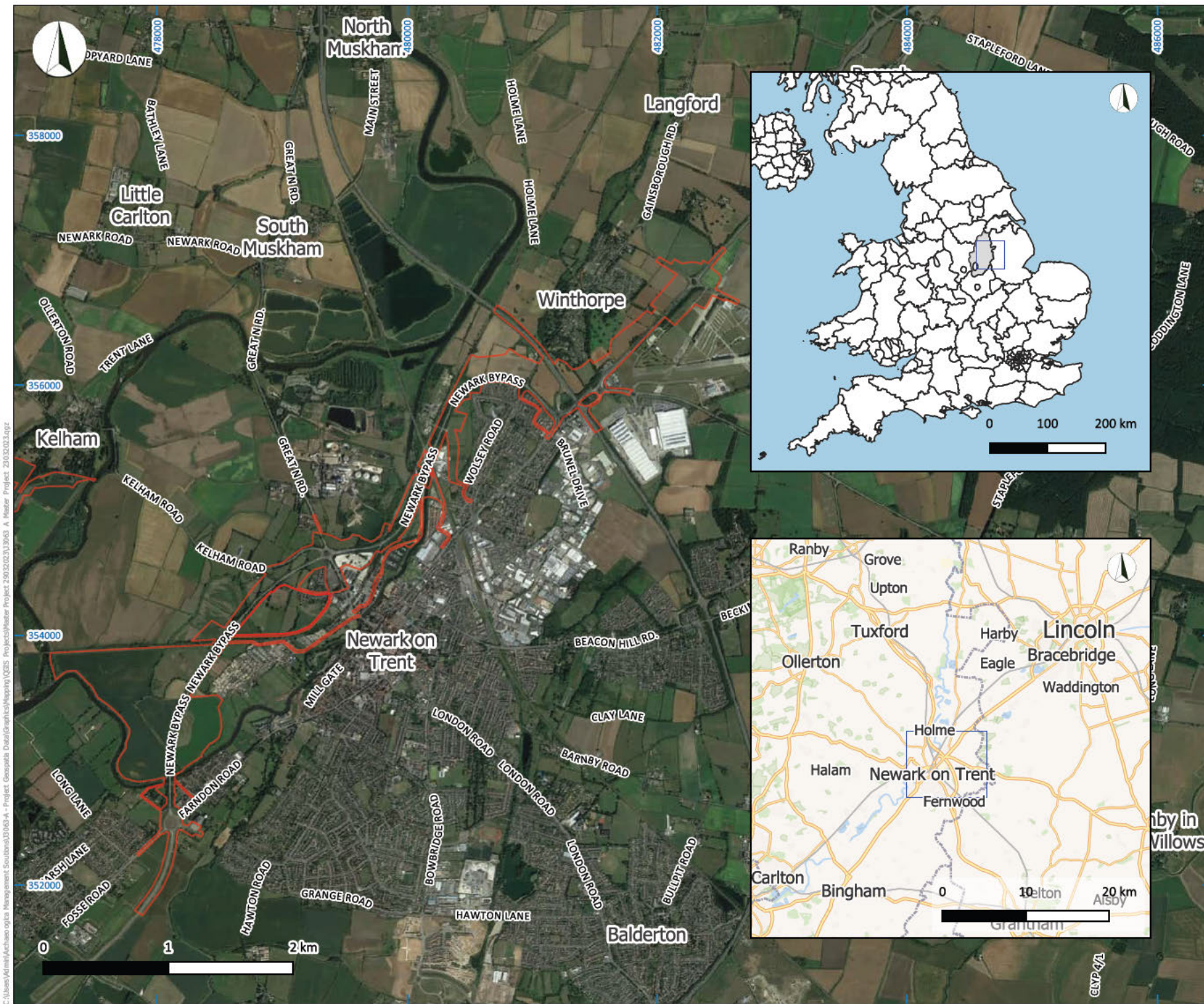
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Appendix 1


Borehole Number	Area Number	Provisional drilling depth (M)	Principal Purpose
1	2	7	Palaeochannel (lidar)
2	2	6	Flood plain sequence
3	2	6	Palaeochannel (lidar)
4	2	7	Flood plain sequence
5	2	7	Flood plain sequence
6	2	6	Flood plain sequence
7	3	5	Flood plain sequence
8	3	5	Palaeochannel (lidar)
9	3	5	Palaeochannel (lidar)
10	6	6	Flood plain sequence
11	6	10	Flood plain sequence
12	6	10	Flood plain sequence
13	6	7	Flood plain sequence
14	6	6	Palaeochannel (lidar)
15	6	6	Flood plain sequence
16	6	7	Flood plain sequence
17	8	7	Flood plain sequence
18	8	7	Flood plain sequence
19	9	7	Flood plain sequence
20	10	7	Flood plain sequence
21	11	6	Palaeochannel (lidar)
22	12	6	Flood plain sequence
23	14	6	Flood plain sequence
24	15	6	Flood plain sequence
25	16	7	Palaeochannel (lidar)
26	18	9	Palaeochannel (lidar)
27	18	7	Flood plain sequence
28	48	11	Palaeochannel (lidar)
29	48	11	Palaeochannel (lidar)
30	48	11	Palaeochannel (lidar)
31	51	11	Palaeochannel (lidar)
32	51	11	Palaeochannel (lidar)


33	6	12	Palaeochannel (lidar)
34	6	14	Palaeochannel (lidar)
35	6	11	Flood plain sequence
36	7	8	Flood plain sequence
37	7	14	Palaeochannel (lidar)
38	7	14	Palaeochannel (lidar, GI data)



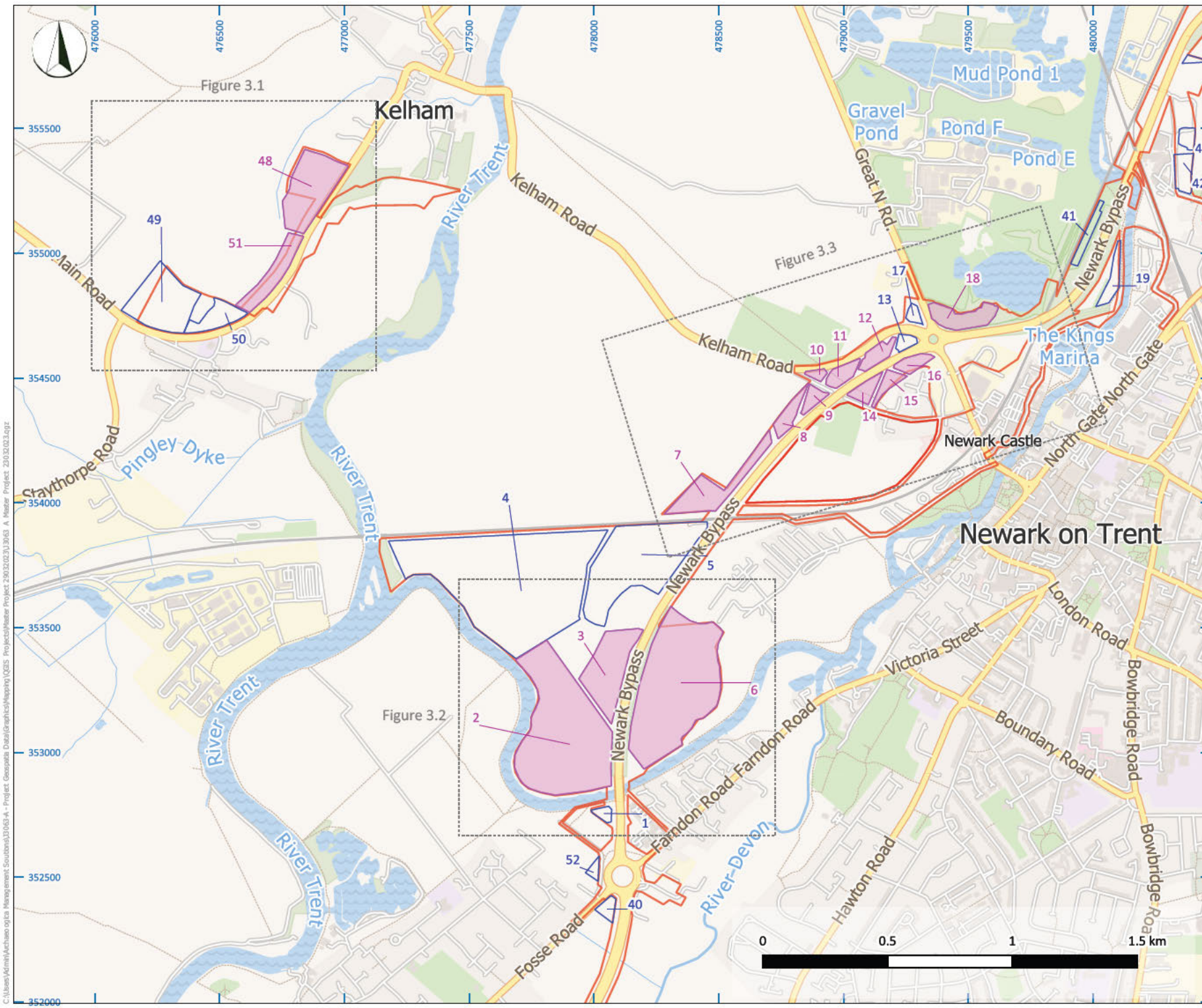
Project
A46 Newark Bypass

Title
Site Location

Legend
 Site Boundary

	Project No. J3063-A	
	Scale @ A4 1:40,000	
Drawn RZ	Check MD	
Date 26 04 23	Rev. 1.0	

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		Figure 1




Project
A46 Newark Bypass

Title
Areas Subject to
Geotechnical Coring

Legend

- Site Boundary
- Areas
- Areas Subject to
Geotechnical Coring

	Project No. J3063-A	
	Scale @ A4 1:20,000	
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Date 26 04 23	Rev. 1.0	
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		Figure 2


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Project
A46 Newark Bypass

Title
Location of
Geoarchaeological Boreholes

- Legend**
- Site Boundary
 - Areas
 - Palaeochannels (York Archaeological Trust 2017)
 - Coring Locations

	Project No. J3063-A	
	Scale @ A4 -	
Drawn RZ	Check MD	
Date 26 04 23	Rev. 1.0	
Copyright Notes Bing Maps © 2022 Microsoft Location of Figures 3.1, 3.2 and 3.3 in Figure 2		CRS OSGB36
		Figure 3.1-3

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F. Appendix: Trial Trench Evaluation WSI

A46 Newark Bypass, Nottinghamshire - Written Scheme of Investigation for Archaeological Trial Trenching and Geoarchaeological Test Pitting



Prepared for Skanska Construction UK Ltd on behalf of National Highways Regional Delivery Partnership Framework

By

August 2023

TITLE PAGE

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Cover Photo: Metal detecting finds from the A46 Newark Bypass

AMS Cultural Heritage Consultancy Limited trading as Archaeological Management Solutions

Company Registration No. 721173

Fahy's Road, Kilrush, Co. Clare. V15 C780

T +353 (0)65 906 2878

Disclaimer

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the authors and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

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Abbreviations and Definitions

Abbreviation	Definition
ACIfA	Associate of the Chartered Institute for Archaeologists
AMS	Archaeological Management Solutions
ADS	Archaeological Data Service
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
CP	Civil Parish
DCO	Development Consent Order
EA	Environment Agency
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
FRAEP	Flood Risk Activities: environmental permit
H & S	Health and Safety
HER	Historic Environment Record
MIAI	Member of the Institute of Archaeologists of Ireland
OSGB36	Ordnance Survey Great Britain 1936 coordinate system
OSL	Optically Stimulated Luminescence
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement
RTK DPGS	Real Time Kinematic Differential Global Positioning System
SAM	Scheduled Ancient Monument
TL	Thermoluminescence dating
WSI	Written Scheme of Investigation

Coordinate System

All grid coordinates in this report use the OSGB36 coordinate reference system unless otherwise stated.

1 Introduction

1.1 Project Background

This Written Scheme of Investigation (WSI) has been prepared by Archaeological Management Solutions (AMS) on behalf of Skanska Construction UK Ltd on behalf of National Highways Regional Delivery Partnership Framework in advance of trial trenching, hand test pitting and geoarchaeological test pitting on lands forming part of the A46 Newark Bypass, Nottinghamshire (Figure 1).

The A46 Newark Bypass scheme is approximately 6km in length, passing the western and northern extents of Newark-on-Trent, Nottinghamshire, between Farndon and Winthorpe roundabouts. The aim of the scheme is to increase capacity and reduce traffic congestion on the A46 in the vicinity of Newark, improve connectivity from Lincolnshire to the national motorway network, and improve route standard consistency for the A46.

The scheme has been subject to a PCF Stage 2 Environmental Assessment Report (EAR) undertaken by Atkins in 2021 (Highways England 2021), which found archaeologically sensitive areas across the route.

Prior to this phase of assessment, geophysical (Dowling 2022 & 2023), fieldwalking (Gethin 2023) and metal detection surveys (Gethin & Appleby 2023), archaeological and geoarchaeological monitoring (YAT 2022 and AMS 2023b) and Geoarchaeological Coring were carried out (AMS 2023c).

1.2 Purpose and Scope of this Assessment

This WSI sets out the aims of the archaeological trial trenching and geoarchaeological test pitting, and the methods and standards that will be employed. It conforms to current best practice, as well as to the guidance outlined in the Chartered Institute for Archaeologists' (CIfA) Standard and guidance for archaeological field evaluation (CIfA 2014). The trenching and test pitting follows geophysical (Dowling 2022), fieldwalking (Gethin 2023) and metal detection surveys (Gethin & Appleby 2023) and the design of trenches has taken the results of these into account.

It is intended that the archaeological trial trenching will be implemented across the proposed scheme, including the flood compensation areas in the vicinity of Kelham. Those parts of the trial trenching that will take place on soils derived from the Holme Pierrepont Sands and Gravels Member will also have a number of geoarchaeological test pits and hand-dug test pits. These are to be undertaken to check the geoarchaeological assessment of potential of these areas. Works on the section of the A46 to the south revealed deposits of Lower Upper Palaeolithic material on soils derived from this geological unit. The work will be carried out in accordance with the agreed methodology detailed in this WSI. Any variations to this working practice will be agreed in advance with the client.

The results of the survey will help inform Phase 3 of the Scheme Archaeological Management Plan which will set out the archaeological requirements for the scheme post DCO submission/future stages of the scheme. The results will also aid future archaeological trial trenching along the scheme.

1.3 Site Location

The archaeological trial trenching will be implemented over 37 fields (designated as Fields 1–3, 6–18, 20.2, 21.2, 21.3, 22, 23, 22–31, 33, 34, 42, 43 & 48–52) and a combined area of 37,700m² (Table 1; Figures 2–3). Fields 2 and 3, 6–18, 42 and 43 are located in the flood plain of the Trent. Fields 1 and 52 are located south of the river, and Fields 21.2, 21.3, 22 and 23 on the northeastern part of the proposed route, above the flood plain. Fields 48–52 are located between Kelham and Averham.

The hand test pitting and geoarchaeological test-pitting will be undertaken in seven fields (designated as Fields 21.2 and 21.3, 22, 48, 49, 50, 51 and 52).

The underlying bedrock of the locality comprises Mercia Mudstone Group, an early Triassic lithostratigraphic group that is widespread in the English Midlands. The bedrock of this type is of fluvial, lacustrine, and marine origin (BGS 2022). Over most of the areas to be trenched this geological unit is not further differentiated (Fields 9–18, 20.2, 21.2, 21.3, 22, 23, 42, 43 & 48–51). Where it has been differentiated, it consists either of Gunthorpe Member mudstones (Fields 3 & 6–7) or Edwalton Member mudstones (Fields 1, 2, 6 & 52). Within the floodplain of the River Trent, the superficial deposits are alluvium, clay, silt, sand, and gravel, dating to the Quaternary period (Fields 2, 3, 6–18 & 23). Outside of the floodplain, the superficial geology consists of the Holme Pierrepont Sands and Gravels (Fields 1, 21.2, 21.3, 22, 33, 34 & 48–52), a river terrace formation dating to either MIS1 or 2, or Balderton Sands and Gravels (Fields 24–30), another river terrace formation dating to MIS6.

1.4 The Proposed Archaeological Strategy

This phase of the evaluation will comprise a total of 354 trenches (typically 2m wide and 50m in length). This includes a 5% coverage of any lands that have not been subject to geophysical survey and a 3% coverage of those that have. The location of the trenches has been determined by the Consultant (Mott MacDonald) and agreed with the Curator (the Newark & Sherwood District Council Historic Environment Officer and Nottinghamshire County Council Senior Practitioner Archaeology); this was informed by the Desk Based Assessment Mott MacDonald 2023), the geophysical (Dowling 2022), fieldwalking (Gethin 2023) metal-detection (Gethin & Appleby 2023) surveys, geoarchaeological coring recently completed (Lancaster 2023) and archaeological monitoring at Kelham which has just been completed.

The evaluation trenching forms part of a wider strategy to inform and supplement the information in the Environmental Statement. The overall strategy is designed to take account of the very different but still related ground conditions and environmental histories of the floodplain area and the river terraces, in particular understanding the dates of the upper terrace deposits and the human activity on them and how this relates to the accumulation and reworking of the flood plain deposits and the pattern of human activity within that environment.

1.5 Changes to this Written Scheme of Investigation

Should changes to the methodology outlined below be required they will first be agreed with the Consultant (Skanska & Mott MacDonald) and Curators (the Newark & Sherwood District Council Historic Environment Officer & Nottingham County Council Senior Practitioner Archaeology).

2 Archaeological Background

The following is an adapted summary of the archaeological background given in the desk-based assessment (Mott MacDonald 2023) and succeeding surveys. The surveys undertaken consisted of a geophysical survey over the northern section of the Scheme, and fieldwalking and metal detecting surveys in the southern section of the Scheme, where it had been assessed that geophysical survey was unlikely to produce useful results. Please refer to the cultural heritage desk-based assessment (Mott MacDonald 2023) for description and location figures depicting archaeological sites mentioned in the wider area of the scheme.

2.1 General Archaeological Background

2.1.1 Palaeolithic

An Upper Palaeolithic site was identified through field walking in 1991 at Farndon Fields (M3571) near the southern end of the scheme (Harding, Ellis & Grant 2014). This is a very rare site type.

2.1.2 Mesolithic

There are no known Mesolithic sites within the area of the scheme; however, excavations at the Staythorpe Power Station site – c.2.5km to the west alongside the River Trent – have revealed Mesolithic remains (Cooper 2006).

2.1.3 Neolithic and Early Bronze Age

There are no known sites from this period within the floodplain section of the scheme, though Neolithic and Bronze Age material has been recovered from higher ground in the area. Flints (L11808) and burnt stone were recovered from Farndon Fields and a Neolithic mortuary enclosure (M3612) was identified through aerial photography and subsequent excavation near the north end of the scheme. A Neolithic and Early Bronze Age occupation site (L12214 and M18427) was identified under the Roman Fosse Way near Langford (L12214 and M18427).

2.1.4 Later Bronze Age and Iron Age

Remains of this period are considered rare in Nottinghamshire and are mainly known from isolated finds of bronze objects, such as palstaves from the River Trent (L8514 and L3039), nevertheless finds of this type may be expected within the flood plain area, given the known practice of depositing metalwork in bodies of water and wetlands during this period. Settlement evidence, indicated by Late Bronze Age and Iron Age pottery recovered from excavations at Farndon Fields (L11810) and further Iron Age sherds recovered at Crankley Point sewage works (L11013), are indicative of human activity off the floodplain.

2.1.5 Romano-British period

The Fosse Way Roman Road is presumed to have run along the same alignment as the current A46. It ran from Exeter to Lincoln, marked the limits of early Roman settlement and connected settlements and production centres. Concentrations of Roman material have been recorded at Farndon Fields and Newark Northgate, and trial trenching near Langford revealed the remains of the original Roman Road (L3737). A small amount of Roman material has been recovered from the flood plain area during the metal detecting survey.

2.1.6 Early Medieval

Archaeological finds are rare; however, place-name evidence attests to Anglo-Saxon settlements throughout the area of the scheme. A high-status female burial (M18359) was found south of the scheme at a cropmark on Winthorpe Road (Newmark-on-Trent) and another inhumation was found in a possible Neolithic barrow (M3612). Excavations of enclosures alongside the Roman road to the south (Newark-on Trent to Widmerpool) suggest continued use into the Anglo-Saxon period.

2.1.7 Medieval

Newark-on-Trent emerged as a marked town in the medieval period. The castle (1003474) in its centre was built in the early twelfth century by the Bishop of Lincoln and sits on the site of an earlier motte-and-bailey. There is also a medieval hospital and cemetery (St Leonard's: M3691, a moated site (near Dairy Farm: 1016051), a medieval settlement (Osmundthorpe at Northgate: M18367), a medieval road (M3093), a medieval bridge (M3214), a medieval building (at Northgate allotments: M3690) and many finds have been identified within the town during minor development works. Medieval finds were recovered during the fieldwalking and metal detecting surveys.

2.1.8 Post-medieval period

There are many standing buildings, agricultural and industrial remains from the post-medieval period within the area of the scheme. However, the most significant remains are those relating to the civil war.

Newark-on-Trent was subjected to three separate sieges from 1643 to 1646 during the English Civil War and a series of defences and forts were built around the town.

The following civil war defences are within the area of the scheme:

- 1016020: Civil War town defences within the Friary Garden (Scheduled Monument);
- 1016046: Civil War redoubt 550m south-east of Valley Farm (Scheduled Monument);
- 1016048: Civil War redoubt 680m north-west of Dairy Farm (Scheduled Monument);

- 1016049: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016050: Civil War redoubt on Crankley Point (Scheduled Monument);
- 1016150: Queen's Sconce (Scheduled Monument);
- 1016152: Civil War redoubt 580m ENE of sugar refinery (Scheduled Monument);
- 1017402: Civil War Sconce 650m north-west of Devon Bridge (Scheduled Monument);
- 1008258: Hawton Moated site, fishpond, Civil War redoubt, and ridge and furrow (Scheduled Monument);
- L3733: Line of Village Defences at Winthorpe;
- L8532: Line of Rampart at Winthorpe;
- M3027: Fortified village at Farndon;
- M3114: Second Line of Circumvallation;
- M8401/L10511/L8470/L8442: Earthworks and line of First Circumvallation;
- L3664: Civil War earthworks at Newark-on-Trent.

Following the Civil War, the castle was destroyed, and Newark-on-Trent returned to its role as a merchant town. Newark-on-Trent was particularly known for its beer. Warwicks and Richardsons began brewing in 1766 and the Northgate Brewery (M3717) was built in 1871). The Brewery Office (1277425), Maltings (1196413) and almshouses (M3262) still stand and the locations of others are known. Many improvements were made to the river and wharfs and warehouses were constructed. Newark Town Warf (M3274) and Cow Lane Wharf (M3291) likely served the breweries. There are nine Grade II listed warehouses within the area of the scheme.

Post-medieval buildings and structures are present, illustrating the development of Newark during the seventeenth to twentieth centuries. The construction of the Grade II listed building, Great North Road causeway arches, was carried out from the 1760s and completed in 1770.

2.1.9 Modern (AD 1750–present)

In the modern period, Industrial activity continued— more breweries and warehouses were built post-1750. For example, the Kelham Home Grown Sugar refinery, along Great North Road, (now operating as British Sugar) was built in 1920. The earliest Ordnance Survey map of the area of the proposed scheme depicts land use in 1883. Most of the land northwest of the River Trent is regular field systems, typical of enclosure-era land divisions. Comparison with current satellite imagery indicates little amalgamation of fields has occurred since.

2.2 Scheduled Ancient Monuments adjacent to the Areas of Trial Trenching

Fields 1–3 and 6–7 are located north of the southern branch of the River Trent. They are 4km northeast of the Battle of Stoke Registered Battlefield limits, southwest of Newark-on-Trent. SAM 1017402 — a Civil War Sconce — is located c.220m southeast of Field 7 and c.300m northeast of Field 6 (Figure 3).

Fields 8–18 are located 0.5–1km from Newark Castle. Field 8 is located immediately south of SAM 1016048, Civil War redoubt. Field 18 is located immediately south of SAM 1016046, a Civil War redoubt. Field 20.2 is approximately 0.4km east of a Civil War redoubt and earthwork (SAM 1016049, SAM 1016050).

2.3 Results of the Geophysical Survey

The geophysical survey comprised high-resolution magnetic gradiometry undertaken in two phases. During the first phase, undertaken in early September 2022, ten areas (20–24 & 29–32) encompassing c.36 ha was surveyed (Dowling 2022). A second phase was undertaken in late February 2023, concentrating on the northern end of the Scheme (Areas 25–27, 29, 30, 33 & 34) and on potential flood compensation areas (Areas 48, 49 & 51). During the first phase, features of archaeological and potential archaeological interest were identified in at least seven areas. These include evidence for potential settlement and relict field systems in Areas 20, 21, 22 and 30, as well as a range of potential features and structures of possible archaeological interest in Areas 22, 28 and 29. Potential pits, ditches, drains and other tentative features were also mapped by the survey in some of the other areas investigated. During the second phase, a series of small, conjoined enclosures (Area 48) were found in the Kelham area, which may correspond to an HER record. An additional rectilinear enclosure was mapped 75m west of this. To the south (Areas 51) also contained potential evidence of archaeological features. Many possible ditches/drains (Areas 25–27, 29, 30, 48, 49 & 51) and pit-type features (Areas 28, 48 & 51) were also detected, though natural, ferrous or agricultural origins for at least some of these features cannot be ruled out.

2.4 Results of the Metal Detecting Survey

The metal detection survey was undertaken in two phases. The first phase in September 2022 comprised the survey of fourteen fields, three under arable and eleven under pasture. The second phase was carried out in January 2023 and comprised two fields under arable.

A total of 115 significant metal finds were retrieved from the survey.

The earliest items identified include the end of a possible Roman period solid copper alloy bracelet or bangle (Area 7); and a possible end of a second bracelet which may also be of Roman date (Area 4). Two other fragmentary copper alloy objects may also be Roman in date (Area 4).

Some objects, such as a large bulbous copper-alloy vessel rim fragment (Area 2), other copper-alloy vessel fragments (Area 2/3), a lead weight (Area 7), lead waste (Area 9/14/18) and a folded lead disc (Area 6) could be of medieval date.

Most objects recovered are well-preserved post-medieval items. Some such as seven musket-calibre balls (Area 7/9/10/18) and a single pistol ball (Area 12) are likely to have been associated with the English Civil War and the sieges of Newark between 1642 and 1646. Several personal items, such as some belt buckles (Area 4/7), may also originate from this period. The remainder of the material was eighteenth to twentieth century in date. All the coins recovered, 29 in total, were eighteenth to twentieth century in date.

2.5 Results of the Field Walking Survey

The fieldwalking survey was carried out in January 2023, immediately after the completion of Phase 2 of a metal detecting survey (Gethin & Appleby 2023). Initially, it was intended to survey five fields (numbered Areas 2–4, 6 & 7) comprising 60.99ha. However, access to Areas 2, 3 and 7 and a portion of Area 4 was not available. It was therefore only possible to survey Area 6 and part of Area 4. This added up to a total of 18.1ha out of the initial target.

The survey recorded 172 items. There included three sherds of medieval pottery, thirteenth to fourteenth century in date, a few fragments of clay tobacco pipe and a large amount of late eighteenth to the early twentieth-century pottery. Many of the artefacts are likely to have been spread over the fields along with manure from nearby farms or Newark itself.

The finds assemblage did not indicate the presence of any early underlying archaeological sites, nor did it include any significant concentration of finds with the potential to date to the English Civil War period.

2.6 Results of the Geoarchaeological Coring

Geoarchaeological coring (event reference MM1265) was carried out within the Order Limits of the Scheme by the appointed archaeological contractor. This consisted of 38 purposive geoarchaeological boreholes targeting known palaeochannels or floodplain alluvium. The full survey report is available as Appendix K of the Cultural Heritage DBA (which itself is contained in Appendix 6.1 of the ES, Application Document Reference: TR010065/APP/6.3).

Six boreholes (BH 9, 14, 17, 25, 35, 38) which were designed to target known palaeochannels produced organic sediments albeit organic material mixed with minerogenic sediments. However, nine other boreholes targeting palaeochannels failed to produce any organic material. In contrast seven organic deposits were in borehole locations not indicated as being in palaeochannels (BH 2, 4, 10, 18, 23, 24,

27). More detailed consideration of the coring logs and LiDAR map data may determine whether these deposits also indicated the presence of palaeochannels.

Only one borehole (BH 31) located within the Kelham and Averham FCA produced a humified peat deposit, however this proved difficult to sample. The remaining boreholes at Kelham either produced no organic material or were shown to be in the Holme Pierrepont sands and gravels indicating that the palaeochannels were further west than originally thought and unlikely to be impacted by the scheme.

2.7 Results of the Archaeological Monitoring

An Archaeological Watching Brief (MM1264) was undertaken within the Order Limits of the Kelham and Averham FCA, by the appointed archaeological contractor between 9 May 2023 and 11 May 2023. The full survey report is available as Appendix J: A46 Newark Bypass GI Watching Brief Report of the AMP, of the Cultural Heritage DBA (which itself is contained in Appendix 6.1 of the ES, Application Document Reference: TR010065/APP/6.3).

The work involved archaeological monitoring of seven GI trial pits, each measuring between 3.1m and 4.0m in length and 0.5m wide and attaining depths of between 2.2m and 3.0m. While no archaeological features were observed in any of the pits, the work enabled observations to be made regarding the character of underlying deposits and the depth of recent overburden sealing potential archaeological layers and features.

Six of the pits were characterised by geological natural deposits of sand and gravel, likely comprising river terrace deposits, or possibly former gravel islands. Such deposits were generally first revealed around 0.5–0.7m below current ground level, being sealed beneath a simple sequence of subsoil and modern ploughsoil/topsoil; however, in S3TP38, an interface layer was recorded between the gravel and the subsoil comprising frequent small to medium-sized sub-angular stones in a reddish brown coarse sandy silt matrix. Such material may be the product of in-situ pedogenesis and could represent a relatively undisturbed 'ancient soil' that has the potential to contain archaeological artefacts. GI pit S3TP36 in Survey Area 49 was also notable for the thickness of overburden sealing natural sand and gravel with up to 1.2m of modern turf, topsoil and subsoil recorded.

One pit (S3TP42) in area 20 was significant for revealing over 2.0m of alluvial silts and clays overlying coarse gravel within which a small fragment of probable waterlogged wood was noted. The pit was located in an obvious low point in the landscape with pit S3TP43 to the east being higher and characterised by sand and gravel deposits beneath the subsoil and topsoil. Consequently, S3TP42 was

likely excavated through a palaeochannel of the River Trent. While the dates of the channel's formation and abandonment are not currently known, such deposits have the potential to produce long records of vegetation and land-use change/development as well as providing good conditions for the preservation of waterlogged remains, such as fish traps, revetments and river craft.

3 Project Aims and Objectives

3.1 Project Aim

The principal aim of the trial trenching is to determine as far as reasonably possible the presence/absence, location, nature, extent, date, and significance of any archaeological remains within the development area, and to quantify this in a manner which will inform the costing of its mitigation. The current understanding of the scheme indicates that it may impact on archaeological remains relating to the Late Upper Palaeolithic, Bronze Age, Iron Age, Roman, early medieval, medieval and post-medieval periods. Part of the purpose of the evaluation is to check this broad understanding of the range of remains that might be impacted.

In fulfilling the principal aim of the trial trenching it will be possible to identify more closely which research questions the archaeological resource within the scheme area may be capable of addressing. An Archaeological Management Plan (AMP) has been prepared for the scheme. This has identified the relevant research agendas as:

- East Midlands Historic Environment Research Framework (EMHERF);
- Research and Conservation Framework for the British Palaeolithic;
- Understanding the British Iron Age: an agenda for action.

The AMP has identified a number of overarching themes that the archaeological remains potential affected by the scheme may be used to address. These are:

- OT1: Pleistocene and Holocene environmental change
- OT2: Hunter-gatherer subsistence strategies and mobility patterns
- OT3: Development of agriculturally-based settlement patterns
- OT4: The development of fields and field systems
- OT5: The role of rivers as movement corridors, sources of power and socio-political boundaries
- OT6: Development of prehistoric monument complexes
- OT7: Development of funerary monuments and changing burial and memorial practices
- OT8: Battlefield and skirmish sites
- OT9: Development of territorial and administrative (e.g. parish) boundaries.

The outcome of the evaluation will allow the assessment of whether the archaeological remains have the potential to address the research questions identified in the AMP, given below:

Palaeolithic

- PRQ1: How were Early Upper and Late Upper Palaeolithic sites distributed across the landscape, and what contrasts may be observed with earlier and later (Mesolithic) periods?
- PRQ2: 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?
- PRQ3: How best may we extend and enhance regional fieldwalking or test-pitting programmes as means of prospecting for open-air sites?
- PRQ4: How can we maximise the research yield of Pleistocene sites investigated during developer-funded work?

Early Bronze Age

- BARQ1: Can we define more precisely the chronology of the major monument classes (causewayed enclosures, barrows and cairns etc), and how might this have varied spatially?
- BARQ2: Why may monument complexes have developed, why were some short-lived and others of longer duration, and why do these incorporate such a wide variety of monument types?
- BARQ3: How significant were river-crossing or confluence zones as foci for monument complexes?
- BARQ4: How far can studies of burials, grave goods, house and barrow/cairn structures contribute to studies of status variations within and between communities?

Late Bronze Age and Iron Age

- IARQ1: What can we deduce about the morphology, spatial extent and functions of settlements, and in particular the processes underlying the development in some areas of enclosed occupation or activity foci?
- IARQ2: Why were settlements increasingly enclosed during this period and to what extent may the progress of enclosure have varied regionally?
- IARQ3: How are the nucleated settlements related to one another and to other settlements of the period? In particular, is there evidence for a developing settlement hierarchy?

- IARQ4: Can we shed further light upon the development of field and boundary systems?
- IARQ5: What were the economic, social or political roles of the pit alignments and linear ditch systems that characterised many areas of the East Midlands?
- IARQ6: What may we deduce from studies of linear boundaries with respect to changes in the agrarian landscape?
- IARQ7: What may further analyses of burials and of settlement architecture and morphology contribute to studies of social and political organisation?

Roman

- RRQ1: How did the conquest impact upon rural settlements and landscapes?
- RRQ2: How did field and boundary systems relate to earlier systems of land allotment, and how did these boundary networks develop over time?
- RRQ3: Can we chart more closely the processes of agricultural intensification and expansion and development of field systems?
- RRQ4: To what extent may communication routes have been influenced by late Iron Age settlement patterns and routes of movement?

Early Medieval

- EMRQ1: Can we identify social/political boundaries (e.g. surviving linear earthworks and natural barriers) and/or estate centres?
- EMRQ2: To what extent may rivers such as the Trent or Witham have served as major political and social boundaries during the Anglo-Saxon period?
- EMRQ3: What impact may Germanic and Scandinavian immigration have had upon established rural settlement patterns, and how may place-name evidence contribute to studies of settlement evolution?

Medieval

- MRQ1: Can we clarify further the processes of settlement desertion and shrinkage, especially within zones of dispersed settlement?
- MRQ2: How did medieval manors and manorial estates develop from the Anglo-Saxon period?
- MRQ3: Can we shed further light upon the origins and development of the open-field system and its impact upon agricultural practices?

Post-medieval

- PMRQ1: How can we improve our understanding of the early landscapes of enclosure and improvement and the interrelationship between arable, pasture, woodland, commons and waste?
- PMRQ2: How can we refine our knowledge of Civil War defences and siege works?

The principal aim of the hand test-pitting is to determine as far as reasonably possible the presence/absence, distribution, nature, type and significance of any Palaeolithic remains within those areas with potential for them to be present. This work should allow the following questions should be addressed:

- PRQ1: How were Early Upper and Late Upper Palaeolithic sites distributed across the landscape, and what contrasts may be observed with earlier and later (Mesolithic) periods?
- PRQ3: How best may we extend and enhance regional fieldwalking or test-pitting programmes as means of prospecting for open-air sites?
- PRQ4: How can we maximise the research yield of Pleistocene sites investigated during developer-funded work?

The principal aim of the geoarchaeological test pitting is to confirm and add detail to the broad geological characterisation of the deposits thought to belong to the Home Pierrepont Sand and Gravel Member with respect to their potential to contain (Palaeolithic) archaeological and palaeoenvironmental materials. This work should allow the following questions should be addressed:

- PRQ1: How were Early Upper and Late Upper Palaeolithic sites distributed across the landscape, and what contrasts may be observed with earlier and later (Mesolithic) periods?
- PRQ2: 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?
- PRQ3: How best may we extend and enhance regional fieldwalking or test-pitting programmes as means of prospecting for open-air sites?
- PRQ4: How can we maximise the research yield of Pleistocene sites investigated during developer-funded work?

3.2 Project Objectives

The trial trenching objectives include:

- to identify, characterise and quantify sub-surface archaeological remains;
- archaeologically test anomalies identified in the geophysical survey;
- recover artefactual and samples other material with the potential to provide spot dates;
- incorporate all of the above in a report to the Client; and
- create a physical and digital site archive.

The hand test pitting objectives include:

- to identify, characterise and quantify Palaeolithic archaeological remains, especially lithic scatters;
- recover artefacts and palaeoenvironmental and dating samples;
- incorporate all of the above in a report to the Client; and
- create a physical and digital site archive.

The geoarchaeological test pitting objectives include:

- to identify and characterise late Pleistocene deposits;
- recover palaeoenvironmental and dating samples;
- incorporate all of the above in a report to the Client; and
- create a physical and digital site archive.

The geoarchaeological test pitting objectives will enable the potential value of the deposits in addressing some of the overarching agenda themes presented in the East Midlands Historic Environment Research Framework to be assessed (East Midlands Historic Environment Research Framework — East Midlands Historic Environment Research Framework (researchframeworks.org)).

Those identified as relevant include:

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

4 Project Team

The archaeological trial trenching and hand test pitting will be conducted by AMS. It will be led by AMS licenced archaeological director¹ (MCIfA equivalent) and Senior Archaeologist and Dr Ros Ó Maoldúin (MIAI) with one surveyor, and three teams comprising one director/project officer, one supervisor and two to four skilled archaeological technicians one of which will be the Health and Safety (H&S) specialist.

The geoarchaeological test-pitting will be undertaken by the AMS geoarchaeologist, Dr Steve Lancaster (ACIfA).

Other specialists will be involved as appropriate, whether from AMS or from other archaeological organisations with relevant skills and experience, such as York Archaeology.

¹ Licence eligibility determined by National Monuments Service, Department of Housing, Local Government and Heritage

5 Methodology

5.1 Archaeological Trial Trenching Methods

5.1.1 Standards

All work will be conducted in accordance with the Chartered Institute for Archaeologists' *Code of Conduct and Standard and Guidance for Archaeological Field Evaluations*.

5.1.2 Pre-commencement

The client will provide up-to-date service plans. Before ground is broken in each area, service plans will be checked to ensure that groundworks can be conducted safely.

Access points, refuelling points, locations for compounds and welfare will all be agreed with the client prior to the commencement of works. The client will inform AMS of any specific landowner requests in advance of the works. Landholder licences giving permission to dig will be obtained prior to work commencing.

Environment Agency (EA) Flood Risk Activities: environmental permits (FRAEP) will be obtained for areas within the floodplain.

A photographic record of pre-commencement ground conditions will be taken of each area and access points prior to commencement in that area.

All relevant site staff will be fully briefed in a toolbox talk for each of the identified areas and issued with an area briefing document in order to ensure that they are conversant with the archaeological potential of that area.

5.1.3 Excavation methodology

The location of all trial trenches has been determined by the consultant, Mott MacDonald (Figures 2 and 3: Location of Evaluation Trenches). These have been determined on the basis of known archaeological or historic remains identified within the desk-based assessment (Mott MacDonald 2023), and geophysical survey (Dowling 2022 & 2023), fieldwalking (Gethin 2023), metal detection surveys (Gethin & Appleby 2023) and geoarchaeological coring recently undertaken and archaeological monitoring at Kelham which has just been completed carried out by AMS. In areas where geophysics has been undertaken, trial trenches equivalent to 3% of project footprint will be dug. In areas where no geophysics has been undertaken trial trenches equivalent to 5% of project footprint will be dug.

The areas to be trenched will be reconnoitred prior to setting out trenches in order to check for previously un-noted surface artefacts and topographic features that may be of use in adjusting the

proposed locations of the trenches. Any potential changes to locations of trenches based on the findings of the reconnaissance will be considered in the light of any ecological constraints and landowner wishes.

Trial trench locations will be marked out by an AMS surveyor with a Leica GS07, at the locations determined and provided by Mott MacDonald (Figures 2 & 3). The marked out trial trench locations will be metal-detected prior to excavation. For those areas subject to hand test pitting this will be undertaken prior to the commencement of machine excavation (see 5.2).

Trial Trenches will initially be excavated with a mechanical excavator and tooth-less grading bucket, prior to and during the topsoil strip the topsoil will be scanned for artefacts. Topsoil will be removed under careful archaeological supervision down to the level of archaeological features, deposits or natural subsoil, if no archaeological material is extant. Mechanical excavation will cease when the first archaeologically significant horizon is identified, or when the absence of any such horizon has been adequately demonstrated. On completion of the topsoil strip the trenches will be metal detected for potential artefacts.

Each trench will be cleaned as required and examined by experienced archaeologists for potential archaeological features. Where potential archaeological remains or features are encountered, the exposed archaeology will be cleaned by hand and test excavated in order to establish its nature, extent, depth, date and significance. Where possible the full stratigraphic sequence will be established, with the trench being extended or stepped in order to allow more complete/safe access to features under investigation. Artefacts and samples for environmental analyses and radiocarbon dating will be recovered as required.

All feature extents, section points and other locational data will be surveyed in by an AMS surveyor using a Leica GS07 in a manner which can be mapped in GIS within the British National Grid (OSGB36) coordinate system.

Spoil will be stored alongside trenches, c.1m from the trench edges, unless otherwise specified by the Consultant. Spoil heaps will be metal detected for potential artefacts. Topsoil, subsoil, and archaeological deposits will be kept separate during excavation, to allow for sequential backfilling of excavations. Trenches will not be backfilled without the approval of the Curator and Consultant.

Table 1: List of areas in which trial trenching will occur, the number of trenches and previous assessments.

Trial trenching area	Number of trial trenches	Previous assessments
1	2	N/A
2	79	Metal detection

Trial trenching area	Number of trial trenches	Previous assessments
3	33	Metal detection
6	76	Metal detection Field walking
7	15	Metal detection
8	5	Metal detection
9	3	Metal detection
10	1	Metal detection
11	4	Metal detection
12	4	Metal detection
13	2	Metal detection
14	4	Metal detection
15	3	Metal detection
16	4	Metal detection
17	2	Metal detection
18	9	Metal detection
20.2	5	Geophysical
21.2	14	Geophysical
21.3	1	Geophysical
22	13	Geophysical
23	5	Geophysical
24	6	Geophysical
25	5	Geophysical
26	12	Geophysical
27	3	Geophysical
28	5	Geophysical
29	10	Geophysical
30	12	Geophysical
31	3	Geophysical
34	1	N/A
42	5	N/A
43	3	N/A
48	16	Geophysical
49	15	Geophysical
50	5	Geophysical
51	7	Geophysical

Trial trenching area	Number of trial trenches	Previous assessments
52	1	N/A

5.1.3.1 Palaeochannel Recording and Sampling

A number of trenches have been positioned to intercept known or suspected palaeochannels. Where a palaeochannel is cut by an evaluation trench, the geoarchaeologist will clean an appropriate section for recording. The section will be described using an appropriate descriptive system, based on established schemas, including the Soil Survey of England and Wales (Hodgson 1976), and recording such data as texture, fabric, orientation of particles and structure (Brown 1997). The section selected for cleaning and recording will initially start from the former bank of the channel, in order to get the fullest range of sedimentary units within depth of the trench. Where the channel deposits exceed the initial stripping depth, a sondage up to 1m in depth from the current surface will be machine excavated in order to record the deposits as fully as possible. Excavation deeper than 1m will not take place for health and safety reasons.

Sampling will take place in accordance with Section 7, with a particular emphasis on recovery of bulk samples suitable for plant macrofossil assessment and column samples suitable for microfossil assessment and radiocarbon dating. In addition, where suitable mineral sediments for OSL dating are encountered, appropriate light-proof samples will be taken from the channel section with a view to undertaking OSL dating.

5.2 Hand test pitting

Prior to the excavation of the trial trenches, 1m x 1m hand test pits will be excavated at one end of each of the trial trench locations given below, as well as an additional four in Area 1. Excavation will be undertaken by hand, through the topsoil and into the upper surface of the subsoil. In line with the recommendations of current Historic England guidelines (Historic England 2023) the spoil will be subsampled to give a sample of 100 litres from the topsoil, and complete sieving of any excavated subsoil. The spoil from excavation will be sieved as excavation proceeds, with a sieve mesh size of 10mm. Surveying and recording will be as for the investigation of features in 5.1 above. Should any features be encountered, these will also be investigated and sampled as per 5.1 above. Should the presence of a lithic scatter be detected, care will be taken through careful trowel excavation to determine the extent within the test pit, and the scatter recorded and surveyed *in situ* prior to lifting.

Table 2: List of areas in which hand test pitting will occur, the number of test pits and previous assessments.

Trial trenching area	Number of test pits	Previous assessments
21.2	4	Geophysical
21.3	1	Geophysical
22	13	Geophysical
48	15	Geophysical
49	15	Geophysical
50	5	Geophysical
51	7	Geophysical
52	1	N/A

5.3 Geoarchaeology test pitting

Geoarchaeological test pits will be excavated at the end of each of the excavated trial trenches within the areas shown in Table 3 and depicted on Figures 4–7. The location of the test pit in each excavated trial trench has been determined by the geoarchaeologist. Each test pit will be excavated to a maximum depth of 1m from the current ground surface. Each test pit will be excavated after the trial trench is cleaned and recorded and it has been determined that either there are no archaeological features or that any archaeological features have been fully recorded. Each test pit will be 2m x 2m. The geoarchaeologist will clean an appropriate section for recording. The section will be described using an appropriate descriptive system, based on established schemas, including the Soil Survey of England and Wales (Hodgson 1976), and recording such data as texture, fabric, orientation of particles and structure (Brown 1997). This will be recorded in notes, measured section drawings and photographically. Should suitable sediments be encountered the dating of which will assist in archaeological interpretation, appropriately light-proof samples will be taken for OSL dating. The location of each test pit will be surveyed as per the test trenches themselves. Environmental sampling will be as per Section 7.

Table 3: List of areas in which geoarchaeological test pitting will occur, the number of test pits and previous assessments.

Trial trenching area	Number of test pits	Previous assessments
21.2	4	Geophysical
21.3	1	Geophysical
22	13	Geophysical
48	15	Geophysical
49	15	Geophysical
50	5	Geophysical

51	7	Geophysical
52	1	N/A

6 Finds Management

Finds will be exposed, lifted, cleaned, conserved, marked, bagged, and boxed in line with the standards in:

- Watkinson & Neal (1988) *First Aid for Finds*; and
- Chartered Institute for Archaeologists (2020) *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*;² and

Where finds require conservation, this will be done in accordance with the guidelines of the Institute for Conservation (ICON).³

At the start of work, a finds supervisor will be appointed to oversee the collection, processing, cataloguing, and specialist advice on all artefacts collected.

Artefacts will be collected by hand, sieving, and by metal detector. Excavation areas and spoil will be scanned visually and with a metal detector to aid recovery of artefacts. All finds will be bagged and labelled according to the individual deposit from which they were recovered, ready for later cleaning and analysis. 'Special/small finds' may be located more accurately by GPS if appropriate.

All artefacts recovered from excavated features will be retained for post-excavation processing and assessment, except:

- those which are obviously modern in date;
- where very large volumes are recovered (typically ceramic building material); and
- where directed to discard on site by the Curator.

Where artefacts are not removed from site, a strategy will be employed to ensure a sufficient sample is retained, in order to characterise the date and function of the features they were excavated from.

A record will be kept of the quantity and nature of artefacts which are not removed from site.

²

[REDACTED]

7 Environmental Sampling

Sampling methods will follow guidelines produced by Historic England and AMS. Where necessary, the project team will consult Historic England's Scientific Advisor on environmental sampling and dating. If necessary, an AMS environmental specialist(s) will visit the site to advise on sampling strategies which will be reviewed periodically during the length of the test excavation. Specialists will be consulted where non-standard sampling is required (e.g. TL, OSL or archaeomagnetic dating) and if appropriate will be invited to visit.

Paleoenvironmental remains will be sampled and processed in accordance with the relevant guidelines produced by Historic England:⁴

- Historic England 2004. *Dendrochronology: Guidelines on Producing and Interpreting Dendrochronological Dates.*
- Historic England 2006. *Archaeomagnetic Dating. Guidelines for Producing and Interpreting Archaeomagnetic Dates.*
- Historic England 2008. *Luminescence Dating. Guidelines on Using Luminescence Dating in Archaeology.*
- Historic England 2008. *Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains.*
- Historic England 2011. *Environmental Archaeology. A guide to the theory and practice of methods, from sampling and recovery to post excavation, (2nd ed).*
- Historic England 2011. *Waterlogged Wood: Guidelines on the recording, sampling, conservation, and curation of waterlogged wood.*
- Historic England 2008. *Investigative conservation. Guidance on how detailed examination of artefacts from archaeological sites can shed light on their manufacture and use.*
- Historic England 2015. *Archaeometallurgy. Guidelines for Best Practice.*
- Historic England 2015. *Geoarchaeology. Using Earth Sciences to Understand the Archaeological Record.*
- Historic England 2018. *Waterlogged organic artefacts. Guidelines on their recovery, analysis and conservation.*
- Historic England 2019. *Animal Bones and Archaeology. Guidelines for Best Practice.*

Environmental samples (up to 40 litres (l) or 100% of context if less is available) will be taken from a range of potentially datable features and well-stratified deposits to target the recovery of plant remains, fish, bird, small mammal and amphibian bone and small artefacts. Samples will be labelled with the site code, context number, and sample number and a register will be kept.

⁴ [REDACTED]

Larger soil samples (up to 100l) may be taken for the complete recovery of animal bones, marine shell, and small artefacts from appropriate contexts. Smaller bulk samples (general biological samples) of 20l will be taken from any waterlogged deposits present for the recovery of macroscopic plant remains and insects. Series of incremental 2l samples may be taken through buried soils and deep feature fills for the recovery of snails and/or waterlogged plant remains, depending on the nature of the stratigraphy and of the soils and sediments.

Columns will be taken from buried soils, peats and waterlogged feature fills for pollen and/or phytoliths, diatoms, ostracods if appropriate. Soil samples will be taken for soil investigations (particle size, organic matter, bulk chemistry, soil micromorphology etc.) in consultation with the appropriate specialists. Where features containing very small artefacts such as micro debitage and hammer scale are identified, 1l grid sampling may be employed.

Early feedback on selected samples taken during the evaluation will result in a dynamic sampling strategy according to the results of rapid assessment of typically 10l sub-samples.

Typically, 20l of each bulk sample will be processed by standard water flotation using a modified Siraf-style machine and meshes of 0.3mm (flot) and 0.5 or 1mm depending on sediment type and like modes of preservation (residue). The remaining soil from a sample will be subsequently processed or discarded based on the results of an initial assessment. Normally, early prehistoric samples will be fully processed, and samples containing human remains will always be fully processed. Heavy residues will be wet sieved, air dried and selectively sorted. Samples taken exclusively for the recovery of bones, marine shell or artefacts will be wet sieved to 2mm. Waterlogged samples will have a sub-sample (approximately 10l) processed as above and the flot will be assessed whilst wet and again once dried. Snail samples (2l) will be processed by hand flotation with flots and residues collected to 0.5mm; these flots and residues will be sorted by the specialist.

Where practical, waterlogged wood specimens will be recorded in detail on site *in situ*. Until it is possible to lift such specimens, they should be maintained wet, covered and protected from extreme weather (e.g. heating or freezing). When removed, they will be cleaned and photographed, and stored in wet, cool conditions for assessment by a suitably qualified specialist.

8 Human Remains

It is currently envisaged that there is a relatively low probability of encountering human remains at this stage of works. As these works are not intended for full mitigation of stripping of areas, where suspected archaeological human remains are discovered, the location will be surveyed, including the depth of the top of the deposit, recorded as far as possible without further disturbance and then carefully covered. No recovery of human remains will take place without agreement from the Curator and Consultant or a valid licence from the Ministry of Justice.

9 Programme

The archaeological trial trenching and geoarchaeological test pitting for the A46 Newark Project is anticipated to take approximately 6–8 weeks to complete. The anticipated start date is 29th August 2023. It is anticipated that the work will take place in two phases (with Phase 1 being further subdivided) (see Table 4), if required a third phase will be undertaken to account for trenches that had to be delayed due to access/crop/flooding constraints. The Contractor / Consultant will advise on phasing timings, and the programme will be shared with the curator at least three weeks prior to the commencement of works.

Table 4: Phase of work, field number and form of evaluation

Phase	Field number	Number of trenches	Geoarchaeology and Hand Test pitting
1.1	22	13	13
1.1	23	5	N/A
1.1	24	6	N/A
1.1	25	5	N/A
1.1	26	11	N/A
1.1	27	3	N/A
1.1	28	4	N/A
1.1	30	16	N/A
1.1	31	3	N/A
1.1	34	1	N/A
1.2	2	75	N/A
1.2	3	17	N/A
1.2	6	76	N/A
1.2	8	5	N/A
1.2	9	3	N/A
1.2	1	2	N/A
1.2	11	4	N/A
1.2	12	4	N/A
1.2	13	2	N/A
1.2	14	4	N/A
1.2	15	3	N/A
1.2	16	4	N/A
1.2	18	9	N/A
2	7	15	N/A

Phase	Field number	Number of trenches	Geoarchaeology and Hand Test pitting
2	20.2	5	N/A
2	21.2	14	4
2	21.3	1	1
2	29	10	N/A
2	33	1	N/A
2	48	11	15
2	49	9	15
2	50	5	5
2	51	4	7
2	52	1	N/A

10 Monitoring

The responsibility for monitoring the progress of the project, to ensure adherence to the Design Brief, the Scope of Works and WSI and the maintenance of professional standards, lies with the Newark & Sherwood District Council Historic Environment Officer. So that arrangements for monitoring can be made, AMS will inform the Newark & Sherwood District Council Historic Environment Officer and Nottinghamshire County Councils Archaeology Officer of AMS's proposed programme to undertake the work and be given one week's notification, in writing, of the start date of the project. Monitoring requirements will also be included in the project timetable with the agreement of the Newark & Sherwood District Council Historic Environment Officer. If appropriate, the Historic England Regional Science Advisor, may also be invited to attend these meetings.

The archaeological evaluation will be subject to regular monitoring visits by Mott MacDonald, Skanska and the Newark & Sherwood District Council and Nottinghamshire County Council Historic Environment Officers, who will have unrestricted access to the working areas, site records or any other information. Archaeological trenches will be signed off by the Newark & Sherwood District Council Historic Environment Officer. It is envisaged that such sign offs will be subject to in-person inspection of trenches by the Newark & Sherwood District Council Historic Environment Officer and Nottinghamshire County Council Archaeology Officer, with visits to facilitate this being initially on a bi-weekly basis. These visits will be organised by AMS.

Verbal progress reports will be provided to Mott MacDonald and Skanska upon request, with a minimum weekly meeting. These reports will form the basis of weekly written progress reports (via email each Monday) to be provided to Mott MacDonald, Skanska, Newark & Sherwood District Council and Nottinghamshire County Council by AMS during the archaeological fieldwork.

11 Safety, Health & Welfare at Work

All survey works will be carried out in accordance with current H&S legislation. A project specific Risk Assessment Method Statement (RAMS) will be in place at the commencement of on-site services (AMS 2023). This RAMS will conform to the overarching scheme RAMS provided by Skanska as Principal Contractor. All staff will be inducted and briefed prior to commencing on-site work, have appropriate safety training, wear appropriate PPE and use sunscreen when necessary. Site visitors will undergo induction by AMS.

12 Reporting

12.1 Interim reports

Interim reports for each area/field will be produced during the fieldwork, as and when the testing in each area is completed. These will summarise in tabular form, the archaeological findings, other quantitative data (such as the number of artefacts & samples retrieved) and be accompanied by a plan of the remains.

12.2 Preliminary evaluation report

A draft report on the archaeological trial trenching and geoarchaeological test pitting will be completed within four weeks of completion of the fieldwork. This report will be submitted to Mott MacDonald and Skanska UK Construction Ltd for review.

The report will include the following information:

- A non-technical summary (300 words maximum);
- Background and aims of trial trenching and geoarchaeological test pitting;
- Description of the areas tested;
- Methodology;
- Results;
- Discussion and conclusions;
- Recommendations;
- References;
- Figures (digitised plans of feature locations and sections through features);
- Plates (site photographs and finds photographs);
- Archive Location and quantity (digital, paper, & artefactual); and
- Appendices (specialist assessments, technical detail & supporting information).

Digital copies of the completed draft preliminary evaluation report will be submitted in both Word and PDF format to Mott MacDonald and Skanska for comment. When the amendments of the draft report have been agreed, Mott MacDonald will submit a copy of the draft report to the Newark & Sherwood District Council Historic Environment Officer and Nottinghamshire County Council Archaeology Officer. In finalising the report, the comments of Mott MacDonald and the Newark & Sherwood District Council Historic Environment Officer will be considered.

The final version of the report will be submitted to Mott MacDonald and Skanska within four weeks of the receipt of comments on the draft report.

Upon completion and approval of the final report, copies of the report will be issued to the client, as well as relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. An OASIS online record will be created, and a PDF version submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

12.3 Final evaluation report

Should further assessment work be recommended at the preliminary reporting stage, a further report will be compiled, incorporating the findings of the specialist assessments undertaken, including any palaeoenvironmental, artefactual and dating results. The scope and content of this report will be agreed with Mott MacDonald and Skanska in consultation with the Newark & Sherwood District Council Historic Environment Officer and Nottinghamshire County Council Archaeology Officer.

13 Archive Storage and Curation

The project archive will be prepared in accordance with Archaeology Data Service's *Guides to Good Practice*⁵ (online) and *ADS Guidelines for Depositors* (ADS 2021). It is envisaged that the archive will be deposited within 6–12 months of project completion.

If any artefacts are recovered from the archaeological trial trenching and geoarchaeological test pitting, they will be retained unless otherwise agreed with the Consultant, Contractor and Newark & Sherwood District Council Historic Environment Officer and Nottingham County Council Senior Practitioner Archaeology) for further analysis during the reporting phase of the archaeological mitigation of the main construction phase. It is envisaged that the Newark Museum will be the final depository of the finds from the archaeological works of the scheme. An accession number has been applied for.

Upon completion and approval of the final report, copies of the report will be issued to the client, as well as relevant Historic Environment Record, Newark & Sherwood District Council Historic Environment Officer and Nottingham County Council Senior Practitioner Archaeology. An OASIS online record will be created, and a PDF version of the final report submitted. Subject to contractual obligations on confidentiality, copies of the report will be provided to relevant local and national records and published through the Archaeology Data Service.

⁵ Available online @ [REDACTED] Accessed on 1 August 2022.

14 Copyright

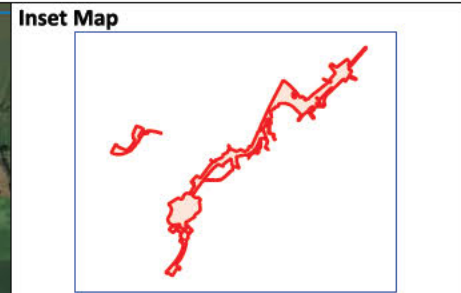
The copyright of the report and archive will be retained by AMS under the *Copyright, Designs and Patents Act 1988*, with all rights reserved. The client will be licensed to use each report for the purposes that it was produced in relation to the project as described in the specification. The archive repository, however, will be granted an exclusive license for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

Information relating to the project will be deposited with the Historic Environment Record where it can be freely copied with reference to AMS for the purposes of archaeological research or development control within the planning process.

Where the project documentation or archive contains material that is non-AMS copyright, or the intellectual property of third parties, which AMS are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 regarding copying and electronic dissemination of such material.

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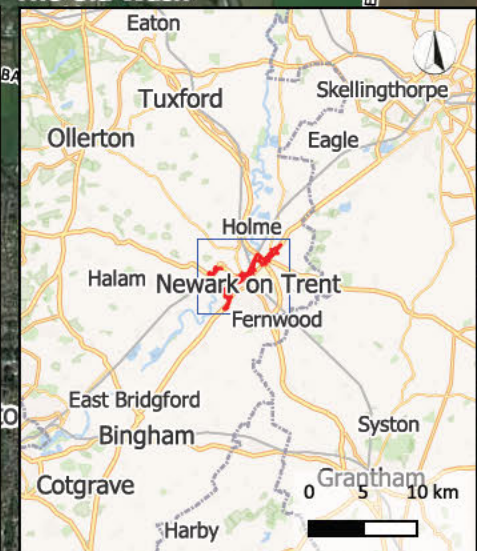
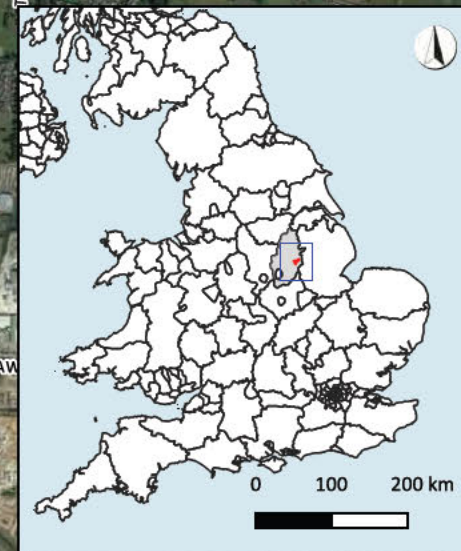


Project
A46 Newark Bypass

Title
Site Location

Legend

- ▭ Order Limits
- ▭ Trenching Areas



Project No. J3063-A	
Scale @ A3 1:25,000	
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Date 22 08 23	Rev. 1.2

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Figure 1	

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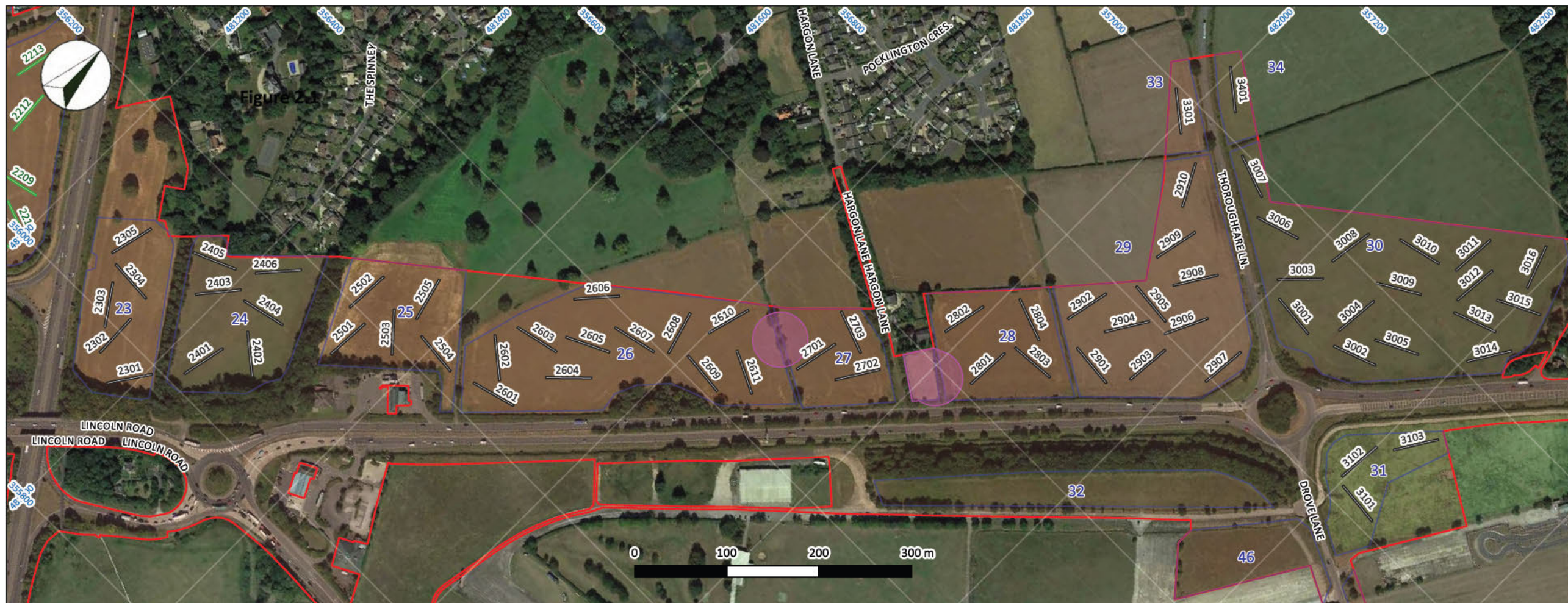
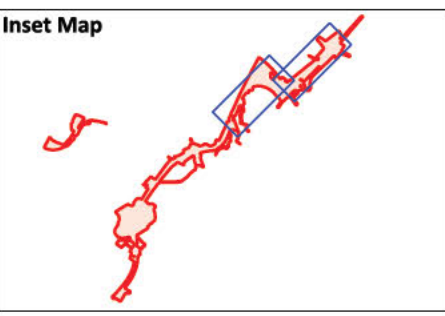


Figure 2.1



Project
A46 Newark Bypass

Title
Title
Location of Evaluation Trenches (Northern)

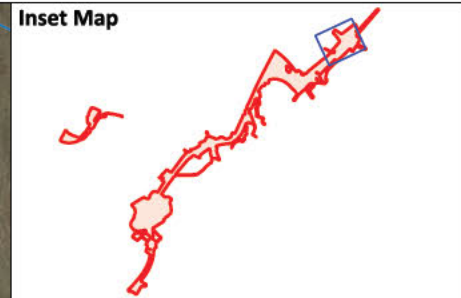
- Legend**
- Order Limits
 - Areas
 - Ecological Exclusion Zone
 - Trenches
 - Trenches with georcheological investigation



Figure 2.2

AMS	Project No. J3063-A	
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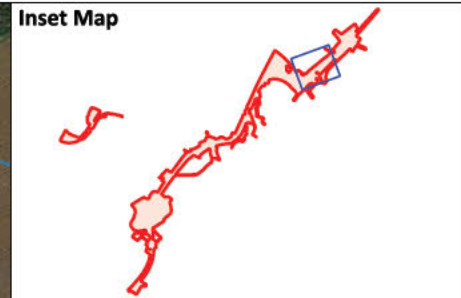
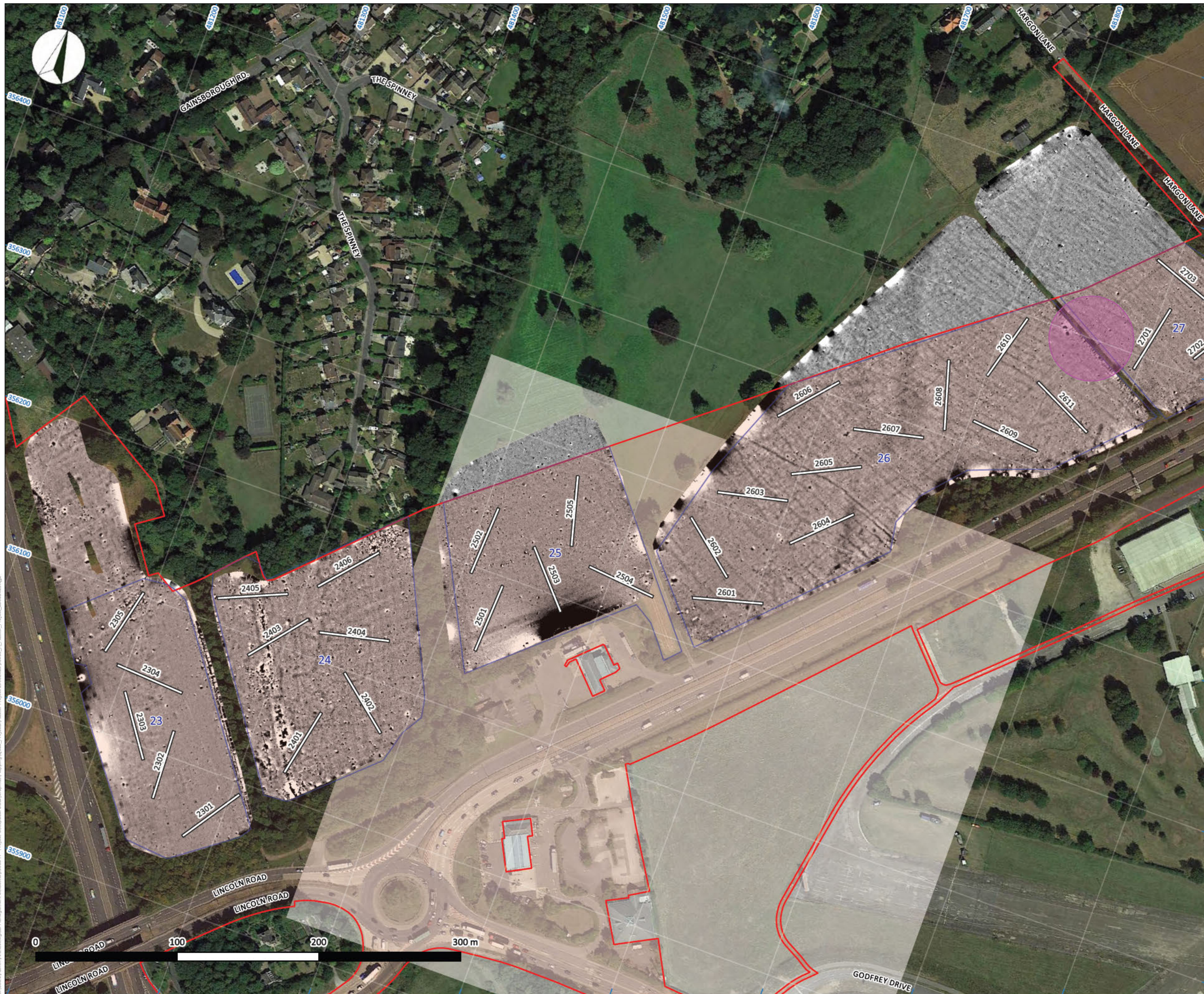
Project
A46 Newark Bypass

Title
Location of geoarchaeological trenches over greyscale image of gradiometry results. Fields 27-31, 33 & 34

- Legend**
- Order Limits
 - Areas
 - Trenches
 - Ecological Exclusion Zone

	Project No. J3063-A	
	Scale @A3 1:2500	
	Drawn RZ	Check SL
	Date 22 08 23	Rev. 1.2
Copyright Notes Bing Maps ©2022 Microsoft		CRS OSGB36
		Figure 4

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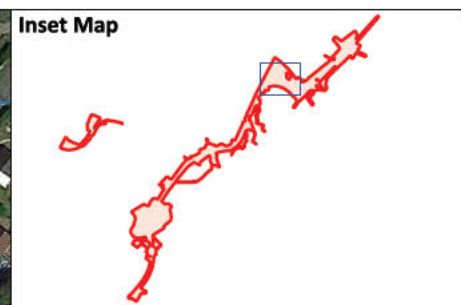
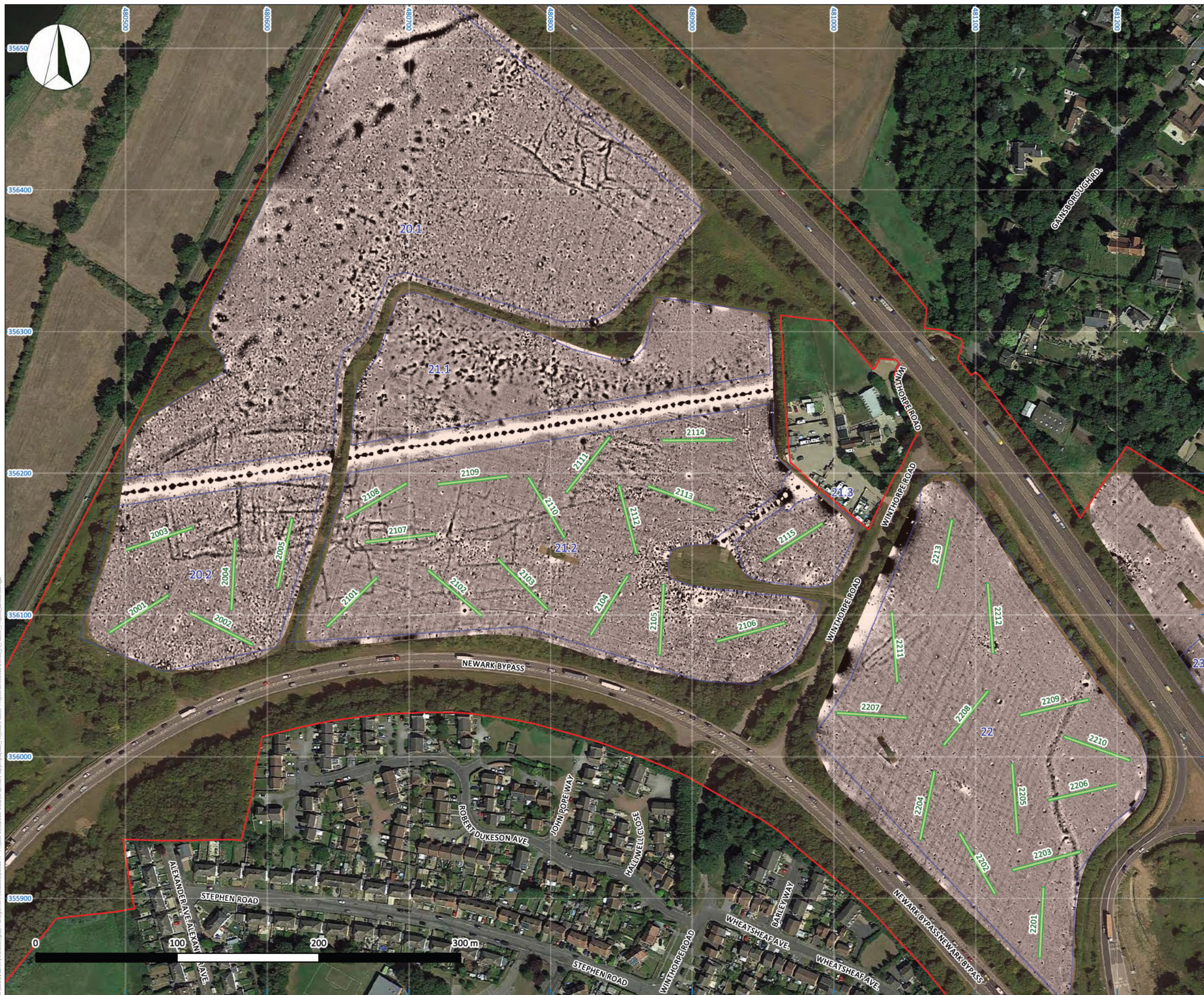
Project
A46 Newark Bypass

Title
Location of geoarchaeological trenches over greyscale image of gradiometry results Fields 23–27

- Legend**
- Order Limits
 - J3063A_A46_Trench_Areas_Ply_12072023
 - Ecological Exclusion Zone
 - Trenches

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		Figure 5



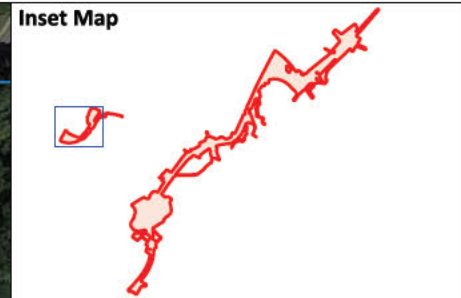
Project
A46 Newark Bypass

Title
Location of georchaеological trenches over greyscale image of gradiometry results (Areas 20–22)

- Legend**
- Order Limits
 - Areas
 - Trenches
 - Trenches with georchaеological investigation

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		Figure 6



Project
A46 Newark Bypass

Title
Location of georchaaeological trenches over greyscale image of gradiometry results Fields 48-51

- Legend**
- Order Limits
 - Areas
 - Trenches
 - Trenches with georchaaeological investigation

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	Date 22 08 23	Rev. 1.2
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		Figure 7

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