The Keadby 3 Low Carbon Gas Power Station Project

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The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order

Land at and in the vicinity of the Keadby Power Station site, Trentside, Keadby, North Lincolnshire

Outline Written Scheme of Investigation

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(q)

Applicant: Keadby Generation Limited

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GLOSSARY

Abbreviation	Description
ADS	Archaeology Data Service
aOD	above Ordnance Datum
BGL	Below Ground Level.
BGS	British Geological Survey
CCUS	Carbon Capture, Usage and Storage
ClfA	Chartered Institute for Archaeologists
CLC	Construction Leadership Council
CPR	Charred Plant Remains
CSCS	Construction Skills Certification Scheme
DBA	Desk Based Assessment
DCO	Development Consent Order
EH	English Heritage
EMHERF	East Midlands Historic Environment Record Framework
ES	Environmental Statement
GPA	Good Practice Advice
HEO	Historic Environment Officer
HER	Historic Environment Record
NGR	National Grid Reference
NHLE	National Heritage List for England
NLC	North Lincolnshire Council
NPPF	National Planning Policy Framework
OASIS	Online Access to the Index of Archaeological Investigation Scheme
OD	Ordnance Datum
OS	Ordnance Survey
OWSI	Outline Written Scheme of Investigation
PPE	Personal Protective Equipment

Abbreviation	Description
PCC	Power and Carbon Capture
RAMS	Risk Assessment and Method Statement
UPD	Updated Project Design
WSI	Written Scheme of Investigation

CONTENTS

APPENDICES

TABLES

EXECUTIVE SUMMARY

1 Keadby Generation Limited (the 'Applicant') is seeking development consent for the construction, operation and maintenance of a new low carbon Combined Cycle Gas Turbine (CCGT) Generating Station ('the Proposed Development'). The Proposed Development is a new gas fired electricity generating station of up to 910 megawatts (MW) of gross electrical output with state-of-the art carbon capture technology and including cooling water, electrical, gas and utility connections, construction laydown areas and other associated works on land to the west of the existing Keadby 2 Power Station, under construction. The Proposed Development will therefore make a significant contribution toward the UK reaching its Net Zero greenhouse gas emissions target by 2050.

2 This Outline Written Scheme of Investigation (OWSI) describes the archaeological evaluation and mitigation works to be carried out in association with the Proposed Development. This document sets out the additional actions which will be undertaken to clarify the impact of the Proposed Development on the archaeological potential of the Proposed Development Site and inform the development and refinement of appropriate mitigation measures. Stage specific written schemes of investigation (WSI) may be required to be prepared prior to the construction of the Proposed Development, or before any part of the Proposed Development is constructed. Each WSI will comply with this OWSI and will identify any further areas requiring archaeological investigation and the nature and extent of the investigation required in order to mitigate any impacts from the Proposed Development on archaeological remains that are identified. This will be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

3 This document provides an overview of the Proposed Development and Proposed Development Site conditions. It outlines the initial investigation and methodology that will be adopted and describes how the fieldwork will be reported. It goes on to identify and establish responsibility for key components and describes how mitigation would be undertaken, if required. Additionally, it contains information about how unexpected discoveries would be handled in accordance with the relevant regulations, and the health and safety requirements which would need to be considered when conducting fieldwork.

1.0 INTRODUCTION

1.1 Overview

1.1.1 This Outline Written Scheme of Investigation (OWSI) (**Application Document Ref. 7.4**) has been prepared by AECOM on behalf of Keadby Generation Limited (the 'Applicant') which is a wholly owned subsidiary of SSE plc. It forms part of the application (the 'Application') for a Development Consent Order (a 'DCO'), that has been submitted to the Secretary of State (the 'SoS') for Business, Energy and Industrial Strategy, under section 37 of 'The Planning Act 2008' (the '2008 Act').

1.1.2 The Applicant is seeking development consent for the construction, operation and maintenance of a new low carbon Combined Cycle Gas Turbine (CCGT) Generating Station ('the Proposed Development') on land at, and in the vicinity of, the existing Keadby Power Station, Trentside, Keadby, Scunthorpe DN17 3EF (the 'Proposed Development Site').

1.1.3 The Proposed Development is a new electricity generating station of up to 910 megawatts (MW) gross electrical output, equipped with carbon capture and compression plant and fuelled by natural gas, on land to the west of Keadby 1 Power Station and the (under construction) Keadby 2 Power Station, including connections for cooling water, electrical, gas and utilities, construction laydown areas and other associated development. It is described in **Chapter 4:** The Proposed Development of the Environmental Statement (ES) (ES Volume I - **Application Document Ref. 6.2**).

1.1.4 The Proposed Development falls within the definition of a 'Nationally Significant Infrastructure Project' (NSIP) under Section 14(1)(a) and Sections 15(1) and (2) of the 2008 Act, as it is an onshore generating station in England that would have a generating capacity greater than 50MW electrical output (50MWe). As such, a DCO application is required to authorise the Proposed Development in accordance with Section 31 of the 2008 Act.

1.1.5 The DCO, if made by the SoS, would be known as 'The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order' ('the Order').

1.2 The Applicant

1.2.1 The Applicant, Keadby Generation Limited, is the freehold owner of a large part of the Proposed Development Site and is a wholly owned subsidiary of the FTSE 100-listed SSE plc, one of the UK's largest and broadest-based energy companies, and the country's leading developer of renewable energy generation. Over the last 20 years, SSE plc has invested over £20bn to deliver industry-leading offshore wind, onshore wind, CCGT, energy from waste, biomass, energy networks and gas storage projects. The Applicant owns and operates the adjacent Keadby 1 Power Station and is in the process of constructing Keadby 2 Power Station. SSE operates the Keadby Windfarm which lies to the north and south of the Proposed Development Site and

generates renewable energy from 34 turbines, with a total installed generation capacity of 68MW.

1.2.2 SSE has produced a 'Greenprint' document (SSE plc, 2020a) that sets out a clear commitment to investment in low carbon power infrastructure, working with government and other stakeholders to create a net zero power system by 2040. This includes investment in flexible sources of electricity generation and storage for times of low renewable output which will complement other renewable generating sources, using low carbon fuels and/ or capturing and storing carbon emissions. SSE is working with leading organisations across the UK to accelerate the development of carbon capture, usage and storage ('CCUS') clusters, including Equinor and National Grid Carbon.

1.2.3 The design of the Proposed Development demonstrates this commitment. The Proposed Development will be built with a clear route to decarbonisation, being equipped with post-combustion carbon capture technology, consistent with SSE's commitment to reduce the carbon intensity of electricity generated by 60% by 2030, compared to 2018 levels (SSE plc, 2020b). It is intended that the Proposed Development will connect to infrastructure that will be delivered by the Zero Carbon Humber (ZCH) Partnership[1] and Northern Endurance Partnership (NEP)[2] for the transport and offshore geological storage of carbon dioxide.

1.3 What is Carbon Capture, Usage and Storage?

1.3.1 CCUS is a process that removes carbon dioxide emissions at source, for example emissions from a power station or industrial installation, and then compresses the carbon dioxide so that it can be safely transported to secure underground geological storage sites. It is then injected into layers of solid rock filled with interconnected pores where the carbon dioxide becomes trapped and locked in place, preventing it from being released into the atmosphere. Plate 1 shows what is involved in the process.

[1] https://www.zerocarbonhumber.co.uk/the-vision/

[2] https://www.zerocarbonhumber.co.uk/news/northern-endurance-partnership/

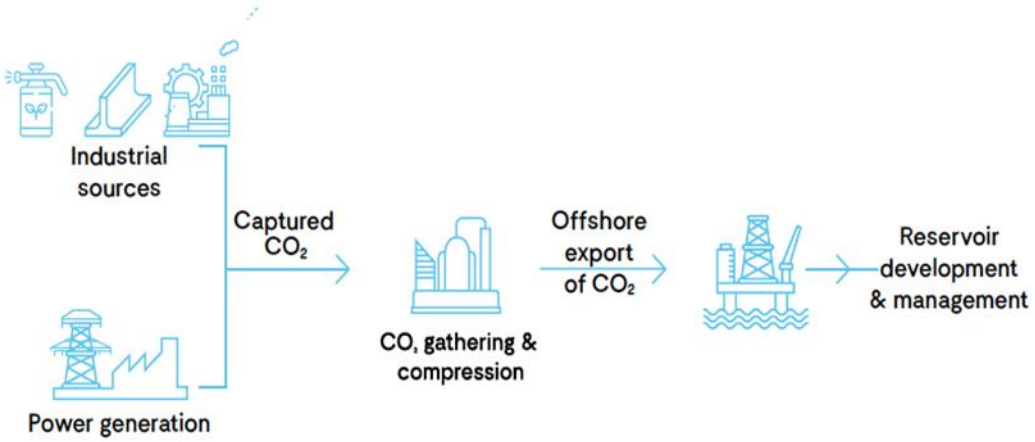

Plate 1: Illustration of the Carbon Capture, Usage and Storage

1.3.2 The technologies used in CCUS are proven and have been used safely across the world for many years. Geological storage sites are located far underground and are subject to stringent tests to ensure that they are geologically suitable. It is expected that the storage sites will be located offshore, in areas such as the North Sea. The NEP has been formed to develop the offshore infrastructure to transport and store carbon dioxide emissions in the North Sea.

1.3.3 CCUS is crucial to reducing carbon dioxide emissions and combatting global warming. The UK Government has committed to achieving Net Zero in terms of greenhouse gas emissions by 2050. This is a legally binding target. UK Government policy further states that the '*deployment of power CCUS projects will play a key role in the decarbonisation of the electricity system at low cost'* (HM Government, 2020a, page 47).

1.3.4 The Proposed Development will provide up to 910MWe (gross) of dispatchable capacity and capture some 2 million tonnes of carbon dioxide per annum, dependent upon the turbine equipment chosen and the running hours of the plant. The Proposed Development could be up and running by the mid-2020s and will facilitate the timely development of a major CCUS cluster in the Humber region, making an important contribution towards the achievement of Net Zero by 2050.

1.4 The Proposed Development

1.4.1 The Proposed Development will work by capturing carbon dioxide emissions from the gas-fired power station and connecting into the ZCH Partnership export pipeline and gathering network for onward transport to the Endurance saline aquifer under the North Sea.

1.4.2 The Proposed Development would comprise a low carbon gas fired power station with a gross electrical output capacity of up to 910MWe and associated

buildings, structures and plant and other associated development defined in the Schedule 1 of the draft DCO (**Application Document Ref. 2.1**) as Work No. 1 – 11 and shown on the Works Plans (**Application Document Ref. 4.3**).

1.4.3 At this stage, the final technology selection cannot yet be made as it will be determined by various technical and economic considerations and will be influenced by future UK Government policy and regulation. The design of the Proposed Development therefore incorporates a necessary degree of flexibility to allow for the future selection of the preferred technology in the light of prevailing policy, regulatory and market conditions once a DCO is made.

1.4.4 The Proposed Development will include:

- a carbon capture equipped electricity generating station including a CCGT plant (**Work No. 1A**) with integrated cooling infrastructure (**Work No. 1B**), and carbon dioxide capture plant (CCP) including conditioning and compression equipment, carbon dioxide absorption unit(s) and stack(s) (**Work No. 1C**), natural gas receiving facility (**Work No. 1D**), supporting uses including control room, workshops, stores, raw and demineralised water tanks and permanent laydown area (**Work No. 1E**), and associated utilities, various pipework, water treatment plant, wastewater treatment, firefighting equipment, emergency diesel generator, gatehouse, chemical storage facilities, other minor infrastructure and auxiliaries/ services (all located in the area referred to as the 'Proposed Power and Carbon Capture (PCC) Site' and which together form **Work No. 1**);
- natural gas pipeline from the existing National Grid Gas high pressure (HP) gas pipeline within the Proposed Development Site to supply the Proposed PCC Site including an above ground installation (AGI) for National Grid Gas's apparatus (**Work No. 2A**) and the Applicant's apparatus (**Work No. 2B**) (the 'Gas Connection Corridor');
- electrical connection works to and from the existing National Grid 400kV Substation for the export of electricity (**Work No. 3A**) (the 'Electrical Connection Area to National Grid 400kV Substation');
- electrical connection works to and from the existing Northern Powergrid 132kV Substation for the supply of electricity at up to 132kV to the Proposed PCC Site, and associated plant and equipment (**Work No. 3B**) (the 'Potential Electrical Connection to Northern Powergrid 132kV Substation');
- Water Connection Corridors to provide cooling and make-up water including:
  - underground and/ or overground water supply pipeline(s) and intake structures within the Stainforth and Keadby Canal, including temporary cofferdam (**Work No. 4A**) (the 'Canal Water Abstraction Option');
  - in the event that the canal abstraction option is not available, works to the existing Keadby 1 power station cooling water supply pipelines and

intake structures within the River Trent, including temporary cofferdam (**Work No. 4B**) (the 'River Water Abstraction Option');
    - works to and use of an existing outfall and associated pipework for the discharge of return cooling water and treated wastewater to the River Trent (**Work No. 5**) (the 'Water Discharge Corridor');
- towns water connection pipeline from existing water supply within the Keadby Power Station to provide potable water (**Work No. 6**);
- above ground carbon dioxide compression and export infrastructure comprising an above ground installation (AGI) for the undertaker's apparatus including deoxygenation, dehydration, staged compression facilities, outlet metering, and electrical connection (**Work No. 7A**) and an above ground installation (AGI) for National Grid Carbon's apparatus (**Work No. 7B**);
- new permanent access from A18, comprising the maintenance and improvement of an existing private access road from the junction with the A18 including the western private bridge crossing of the Hatfield Waste Drain (**Work No. 8A**) and installation of a layby and gatehouse (**Work No. 8B**), and an emergency vehicle and pedestrian access road comprising the maintenance and improvement of an existing private track running between the Proposed PCC Site and Chapel Lane, Keadby and including new private bridge (**Work No. 8C**);
- temporary construction and laydown areas including contractor facilities and parking (**Work No. 9A**), and access to these using the existing private roads from the A18 and the existing private bridge crossings, including the replacement of the western existing private bridge crossing known as 'Mabey Bridge') over Hatfield Waste Drain (**Work No. 9B**) and a temporary construction laydown area associated with that bridge replacement (**Work No. 9C**);
- temporary retention, improvement and subsequent removal of an existing Additional Abnormal Indivisible Load Haulage Route (**Work No. 10A**) and temporary use, maintenance, and placement of mobile crane(s) at the existing Railway Wharf jetty for a Waterborne Transport Offloading Area (**Work No. 10B**);
- landscaping and biodiversity enhancement measures (**Work No. 11A**) and security fencing and boundary treatments (**Work No. 11B**); and
- associated development including: surface water drainage systems; pipeline and cable connections between parts of the Proposed Development Site; hard standings and hard landscaping; soft landscaping, including bunds and embankments; external lighting, including lighting columns; gatehouses and weighbridges; closed circuit television cameras and columns and other security measures; site preparation works including clearance, demolition, earthworks, works to protect buildings and land, and utility connections; accesses, roads, roadways and vehicle and cycle parking; pedestrian and cycle routes; and temporary works associated with the maintenance of the authorised development.

1.4.5 The Applicant will be responsible for the construction, operation (including maintenance) and eventual decommissioning of the Proposed Development, with the exception of the National Grid Gas compound works (**Work No. 2A**), the works within the National Grid Electricity Transmission 400kV substation (part of **Work No. 3A**), the works within the Northern Powergrid 132kV substation (part of **Work No. 3B**), and the National Grid Carbon compound works (**Work No. 7B**), which will be the responsibility of those named beneficiaries.

1.4.6 The Proposed Development includes the equipment required for the capture and compression of carbon dioxide emissions from the generating station so that it is capable of being transported off-site. ZCH Partnership will be responsible for the construction, operation and decommissioning of the carbon dioxide gathering network linking onshore power and industrial facilities including the Proposed Development in the Humber Region. The carbon dioxide export pipeline does not, therefore, form part of the Proposed Development and is not included in the Application but will be the subject of separate consent applications by third parties, such as the Humber Low Carbon Pipeline DCO Project by National Grid Carbon[3].

1.4.7 The Proposed Development will operate 24 hours per day, 7 days per week with programmed offline periods for maintenance. It is anticipated that in the event of CCP maintenance outages, for example, it will be necessary to operate the Proposed Development without carbon capture, with exhaust gases from the CCGT being routed via the Heat Recovery Steam Generator (HRSG) stack.

1.4.8 Various types of associated and ancillary development further required in connection with and subsidiary to the above works are detailed in Schedule 1 'Authorised Development' of the draft DCO (**Application Document Ref. 2.1**). This along with **Chapter 4:** The Proposed Development in the ES Volume I (**Application Document Ref. 6.2**) provides further description of the Proposed Development. The areas within which each numbered Work (component) of the Proposed Development are to be built are defined by the coloured and hatched areas on the Works Plans (**Application Document Ref. 4.3**).

1.5 The Proposed Development Site

1.5.1 The Proposed Development Site (the 'Order Limits') is located within and near to the existing Keadby Power Station site near Scunthorpe, Lincolnshire and lies within the administrative boundary of North Lincolnshire Council (NLC). The majority of land is within the ownership or control of the Applicant (or SSE

[3] https://infrastructure.planninginspectorate.gov.uk/projects/yorkshire-and-the-humber/humber-low-carbon-pipelines/

associated companies) and is centred on national grid reference 482351, 411796.

1.5.2 The existing Keadby Power Station site currently encompasses the operational Keadby 1 and (under construction) Keadby 2 Power Station sites, including the Keadby 2 Power Station Carbon Capture and Readiness reserve space.

1.5.3 The Proposed Development Site encompasses an area of approximately 69.4 hectares (ha). This includes an area of approximately 18.7ha to the west of Keadby 2 Power Station in which the generating station (CCGT plant, cooling infrastructure and CCP) and gas connection will be developed (the Proposed PCC Site).

1.5.4 The Proposed Development Site includes other areas including:

- Previously developed land, along with gas, towns water and other connections, and access routes, within the Keadby Power Station site;
- the National Grid 400kV Substation located directly adjacent to the Proposed PCC Site, through which electricity generated by the Proposed Development will be exported;
- Emergency Vehicle Access Road and Potential Electrical Connection to Northern Powergrid Substation, the routes of which utilise an existing farm access track towards Chapel Lane and land within the existing Northern Powergrid substation on Chapel Lane;
- Water Connection Corridors:
  - Canal Water Abstraction Option which includes land within the existing Keadby Power Station site with an intake adjacent to the Keadby 2 Power Station intake and pumping station and interconnecting pipework;
  - River Water Abstraction Option which includes a corridor that spans Trent Road and encompasses the existing Keadby Power Station pumping station, below ground cooling water pipework, and infrastructure within the River Trent; and
  - a Water Discharge Corridor which includes an existing discharge pipeline and outfall to the River Trent and follows a route of an existing easement for Keadby 1 Power Station;
- an existing river wharf at Railway Wharf (the Waterborne Transport Offloading Area) and existing temporary haul road into the into the existing Keadby 1 Power Station Site (the 'Additional Abnormal Indivisible Load (AIL) Route');
- a number of temporary Construction Laydown Areas on previously developed land and adjoining agricultural land; and
- land at the A18 Junction and an existing site access road, including two existing private bridge crossing of the Hatfield Waste Drain lying west of Pilfrey Farm (the western of which is known as Mabey Bridge, to be

replaced, and the eastern of which is termed Skew Bridge) and an existing temporary gatehouse, to be replaced in permanent form.

1.5.5 In the vicinity of the Proposed Development Site the River Trent is tidal, therefore parts of the Proposed Development Site are within the UK marine area. No harbour works are proposed.

1.5.6 Further description of the Proposed Development Site and its surroundings is provided in **Chapter 3:** The Site and Surrounding Area in ES Volume I (**Application Document Ref. 6.2**).

1.6 The Development Consent Process

1.6.1 As a NSIP project, the Applicant is required to obtain a DCO to construct, operate and maintain the generating station, under Section 31 of the 2008 Act. Sections 42 to 48 of the 2008 Act govern the consultation that the promoter must carry out before submitting an application for a DCO and Section 37 of the 2008 Act governs the form, content and accompanying documents that are required as part of a DCO application. These requirements are implemented through the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) ('APFP Regulations') which state that an application must be accompanied by an ES, where a development is considered to be 'EIA development' under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations).

1.6.2 An application for development consent for the Proposed Development has been submitted to the Planning Inspectorate (PINS) acting on behalf of the Secretary of State. Subject to the Application being accepted (which will be decided within a period of 28 days following receipt of the Application), PINS will then examine it and make a recommendation to the Secretary of State, who will then decide whether to make (grant) the DCO.

1.7 The Purpose and Structure of this Document

1.7.1 The purpose of this document is to outline the methodologies for potential additional archaeological evaluation and mitigation strategies. Agreement and implementation of the final archaeological evaluation and mitigation strategies are secured in accordance with a Requirement in Schedule 2 of the draft DCO (**Application Document Ref. 2.1**).

1.7.2 The document is structured as follows:

- Section 2 describes the background information relevant to this document;
- Section 3 describes the aims and objectives of the fieldwork;
- Section 4 describes the works specification for geoarchaeological assessment;

- Section 5 describes the works specification for archaeological trial trenching;
- Section 6 describes the works specification for preservation of archaeological remains;
- Section 7 describes the works specification for detailed excavation;
- Section 8 describes the works specification for archaeological monitoring;
- Section 9 describes the risk assessment and method statement methodology;
- Section 10 describes monitoring, progress reports and meetings requirements;
- Section 11 describes the process following the completion of archaeological fieldwork;
- Section 12 describes the fieldwork report deliverables produced following the completion of each phase of archaeological fieldwork;
- Section 13 describes the archive preparation and deposition requirements;
- Section 14 describes the general project requirements;
- Section 15 describes the insurances and health and safety requirements; and
- Section 16 describes details surrounding undertaking fieldwork during Covid-19 restrictions.

2.0 BACKGROUND INFORMATION

2.1 Overview

2.1.1 The archaeological background of the Proposed Development Site has been set out in detail in a Desk-based Assessment (**Appendix 15A**, ES Volume II – **Application Document Ref. 6.3)** and is summarised here.

2.1.2 The Proposed PCC Site is located towards the north of the Proposed Development Site. This is therefore the location where most permanent land take for the Proposed Development would occur. Until circa 2017/ 2018, this area was used for arable production but has since been re-seeded as species-poor improved grassland and is managed through mowing. The area is known as Keadby Common and has a drain on each boundary (four drains in total). A drain also crosses the Common between a northern field and the southern area which is currently temporarily being used for soil storage during construction of the Keadby 2 Power Station.

2.1.3 South of the Stainforth and Keadby Canal/ Scunthorpe to Doncaster passenger railway line, the Proposed Development Site comprises agricultural fields and an existing access road from the A18.

2.1.4 Immediately west of the Proposed Development Site, north of the canal/ railway line is the former Keadby Ash Tip which contains extensive semi-natural habitat including areas of unimproved acid and semi-improved neutral grasslands, open mosaic habitats, scrub and woodland. The former Ash Tip is also within the control of the Applicant.

2.1.5 Beyond the current Keadby Power Station Site, the predominant land use is agriculture with the land managed for intensive arable production. However, the immediate site surroundings have been developed in recent years with power infrastructure, including the Keadby Windfarm to the north which has been in operation since 2014. Additional wind turbines and electricity transmission and distribution infrastructure are present over the wider surrounding area.

2.1.6 The Proposed Development Site lies within an area of clays and silts overlying Mercia Mudstone (BGS, Geology of Britain Viewer) bedrock. The clays and silts consist of a deep sequence of late Pleistocene and Holocene clays, sands, silts and in some areas, peat horizons, reflecting the low-lying, wetland character of the area.

2.2 Previous Archaeological Investigations

Keadby 2 Power Station Works

2.2.1 As part of the Keadby 2 Power Station development, the following programme of archaeological investigations occurred between 2018 and 2019:

- excavation of eight trial trenches located within the footprint of the proposed Keadby 2 Power Station (Headland Archaeology, 2018a);
- drilling of 23 geoarchaeological boreholes (Headland Archaeology, 2018b); and
- an archaeological watching brief (Headland Archaeology, 2019).

2.2.2 The generalised stratigraphic sequence recorded in the trial trenches comprised topsoil overlying modern deposits (made ground) (between 0.3m and 1.8m thick) generated through the demolition of the former Keadby coal fired power station. This in turn, overlay alluvium (up to 0.6m thick) and peat deposits.

2.2.3 The geoarchaeological boreholes recorded '*a tripartite natural sequence beneath the modern made ground. This consisted of stiff greenish-grey silty clay (1), overlying black to reddish-brown peat (2), overlying greenish-grey to pinkish-grey fine sandy silt, grading downwards into brown and grey medium to coarse sands (3)*'. Peat was widespread across site, ranging from 0.15m to 0.64m thick. The peat was also recorded as 'tripartite' in character in many of the cores, with the upper and lower horizon recorded as 'silty peat' or 'peaty silt', and the middle horizon described as 'wood or reed peat'.

2.2.4 Of the peat samples recovered from the geoarchaeological boreholes, three sub-samples from a single core were selected for further palaeoenvironmental analysis (Borehole 27: 1.30m – 135m, 146.-1.50m and 1.56m-1.60m below ground level). In addition to this, two pieces of 'woody material' were selected from the sub-samples for radiocarbon dating. The dating and assessment provided the following results:

- the radiocarbon dates from remains from the basal part of the peat indicate formation during the Late Neolithic to Early Bronze Age. A further 0.3m thickness of peat overlaid this, suggesting that waterlogged conditions continued through the Bronze Age;
- macroscopic plant remains suggest the basal sediments were laid down in a woodland carr environment with occasional fragments of larch/ spruce/ pine charcoal;
- the macroscopic plant remains in the middle and upper sediments are dominated by fibrous stem fragments 'suggesting the woodland carr developed into an open rush/ sedge/ reed marshland environment with little indication of woodland in situ or in the near vicinity'; and
- the pollen data supported the macroscopic plant evidence, indicating a fen woodland that became more open and reed-dominated, demonstrating marine transgressions and a change in environmental conditions.

Keadby Wind Farm Works

2.2.5 The Keadby Wind Farm works extended north, south and west of the Site, covering an area approximately 4.5km by 3km. The programme of

archaeological investigation carried out to inform and support the windfarm development comprised:

- an initial auger survey (Headland Archaeology, 2012a);
- targeted trial trenching and coring survey (Headland Archaeology, 2012b);
- an auger/ trial trenching evaluation of 'Compound 3' (located on the south side of the Stainforth and Keadby Canal) (Headland Archaeology, 2013); and
- a final phase of watching brief and excavation (Headland Archaeology, 2014).

2.2.6 The initial auger survey was organised along twelve transects and generated a 2D contour map of peat thicknesses, as well as demonstrating the presence of two main episodes of peat formation (at 0.8m to 1m AOD and -0.25m to 2.1m AOD).

2.2.7 Core samples were taken from two cores during the second phase of investigations in advance of the Keadby Wind Farm: Core 1, located approximately 1.2km north of the Site; and Core 2, located approximately 1km south of the Site. The samples from these cores indicated four separate periods of peat formation. These were as follows:

- Peat 1. Only identified within Core 1, the peat was recorded at -3.88m to -4.20m OD. Dating from this phase of peat deposition, from the top and bottom of the deposit, indicate a date range between 11,423–11,196 cal BC and 9,660–9,304BC. The early date indicates that peat began to develop almost immediately after the Younger Dryas period. The presence of juniper and dwarf birch indicate sub-Arctic conditions and are among the first trees to have colonised Britain following the end of the last glacial period;
- Peat 2. Only identified in Core 1 this peat horizon was recorded at -3.12 to -3.52m OD. The peat was not scientifically dated but its stratigraphic position indicates a Mesolithic date (before 4,000BC);
- Peat 3. This horizon was identified in both cores and based on the previous auger survey this peat accretion was almost ubiquitous across the area. Within Core 1 the peat formation occurred at -0.82m to -2.47m OD and in Core 2, at 0.25 to -2.03m OD. The dates from the two cores are very similar, forming at 3341-3013 cal BC in Core 1 and at 3339–3029 cal BC in Core 2. The cessation of this peat formation was recorded as occurring in the Iron Age between 537–387 cal BC (Core 1) and 350–54 cal BC (Core 2). This particular horizon has yielded large wood fragments, of types that indicated a landscape of carr woodland throughout much of the Neolithic, Bronze Age, and Iron Age periods; and
- Peat 4. A thin layer of silty peat recorded during the previous auger survey that likely developed after the Iron Age.

2.2.8 The following sequence was recorded within Core 2:

- peat deposit (lowest level) at 2.58 to 2.59m below ground level (bgl), developed at 3339-3029 cal BC (Neolithic);
- peat deposit (upper level) at 2.33 to 2.34m bgl, developed at 2865-2573 cal BC (Neolithic), and containing wood fragments from a carr woodland environment;
- overlain by a deposit of silty clay with peat inclusions, indicating flooding episodes;
- overlain by peat deposit (lowest level) at 1.70 to 1.71m bgl developed at 2027–1881 cal BC (Early Bronze Age) and containing large wood fragments indicating the re-establishment of carr woodland;
- peat deposit (upper level) at 0.84 to 0.85m bgl developed 350–54 cal BC (Iron Age); and
- overlain by a 0.62m thick deposit of silty clay with peat inclusions, indicating flooding episodes, possibly occurring between Roman to medieval periods.

2.2.9 In addition to this, a further auger survey was conducted in the location of Compound 3 of Keadby Wind Farm. A total of eight augers were drilled, revealing the presence of wood peat, ranging between 0.22m and 2.43m thick, from 0.72m bgl. Wood fragments from the basal peat were identified as alder and birch, indicative of wet woodland. The presence of an oak stump in the middle of the peat layer suggest the peatland was becoming more terrestrial. No scientific dating was conducted on the auger samples.

Keadby 3 Low Carbon Gas Power Station Project

2.2.10 An initial pre application phase of archaeological evaluation, comprising a geoarchaeological hand auger survey and geophysical survey has been carried out by the Applicant in order to support the Application.

2.2.11 The geoarchaeological hand-auger survey was undertaken on the Proposed PCC Site and Construction Laydown Area 2 on 24 February 2021 – 01 March 2021, the results of which are presented in detail in **Appendix 15B** (ES Volume II – **Application Document Ref. 6.3**). The survey identified organic deposits across both areas which have the potential to contain palaeoenvironmental data and waterlogged archaeological remains. The underlying sands also have the potential to preserve multi-period land-surfaces from the later prehistoric period onwards.

2.2.12 The geophysical survey was undertaken on the Proposed PCC Site and Construction Laydown Area 2 on 12 April 2021 – 14 April 2021, the results of which are presented in detail in **Appendix 15C** (ES Volume II – **Application Document Ref. 6.3**). The survey identified anomalies which are suggestive of infilled cut features and may represent partial enclosures. In addition, a number of linear anomalies were identified which correspond with post-

medieval former field boundaries identified on historic mapping. A linear anomaly was also identified and was recorded as being of undetermined origin as it does not correlate with any features on historic mapping or satellite imagery and is likely to be of modern or agricultural origin (**Appendix 15C**, ES Volume II – **Application Document Ref. 6.3**).

2.3 Historical and Archaeological Background

Palaeoenvironmental

2.3.1 Palaeoenvironmental remains are considered heritage assets based on their potential to reconstruct past environments. The presence of peat deposits within the Proposed Development Site and study area has been demonstrated, with deposition occurring between the Late Neolithic and Iron Age periods. Further, palaeochannels pre-dating post-medieval drainage schemes have been identified to the northeast and south of the Proposed Development Site, indicating the presence of a former channel (approximately 13-14m below ground level) of the River Trent beneath the footprint of the Keadby 1 Power Station, with a possible area of higher ground (eyot) to the east.

Early Prehistoric (up to 4,000 BC) to later Prehistoric (4,000 BC to AD 43)

2.3.2 The majority of known evidence for prehistoric activity is located on the higher ground ridges of Crowle and Belton, where remains are not buried beneath post-medieval warping sediments and earlier periods/ events of alluviation. Baseline assessment has demonstrated that peat deposition occurred in the late Neolithic period, and there is potential for a buried pre-Neolithic land surface to exist beneath this.

2.3.3 The wetland marsh environment from the Late Neolithic onwards, would be attractive to populations, yielding rich resources (peat, fish, game, plants, wood). The proximity of the area to known sites of prehistoric settlement (such as at Crowle) mean that that this wetland environment would have been easily accessible during these periods. Evidence of Bronze Age activity in the wider area includes a hoard of socketed axes and a Bronze Age shield, and a possible one-tree log boat identified near White House Farm. The latter was found within a peat layer and demonstrates the preservation potential of such deposits.

Roman (AD 43 – 410)

2.3.4 The recovery of Romano-British ‘bog body’, dated to the late 3rd to 4th centuries c. 270m north of the Site demonstrates the level of preservation that peat provides, as well as demonstrating Roman activity within the area. Roman occupation is known to have occurred at Crowle, which may have functioned as a trading post at this time. A possible small Romano-British settlement is thought to exist within the eastern limits of the Site, within the Water Connection Corridor, based on a recorded pottery scatter. This

settlement may be associated with occupation of an eyot (island) during this period.

Early medieval (450 – 1066)

2.3.5 The place names Keadby and Gunness suggest Viking derivation, with Keadby thought to mean 'Kaeti or keti's farmstead' and Gunness to mean 'Gunni's headland'. If settlements existed here at this time they may have been connected to retreating positions of the Danes, mentioned in 11th century Anglo-Saxon chronicles as Danes taking shelter in the marshlands of Axholme in order to use its sea and river connections.

Medieval (1066 – 1540)

2.3.6 Throughout the medieval period the Site is likely to have remained marshland, used as summer pasture and exploited for the rich fishing and hunting resources that such an environment provides. To date however, no medieval remains have been identified within the Site and the only remains recovered in the vicinity of the Site is a lead spindlewhorl, found in a garden in Gunness.

Post-medieval (1540 – 1900)

2.3.7 The post-medieval period saw dramatic and systematic drainage programmes on the Isle of Axholme, converting areas of marshland and moorland into organised, drained and fertile enclosures to create an entirely new landscape. The work comprised cutting of new drains, constructions of dykes, re-directing the flow of the island's bounding rivers, and warping systems. The ambitious programme began in the 1620s, designed by Cornelius Vermuyden, who had been commissioned by Charles I to drain the land.

Modern (1901 – present)

2.3.8 The first power station was constructed within the Keadby Power Station site and opened in 1952. The power station was coal fired and comprised a coal store, compounds, chimneys, conveyors, turbine house, boiler house and further features. The power station operated until 1984 and was replaced in 1996 by Keadby 1 Power Station, a gas fired power station constructed on the main footprint of the previous station in the 1990s.

2.4 Consultation

2.4.1 Pre-application consultation with the Historic Environment Officer (HEO) for North Lincolnshire Council (NLC) confirmed a requirement for geoarchaeological hand auger survey and geophysical survey within the Proposed Development Site.

2.4.2 Following the completion of the surveys described in paragraphs 2.2.11 – 2.2.12, the HEO for NLC confirmed that further evaluation and mitigation could be undertaken as a requirement of the draft DCO (**Application Document**

Ref. 2.1), and the methodologies for such work should be set out in an OWSI (this document) to accompany the DCO Application.

2.5 Archaeological Works

2.5.1 This document forms the OWSI which sets out the methodology, specifications, and protocol to be adhered to during the completion of the archaeological fieldwork, interim reporting and preparation of fieldwork reports. The scope of any evaluation and mitigation that may be required will be discussed and approved by the HEO for NLC.

2.5.2 The works specified in this document will be undertaken (as required) on behalf of the Applicant by a competent and suitably qualified Archaeological Contractor who is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA).

2.5.3 All archaeological works will be carried out in accordance with this OWSI and any further specifications approved by the HEO for NLC. The works will be undertaken in accordance, as required for that stage, with the guidance provided by the CIfA Code of Conduct (CIfA, 2019), the Standard and Guidance for Archaeological Field Evaluation (CIfA, 2020a); the Standard and Guidance for Archaeological Watching Briefs (2020b); the Standard and Guidance for Archaeological Excavation (2020c); and other current and relevant good practice and standards and guidance (including those in **Appendix A**).

3.0 AIMS AND OBJECTIVES

3.1 General Objectives

3.1.1 The general objectives of the archaeological investigations are:

- to confirm the presence or absence of surviving archaeological remains within relevant areas of the Proposed Development Site;
- to determine the location, nature, extent, date, condition, state of preservation, significance and complexity of any archaeological remains;
- to determine the likely range, quality and quantity of artefactual and environmental evidence present;
- to interpret the archaeological remains within their local, regional and national archaeological context; and
- to inform the requirement for and scope of any archaeological mitigation works that may be required.

3.2 Site Specific Aims

3.2.1 Site-specific aims include assessing the date, extent and palaeoenvironmental potential of any peat horizons that may survive within the Proposed Development Site and assessing the effect that later activity has had on the state of preservation of any archaeological and palaeoenvironmental remains.

3.3 Research Frameworks and Regional Research Agendas

3.3.1 Consideration of research themes is key to understanding the potential evidential significance of archaeological remains. The desk-based assessment (**Appendix 15A**, ES Volume II – **Application Document Ref. 6.3)** identified the Proposed Development Site to have a high potential to contain palaeoenvironmental remains. The assessment also identified the Proposed Development Site to have a high potential for significant archaeological remains dating to the Roman period and a medium potential for significant archaeological remains dating to the later prehistoric and post-medieval periods.

3.3.2 The broad principles of a number of existing research agendas will be applicable. Key archaeological research agendas include:

- East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands – Neolithic and Early to Middle Bronze Age Updated Research Agenda (Knight et. al., 2012);
- East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands – Late Bronze Age and Iron Age Updated Research Agenda (Knight et. al., 2012);

- East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands – Romano-British Updated Research Agenda (Knight et. al., 2012);
- East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands – Post-Medieval Updated Research Agenda (Knight et. al., 2012);
- Research and Conservation Frameworks for the British Palaeolithic (Pettit et al., 2008);
- Research Frameworks for the Palaeolithic and Mesolithic of Britain and Ireland (Prehistoric Society, 1999);
- Creating a research agenda for the Bronze Age in Britain (Roberts, 2008);
- Understanding the British Iron Age: an agenda for action (Haselgrove et al., 2001);
- Britons and Romans: advancing an archaeological agenda (James & Millett, 2001); and
- Historic England (formerly English Heritage (EH)) archaeological guidance, advice notes and research agendas, and thematic strategies such as those for prehistory (EH, 2010), the Roman period (EH, 2012a) and Water and Wetland Heritage (EH, 2012b).

3.3.3 Further research agendas are outlined in the *East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands* (Knight, et. al. 2012) and will be consulted so that the archaeology can, if possible, be placed within their local, regional and national context.

3.3.4 Provision should be made for updating the East Midlands Historic Environment Research Framework (EMHERF, 2020) where the results of a fieldwork project contribute towards agenda topics. This should be done using the interactive digital resource at https://researchframeworks.org/emherf/ and noted explicitly in the conclusions of the relevant report.

3.3.5 Due to the Proposed Development Site's close proximity to Yorkshire, the *Yorkshire Archaeological Research Framework: resource assessment* (Roskams and Whyman, 2005) and *research agenda* (ibid., 2007) should also be consulted.

4.0 WORKS SPECIFICATION FOR GEOARCHAEOLOGICAL ASSESSMENT

4.1 Scope of Investigation

4.1.1 Following the completion of the geoarchaeological hand auger survey during the first stage of evaluation, organic (peaty) deposits were identified across the Proposed PCC Site and the Construction Laydown Area 2. The organic deposits have the potential to contain paleoenvironmental data and waterlogged remains and the underlying sands have the potential to preserve multi-period land-surfaces from the later prehistoric period onwards.

4.1.2 The hand auger survey only reached depths of approximately 1.3m bgl, therefore further geoarchaeological assessment is recommended in order to confirm the full depositional sequence and identify the potential for paleoenvironmental remains, waterlogged archaeological remains and buried land surfaces.

4.1.3 The proposed geoarchaeological investigation will comprise the drilling and recovery of borehole cores across the Proposed PCC Site and Construction Laydown Area 2. The results of the geoarchaeological investigation and assessment will inform the requirements for and design of further archaeological investigation, analysis and reporting of the results.

4.1.4 The exact locations of the boreholes and methodology to be used will be established by the Archaeological Contractor's geoarchaeological specialist in their Risk Assessment and Method Statement (RAMS) and agreed with the HEO for NLC. A preliminary methodology is proposed below and comprises the minimum requirements.

4.2 Fieldwork Methodology

4.2.1 Each borehole column will be recovered using a windowless sampling rig (for example a Terrier Drilling Rig, Dando Rig or for shallower deposits a power auger) that will be provided by and under the control of the Archaeological Contractor. The diameter of the borehole shall be approximately 100mm and the core shall be recovered in plastic tubes (or an appropriate substitute).

4.2.2 The location of the borehole will be set out by the Archaeological Contractor's surveyors and shall be surveyed and levelled in three dimensions to Ordnance Survey Grid and Ordnance Datum (OD).

4.2.3 A suitably experienced archaeologist/ geo-archaeologist shall be present at all times during the preparatory ground disturbance and during rig drilling. This is to ensure that a proper record is made of the depth of deposits and to ensure that samples are collected and labelled appropriately.

4.2.4 The Archaeological Contractor should make allowance for the excavation of a starter pit prior to drilling in order to confirm that no buried services, land drains or other subsurface obstructions are present.

4.2.5 The core will be exposed and the sequence of sediments from the borehole shall be described/ logged on site (character and depths of deposits). If possible a record shall be made of the depth of any water table at the borehole location. The surface of each deposit/ the contact between deposits must be levelled and the height recorded to OD.

4.2.6 Upon completion of the borehole and the recovery of the core, the void left by the sampling rig shall be backfilled by the operator with Bentonite or an equivalent suitable material.

4.2.7 The core sample shall be sealed, labelled, transported (as soon as possible) and stored securely and in appropriate controlled conditions either on site (temporary) or off-site at the assessment stage. It may be necessary to store the core long-term if it is likely to contribute to any future analyses.

4.2.8 If suitable organic sediment is recovered from the core, samples will be taken for radiocarbon dating, in order to provide a dating framework for the stratigraphic sequence. The Archaeological Contractor shall make provision for submitting a justified proposal and number of samples for radiocarbon dating.

4.2.9 If suitable deposits exist, samples will be submitted for specialist assessment (pollen, diatom/ foraminifera) to identify the potential for past environmental reconstruction.

5.0 WORKS SPECIFICATION FOR ARCHAEOLOGICAL TRIAL TRENCHING

5.1 General Requirements

5.1.1 The requirement for archaeological trial trenching will be determined by the Applicant's Archaeological Representative, based on the results of the geophysical survey, and would be agreed with the HEO for NLC

5.1.2 The trenches will target archaeological anomalies identified from the geophysical survey, as well as any 'blank' areas.

5.1.3 The Archaeological Contractor shall liaise with the Applicant or the Applicant's Archaeological Representative to ensure that the archaeological works are undertaken in an organised, efficient and professional manner.

5.1.4 The Archaeological Contractor shall ensure that the archaeological works are suitably staffed to a level that means that there will be no delays to the programme and the Archaeological Contractor shall liaise with the Applicant and/ or the Applicant's Archaeological Representative to agree the level of resourcing for the duration of the works.

5.1.5 All necessary archaeological works, which may include excavation and recording, to meet the aims and objectives of the archaeological works, will be completed prior to construction activities commencing in the area of the archaeological remains.

5.1.6 The Applicant or their appointed Engineering Procurement and Construction (EPC) Contractor(s) will allow adequate time in the programme for the archaeological works to be completed.

5.1.7 For the avoidance of doubt, should there be unexpectedly significant or complex discoveries made that warrant, in the professional judgement of the archaeologist on site, more detailed recording than is outlined within this OWSI, then the Archaeological Contractor will discuss the matter with the Applicant's Archaeological Representative and the HEO for NLC before proceeding.

5.2 Machine Excavation

5.2.1 All trial trenches will be excavated at the locations indicated in the Archaeological Contractors RAMS. The trenches shall be positioned to an accuracy of ± 100mm of the specified trench location using survey-grade GPS or equivalent metric-survey equipment.

5.2.2 Each trench location will be scanned using a Cable Avoidance Tool (CAT scanner) and genny prior to and during the excavation (mechanical excavation and hand excavation) to ensure that no live services are present.

5.2.3 Each trench will be opened under direct archaeological supervision using an appropriate mechanical excavator fitted with a toothless ditching bucket. Where necessary recent concrete or tarmac surfacing will be broken out and stored separately from other arisings.

5.2.4 All trenches shall be excavated to the dimensions indicated in the Archaeological Contractor's RAMS. These dimensions are for the base of the trench. Where necessary to achieve this the trenches will be stepped to ensure stability and safety of the excavation and that safe access/ egress and working conditions are maintained.

5.2.5 The arisings from the archaeological works will be stored adjacent to each trench (within a safe working distance) and will be separated according to material, (i.e. topsoil separated from subsoils).

5.2.6 The excavation will proceed under direct archaeological supervision, in broadly level spits of no more than 200mm, until either the top of the first archaeological horizon or undisturbed natural deposits are encountered. If appropriate, particular attention should be paid to achieving a clean and well-defined horizon with the machine. It is not anticipated that entire trenches will require hand cleaning. Under no circumstances should the machine be used to cut arbitrary trenches down to natural deposits. The surface achieved through machine excavation will be inspected for archaeological remains. The mechanical excavator will not traverse any stripped areas.

5.2.7 If important concentrations of artefacts suggestive of significant activity are uncovered during machining, these should be left in-situ in the first instance, and investigated using hand tools only, if appropriate.

5.2.8 Machined surfaces will be cleaned by hand sufficiently to allow acceptable definition of the archaeological remains. Following cleaning, all archaeological remains will be planned, to enable the selection of features and deposits for sample excavation by the Archaeological Contractor.

5.2.9 The trenches will be clearly demarcated and secured with appropriate barrier fencing (such as high visibility plastic barrier mesh fencing or Heras fencing), supplied by the Archaeological Contractor, to ensure that persons or plant cannot inadvertently traverse across the area of investigation whilst archaeological works are in progress. The fencing will be regularly inspected and maintained by the Archaeological Contractor until works in each area have been completed.

5.3 Hand Excavation

5.3.1 Archaeological remains identified for excavation will be cleaned and hand excavated in an archaeologically controlled and stratigraphic manner sufficient to meet the aims and objectives of the archaeological works.

5.3.2 The following provisional sampling strategy is proposed for hand excavation:

- **Linear features**: a minimum sample of 20% of each linear feature of less than 5m in length and a minimum sample of 10% of each linear feature greater than 5m in length (each length will be not less than 1m). Sample sections shall always be positioned to record accurate profiles of any deposit and to identify structural/phasing sequences (for example terminus and intersections).
- **Discrete features**: 50% of cut features such as pits, post-holes and other isolated features as a minimum in order to determine and record their form. Stake-holes will be fully excavated. If large pits or deposits (over 1.5m in diameter) are encountered, then the sample excavated should be sufficient to define the extent and maximum depth of the feature and to achieve the objectives of the archaeological works and should normally be quadranted.
- **Special or burnt features**: such as hearths, kilns, storage pits, industrial, funerary or ritual structures or buildings are to be the subject of 100% excavation so that their extent, nature, form, date, function and relationships to other features and deposits can be established; Such features will be identified during pre-excavation planning to enable the input and advice of appropriate archaeological specialists. Where in situ burning is identified no excavation shall take place until the possible recovery of samples for scientific dating has been considered.
- **Structural remains**: Built structures such as walls will be examined prior to destruction and sampled so that their extent, nature, form, date, function and relationship to other features and deposits can be established.

5.4 Recording

5.4.1 A full written, drawn and photographic record will be made of all archaeological remains, in accordance with standard archaeological methodologies (refer to **Appendix A**).

5.4.2 The perimeter of each trench and all archaeological remains within the trenches will be recorded in plan using metric survey-grade equipment (or its equivalent).

5.4.3 A full written, drawn and photographic record will be made of each trench, even where no archaeological features are identified. Hand drawn plans and sections/elevations of features/ structures will be produced at an appropriate scale (normally 1:50 for plans and 1:10 or 1:20 for sections/ elevations). One long section of each trench will be drawn at a scale of not less than 1:50 but only after the features within the trench have been excavated. All plans and sections will include spot heights relative to Ordnance Datum in metres, correct to two decimal places.

5.4.4 Digital photography (minimum 12-megapixel resolution) will be used to record the archaeological works and will follow Archaeological Data Service (ADS, 2011) advice for secure long-term storage and migration of files. In addition to records of archaeological features, a number of general site photographs will

also be taken to give an overview of the site. Particular attention should be paid to obtaining shots suitable for displays, exhibitions and other publicity.

5.4.5 Indices of context records, drawings, samples and photographs will be maintained and checked. These will form part of the project archive. These indexed registers will be fully cross-referenced.

5.5 Artefact Recovery

5.5.1 All artefacts will be collected, stored and processed in accordance with standard methodologies and national guidelines (refer to **Appendix A**). Except for modern artefacts, all finds will be collected and retained.

5.5.2 The Archaeological Contractor will clarify their Selection Strategy in their RAMS and will ensure that it is in line with CIfA (2020d) guidelines. Each 'significant find' will be recorded three dimensionally. Similarly, if artefact scatters are encountered these should be also recorded three dimensionally. Bulk finds will be collected and recorded by context.

5.5.3 All recovered artefacts will be stabilised, conserved and stored in accordance with the current national conservation guidelines and standards (refer to **Appendix A**). If necessary, a conservator will visit the site to undertake 'first aid' conservation treatment.

5.5.4 Artefacts will be stored in appropriate materials and conditions and monitored to minimise further deterioration.

5.6 Environmental Sampling

5.6.1 The Archaeological Contractor's RAMS will outline an appropriate environmental sampling strategy that conforms to this specification. The environmental sampling strategy will be targeted to answer the questions laid out in the site-specific aims and the regional research agendas.

5.6.2 The Historic England Regional Science Advisor will be notified of the commencement of the project and will be consulted regarding the sampling strategy proposed by the Archaeological Contractor. Provision will also be made for the recovery of material suitable for scientific dating. An appropriate dating specialist will be consulted on this in advance of and throughout the fieldwork and will be available to advise on the ongoing strategy.

5.6.3 Any samples taken must be obtained from securely stratified deposits using the methodologies outlined in *Environmental Archaeology; A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (EH, 2011).

5.6.4 Any samples taken must be obtained from appropriately cleaned surfaces, be collected with clean tools and be placed in clean containers. They will be adequately recorded and labelled and a register of all samples will be kept. Once the samples have been obtained they should be stored appropriately in

a secure location prior to being sent to the appropriate specialist. Provision will be made for the ongoing processing and initial assessment of sampled material in order to provide timely feedback regarding quality of preservation and significance of specific deposits during the evaluation and to inform the ongoing strategy.

5.6.5 A provisional sampling strategy is proposed in Table 1.

Table 1: Provisional Environmental Sampling Strategy for Archaeological Trial Trenching

POTENTIAL DATA	METHOD	CONTEXT TYPE	SAMPLE SIZE (LTR)	EXCAVATED FEATURE SAMPLE
Charred Plant Remains (CPR)	Bulk	Structural/ occupation features	40	100%
		Pits	40	50%
		Gully/ ditch (settlement)	40	10%
		Gully/ ditch (outfield)	40	5-10%
Waterlogged and organic remains	Bulk	All contexts	10-20	Layer (N/A)
Small bones	Bulk	All contexts	40	50%
Molluscs	Incremental	Deposit sequence	As advised by specialist	N/A
Pollen	Monolith	Deposit sequence	As advised by specialist	N/A

5.7 Finds Processing

5.7.1 Initial processing of finds (and if appropriate other samples) will be carried out concurrent with the fieldwork. The processing of finds will be finished shortly after completion of the investigations. The finds will be retained (according to Section 5.5 - Artefact Recovery), washed, marked, bagged and logged on a Microsoft Access or GIS database (or equivalent), together with their locations (if applicable) according to the National Grid (eastings, northings) and Ordnance Datum (height), accurate to two decimal places.

5.7.2 The finds assemblage will be treated, labelled and stored in accordance with the appropriate Historic England guidance documents, local authority guidelines (if appropriate) and the Institute of Conservation guidelines (refer to **Appendix A**). The Archaeological Contractor will ensure that the processing of the assemblage is in accordance with the requirements of the recipient museum (to be confirmed).

5.7.3 If appropriate, each category of find or each material type will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the fieldwork report.

5.8 Human Remains

5.8.1 Should human remains be discovered during the course of the excavations, the remains will be covered and protected and left *in situ* in the first instance, in accordance with current best practice. Should human remains be discovered, all works within the vicinity of the relevant area of the Proposed Development Site will stop until the remains have been removed. The Archaeological Contractor will notify the Applicant, the Applicant's Archaeological Representative and H.M. Coroner with details of the remains immediately. The removal of human remains will only take place in accordance with a licence from the Ministry of Justice and under the appropriate Environmental Health regulations and the Burial Act 1857.

5.9 Treasure

5.9.1 Any recovered artefacts that fall within the scope of the Treasure Act 1996 and Treasure (Designation) Order 2002 will be reported to the Applicant's Archaeological Representative immediately.

5.9.2 The Applicant's Archaeological Representative will ensure that the Treasure Regulations are enforced and that all the relevant parties are kept informed. In addition, the Archaeological Contractor shall maintain a list of finds that have been collected that fall under the Treasure Act and related legislation and this list shall be included in the fieldwork report.

5.9.3 Artefacts that are classified as 'treasure' will be removed to a safe place but where removal cannot be undertaken on the same working day as the discovery, suitable security measures must be taken to protect the finds from damage or unauthorised removal.

5.10 Land Drains

5.10.1 Any land drains encountered during the archaeological works will be left in-situ initially. A buffer of at least 300mm will be left either side of a land drain and excavation will proceed either side of it. Damage to any part of a land drain will be repaired immediately with plastic pipe. A photographic record of any damage and subsequent repair will be made. The location of the repaired land drain will be recorded and plotted onto the OS base map for future

reference and potential compensation events. A schedule of all damaged and repaired land drains will be maintained by the Archaeological Contractor and submitted to the Applicant upon completion of the trial trenching work.

5.11 Reinstatement of Trenches

5.11.1 Trenches will not be backfilled without the approval of the HEO for NLC which can be given verbally during monitoring meetings (refer to Section 10) or via email updates (as agreed). The methodology for obtaining approval for backfilling will be agreed in advance with the HEO for NLC and outlined in the Archaeological Contractor's RAMS. In exceptional circumstances, such as for health and safety purposes or ground stability reasons, some backfilling would be permitted without prior approval. The trenches shall only be backfilled by machine under appropriate conditions and with direct archaeological supervision. Arisings will be returned strictly in the correct sequence and will not be compacted.

6.0 WORKS SPECIFICATION FOR PRESERVATION OF ARCHAEOLOGICAL REMAINS

6.1.1 Any areas requiring preservation of archaeological remains will be identified by the Applicant's Archaeological Representative following the results of the trial trench evaluation and would be agreed with the HEO for NLC. Preservation of archaeological remains will comprise protective fencing and/ or burying/ sealing beneath fill material (to prevent unintended incursion/ damage by plant or other vehicles).

6.1.2 Archaeological photographic recording of sites will be undertaken by the Archaeological Contractor before preservation measures are deployed.

6.1.3 The photographic record will be commensurate with Historic England's Level 1 recording (Historic England, 2016a). It will include general and specific views of the site (even if there are no visible remains), to record its appearance, condition and to give an impression of the size and shape of the site and to record details such as dates or inscriptions, any signage, marker plates or graffiti (milestones/ stones). The basic visual record will be supplemented by a written account (descriptive record) that provides a basic context to the photographic record.

6.2 Protective Fencing

6.2.1 In order to demarcate those sites that require preservation of archaeological remains and to avoid unintentional damage during construction, temporary fencing will be installed. The fencing will be installed by a fencing contractor under the supervision of the Archaeological Contractor.

6.2.2 The location and type of fencing for each site for preservation of archaeological remains will be set out in the Archaeological Contractor's RAMS. It will also set out whether any preliminary archaeological investigative work is required (before or during the installation or removal process). Requirements for archaeological investigation will be outlined in detail within the Archaeological Contractors RAMS. The Applicant's appointed EPC Contractor will be responsible for regularly monitoring the condition of the fencing and will be responsible for its maintenance until construction work in that area is complete, at which time the removal of the fencing will be monitored by the Archaeological Contractor.

6.3 Preservation of Archaeological Remains Beneath Fill

6.3.1 Suitable fill material on top of a protective barrier membrane as identified in the Archaeological Contractor's RAMS will be used to bury sensitive archaeological remains, to ensure that they are not disturbed during construction and to preserve them for future generations. Sites will either be temporarily buried beneath fill (e.g. compounds or temporary roads) or permanently preserved beneath shallow (<1m deep) fill areas.

6.3.2 The Archaeological Contractor will include in their RAMS, methods that they intend to use to protect sensitive buried archaeological remains, including measures to prevent damage (such as deep rutting) caused by vehicles or plant.

6.3.3 The Applicant or their appointed EPC Contractor will describe in a Method Statement the effects of compression and loading (whether dynamic or static) and site-specific protective measures, including the extent of the area to be protected, the depth of fill required and the type of fill. The Method Statement will set out suitable methodologies for filling areas without disturbing or impacting sensitive archaeological remains, and also for removing the fill at the end of construction. The Method Statement will be developed in line with the principles of Historic England's 'Preserving Archaeological Remains' guidance (2016b) in consultation with the Applicant's Archaeological Representative and the HEO for NLC. At each site, measures will be put in place to avoid rutting or the compaction of soft ground (topsoil and fill) until or unless adequate protection is provided (vehicles will be restricted or prohibited from traversing sensitive areas prior to fencing, the laying of a protective membrane and fill deposits/vehicle running surface, and at decommissioning).

6.3.4 The Archaeological Contractor will give Tool Box Talks to inform all site personnel of the archaeological and historic environment constraints on site, the protection measures that are required and their obligations under the Archaeological Contractor's RAMS/ Applicant's Method Statement and generally to ensure that these are put in place and complied with. Following construction, the protective fill material will be removed by the Applicant or their appointed EPC Contractor, under supervision by the Archaeological Contractor, leaving the sites in their original condition.

7.0 WORKS SPECIFICATION FOR DETAILED EXCAVATION

7.1 General Requirements

7.1.1 Any areas for detailed excavation will be identified by the Applicant's Archaeological Representative following the results of the trial trench evaluation and would be agreed with the HEO for NLC.

7.1.2 The Archaeological Contractor will be responsible for the safekeeping of all records and artefacts recovered during the fieldwork, from the moment of creation/ discovery, until their delivery to a recipient repository.

7.2 Ecological Considerations

7.2.1 Consultation with the Applicant's ecology and landscape consultant has identified the following constraints to machine excavation:

- a 3m stand-off from hedgerows will be maintained;
- the stand-off area for trees will comprise the extent of the canopy plus 3m;
- trees within hedgerows will also require the stand-off to comprise the extent of the canopy plus 3m; and
- a 10m stand-off will be maintained from all watercourses.

7.2.2 These considerations outweigh the location of the archaeological site. The edge of excavation will be adjusted if necessary in order to observe the ecological and landscape considerations.

7.3 Machine Excavation

7.3.1 It is currently envisaged that the excavation areas will be set out using electronic survey equipment by the Archaeological Contractor.

7.3.2 The areas of open excavation will be clearly demarcated and secured with appropriate barrier fencing (such as high visibility plastic barrier mesh fencing or Heras fencing), supplied by the Archaeological Contractor, to ensure that persons or plant cannot inadvertently traverse across the area of investigation whilst archaeological works are in progress. The fencing (to be supplied by the Archaeological Contractor) will be regularly inspected and maintained by the Archaeological Contractor until archaeological works in each area have been completed, inspected, approved, and signed off by the statutory authority.

7.3.3 The machine excavation will be undertaken using an appropriate 360° mechanical excavator fitted with a toothless ditching bucket. A toothed bucket or breaker may only be used temporarily if concrete, tarmac, or other hard standing is encountered. A toothless bucket is to be used at all other times. Machine excavation will be carried out using a flat bladed bucket.

7.3.4 Upon removal of the topsoil, the underlying subsoil shall be removed by mechanical excavator under close archaeological supervision until either the top of the first archaeological horizon or undisturbed natural deposits are encountered. Particular attention should be paid to achieving a clean and well-defined horizon with the machine. Topsoil overburden and subsoil will be stockpiled separately. The mechanical excavator will not traverse any stripped areas. If archaeological remains are identified, topsoil stripping will cease in the affected areas and the archaeologists will excavate and record the remains as appropriate.

7.3.5 The machined surface will be hand cleaned if necessary, and inspected for archaeological features, and all identified features should be marked on the ground to ensure that they are not 'lost' during the mapping stage. Pre-excavation planning will be undertaken to record all identified archaeological features. The pre-excavation plan will form the basis for discussion on site to inform the strategy for detailed excavation of the archaeological remains.

7.3.6 If extensive or significant archaeological deposits and/ or features are identified, the Archaeological Contractor will notify the Applicant and the Applicant's Archaeological Representative immediately. Additional archaeologists may be deployed, subject to agreement from the Applicant.

7.3.7 The Archaeological Contractor shall not excavate any area beyond those scheduled for the proposed works. Should archaeological features revealed within the mitigation area continue outside of the area and be likely to be subject to construction impact in the current or later phases, the excavation area may need to be extended sufficiently characterise the material. This will only be undertaken with the agreement of the HEO for NLC.

7.3.8 Areas will be recorded on a suitable digital base map/ development plan and the stratigraphy and depth of excavation will be recorded. Details on recording procedures where significant archaeology is discovered are detailed in the section below.

7.4 Hand Excavation

7.4.1 All archaeological features and deposits within the detailed excavation areas will be hand excavated and recorded in an archaeologically controlled and stratigraphic manner in order to achieve suitable preservation by record and to fulfil the aims and objectives of the project.

7.4.2 Hand excavation will be initially targeted to provide information on the form, function, and date of the archaeological features.

7.4.3 Machine-assisted excavation may be permissible if large deposits are encountered but only after consultation with the HEO for NLC.

7.4.4 A sufficient sample of deposits/ features will be investigated through hand excavation to record horizontal and vertical extent of the stratigraphic sequence to the level of undisturbed natural deposits.

7.4.5 The Archaeological Contractor will make provision for appropriate archaeological specialists to visit the site or attend meetings upon requested in order to advise on the excavation strategy.

7.4.6 Unless it is agreed otherwise at the pre-excavation site meeting the following excavation strategy will be employed:

- **Non-structural linear features:** A minimum of 25% of the feature (including terminals) will be excavated in order to determine its character, date, morphology, and function. Each section will be excavated away from intersections with other features in order to recover an uncontaminated artefact assemblage and will measure not less than 1m long or a minimum of a 1m long section if the feature is less than 10m in length. In addition to the 25% sample all intersections will be investigated to determine stratigraphic relationships between features.
- **Non-structural discrete features:** A minimum of 50% of all pits, post-holes and other isolated discrete features will be excavated; unless it is proven that they are of modern origin. If large quarry pits (over 1.5m diameter) are encountered then the sample excavated should be sufficient to define the extent and maximum depth of the feature but should not be less than a 25% quadrant, unless agreed otherwise.
- **Special or burnt features:** are to be the subject of 100% excavation. Such features will be identified during pre-excavation planning to enable the input and advice of appropriate archaeological specialists. Where in situ burning is identified no excavation shall take place until the possible recovery of samples for scientific dating has been considered.
- **Human remains:** during detailed excavation human remains will be 100% excavated, recorded in situ, and subsequently lifted, labelled, and packed to the standard established by *Excavation and post-excavation treatment of cremated and inhumed human remains* (McKinley and Roberts, 1993) and *Updated guidelines to the standards for recording human remains* (Mitchell and Brickley, 2017). Environmental samples will be recovered from grave fills and specific locations such as the abdominal cavity for specialist analysis. Site inspection will be made by a recognised specialist who will advise on the excavation and sampling strategy following guidelines on *The Role of the Human Osteologist in an Archaeological Fieldwork Project* (Historic England, 2018). The location of each grave, inhumation/cremation and any associated grave goods will be recorded three dimensionally using metric survey-grade equipment (or its equivalent). The exhumation of any human remains will only be undertaken in accordance with current UK legislation and good practice (refer to Section 5.8 and **Appendix A**) and any local Environmental Health concerns.
- **Furrows:** each archaeological feature identified as a potential furrow will be subject to limited hand investigation and recorded in order to confirm the interpretation. Features where this interpretation is unclear should be

treated as non-structural linear features and investigated in accordance with the strategy set out above.

- **Tree throws:** where features are identified as tree throws or hollows a sample will be hand excavated to confirm the interpretation. Features where this interpretation is unclear should be treated as non-structural discrete features and investigated in accordance with the strategy set out above.

7.4.7 All features demonstrated as being the earliest or latest in the stratigraphic sequence will be considered for full (100%) hand excavation. Selection will be based on whether they may belong to a transitional period.

7.4.8 Archaeological recording will proceed in accordance with the specification and accepted national, regional, and professional standards and guidance (refer to **Appendix A**).

7.5 Recording

7.5.1 All archaeological remains shall be recorded to best practice standards; Standard and Guidance for Archaeological Excavation prepared by the Chartered Institute for Archaeologists (CIfA, 2020c). Archaeological recording is to include as a minimum:

- A full written (on appropriate pro-forma recording sheets), drawn and photographic record will be made for each element of the mitigation works, even where no archaeological features are identified. Where the stratigraphic sequence or inter-cutting features are complex the relationships between contexts shall also be compiled as 'Harris matrix' diagrams (Harris, 1993);
- Hand drawn plans and sections of features will be produced at an appropriate scale (normally 1:20 for plans and 1:10 for sections). All plans and sections will include spot heights relative to Ordnance Datum in metres, correct to two decimal places;
- Digital photography (minimum 12-megapixel resolution) will be used to record the archaeological works and will follow Archaeological Data Service (ADS, 2011) advice for secure long-term storage and migration of files. In addition to records of archaeological features, a number of general site photographs will also be taken to give an overview of the site. Particular attention should be paid to obtaining shots suitable for displays, exhibitions, and other publicity; and
- Indices of context records, drawings samples and photographs will be maintained and checked. These will form part of the project archive. These indexed registers will be fully cross-referenced.

7.5.2 On completion of the field project the site archive will be consolidated, checked to ensure it is internally consistent and ordered as a permanent archive.

7.6 Artefact Recovery

7.6.1 All artefacts will be collected, stored, and processed in accordance with standard methodologies and national guidelines (refer to **Appendix A**). Except for modern artefacts, all finds will be collected and retained.

7.6.2 The Archaeological Contractor will clarify their Selection Strategy in their RAMS and will ensure that it is in line with CIfA (2020d) guidelines. Each 'significant find' will be recorded three dimensionally. Similarly, if artefact scatters are encountered these should be also recorded three dimensionally. Bulk finds will be collected and recorded by context.

7.6.3 All recovered artefacts will be stabilised, conserved, and stored in accordance with the current national conservation guidelines and standards (refer to **Appendix A**). If necessary, a conservator will visit the site to undertake 'first aid' conservation treatment.

7.6.4 Artefacts will be stored in appropriate materials and conditions and monitored to minimise further deterioration.

7.7 Environmental Bulk Sampling and Scientific Dating

7.7.1 The provisional strategy for environmental sampling during detailed excavation should follow the strategy proposed for trial trench evaluation, as outlined in Table 1 (Section 5.6).

7.7.2 The Archaeological Contractor's RAMS will outline an appropriate environmental sampling strategy that conforms to this specification. The environmental sampling strategy will be targeted to answer the questions laid out in the site-specific aims and the regional research agendas.

7.7.3 The Historic England Regional Science Advisor will be notified of the commencement of the project and will be consulted regarding the sampling strategy proposed by the Archaeological Contractor. Provision will also be made for the recovery of material suitable for scientific dating. An appropriate dating specialist will be consulted on this in advance of and throughout the fieldwork and will be available to advise on the ongoing strategy.

7.7.4 Any samples taken must come from securely stratified, datable deposits with a low risk of contamination using the methodologies outlined in *Environmental Archaeology; A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage, 2011).

7.7.5 Any samples taken must come from appropriately cleaned surfaces, be collected with clean tools, and be placed in clean containers. They will be adequately recorded and labelled, and a register of all samples will be kept. Once the samples have been obtained they should be stored appropriately in a secure location prior to being sent to the appropriate specialist. Provision will be made for the ongoing processing and initial assessment of sampled material in order to provide timely feedback regarding quality of preservation

and significance of specific deposits during the evaluation and to inform the ongoing strategy.

7.7.6 The finds and samples will be processed (cleaned and marked) as appropriate. Each category of find or environmental/ industrial material will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the fieldwork report.

7.8 Finds Processing

7.8.1 Initial processing of finds (and if appropriate other samples) will be carried out concurrently with the fieldwork. The processing of finds will be finished shortly after completion of the investigations. The finds will be retained (according to the Artefact Recovery section), washed, marked, bagged, and logged on a Microsoft Access or GIS database (or equivalent), together with their locations (if applicable) according to the National Grid (eastings, northings) and Ordnance Datum (height), accurate to two decimal places.

7.8.2 The finds assemblage will be treated, labelled, and stored in accordance with the appropriate Historic England guidance documents and the Institute of Conservation guidelines (refer to **Appendix A**). At all times the Archaeological Contractor shall ensure that the processing of the assemblage is in accordance with the requirements of the recipient museum (to be confirmed).

7.8.3 If appropriate, each category of find or each material type will be examined by a suitably qualified archaeologist or specialist and the results incorporated into a fieldwork report.

7.8.4 The deposition of any finds collected during the archaeological monitoring and the related archive forms the final stage of this project. The Archaeological Contractor shall provide the Applicant's Archaeological Representative with copies of communication with the recipient museum and confirmation of the deposition of the archive.

7.9 Treasure

7.9.1 Any recovered artefacts that fall within the scope of the Treasure Act 1996 and Treasure (Designation) Order 2002 will be reported to the Applicant's Archaeological Representative immediately.

7.9.2 The Applicant's Archaeological Representative will ensure that the Treasure regulations are enforced and that all the relevant parties are kept informed. In addition, the Archaeological Contractor shall maintain a list of finds that have been collected that fall under the Treasure Act and related legislation and this list shall be included in the fieldwork report.

7.9.3 Artefacts that are classified as 'treasure' will be removed to a safe place but where removal cannot be undertaken on the same working day as the discovery, suitable security measures must be taken to protect the finds from damage or unauthorised removal.

7.10 Land Drains

7.10.1 Any land drains encountered during the archaeological works will be left in situ initially. A buffer of at least 300mm will be left either side of a land drain and excavation will proceed either side of it. Damage to any part of a land drain will be repaired immediately with plastic pipe. A photographic record of any damage and subsequent repair will be made. The location of the repaired land drain will be recorded and plotted onto the OS base map for future reference and potential compensation events. A schedule of all damaged and repaired land drains will be maintained by the Archaeological Contractor and submitted to the Applicant upon completion of the trial trenching work.

8.0 WORKS SPECIFICATION FOR ARCHAEOLOGICAL MONITORING

8.1 General Requirements

8.1.1 Archaeological monitoring will be undertaken in areas of the Proposed Development Site where no specific archaeological remains have been identified but a general potential for dispersed archaeological features or where a residual risk of archaeological discoveries remains. The use of archaeological monitoring during construction will be agreed with the HEO for NLC but is anticipated to be limited, with trial trench evaluation, geoarchaeological assessment, and where reasonably practicable, preservation of archaeological remains providing the preferred mitigation strategy. Where preservation of archaeological remains is not reasonably practicable, preservation by detailed excavation will be the alternative mitigation strategy.

8.1.2 The archaeological monitoring, if required, will comprise a programme of observation, investigation and recording during the main construction programme and will allow the Applicant and their appointed EPC Contractor's preferred method of working to be undertaken with minimal disruption whilst providing sufficient access and time for the recording of any archaeology present.

8.1.3 During the archaeological monitoring, the Archaeological Contractor will monitor and observe the removal of topsoil and overburden undertaken by the Applicant's appointed EPC Contractor to the archaeological horizon or natural substrate, whichever is encountered first. Where archaeological remains are identified, selective hand investigation and recording of the archaeological deposits will be undertaken by the Archaeological Contractor.

8.1.4 Any requirement for archaeological monitoring will be informed by the results of the trial trench evaluation or other mitigation measures that are detailed in this specification.

9.0 RISK ASSESSMENT AND METHOD STATEMENT

9.1.1 Notwithstanding this OWSI, prior to the start of each phase of archaeological evaluation or mitigation works, the Archaeological Contractor shall provide a detailed RAMS for the archaeological works for approval by the Applicant, the Applicant's Archaeological Representative and the HEO for NLC.

9.1.2 Each RAMS shall be prepared in consultation with the Applicant and where required, their appointed EPC Contractor , taking account of their Environmental Management and Health and Safety Plans.

9.1.3 The RAMS shall include as a minimum (as appropriate):

- the safe method of working whilst undertaking machine excavation including any temporary works required;
- the methods for survey and setting out works;
- the Archaeological Contractor's methods and approach for undertaking the site-based works and off-site processes to completion;
- details of specific survey methods for on-site recording of stratigraphic profiles and topographic modelling;
- the Archaeological Contractor's strategy for environmental sampling and archaeological science;
- the method for excavating and recording inhumations and cremations in compliance with this OWSI;
- the retention and disposal policies for samples and artefacts recovered during the work;
- the method for preparation of the required reports, archive and all associated deliverables;
- the procedures for assessment of potential for analysis (post excavation assessment);
- analysis and publication proposals;
- the method for preparation of the digital dataset, digital drawings, and digital report deliverables;
- a resource plan and programme and CVs of key personnel including post-excavation specialists;
- the Health and Safety Plan and Site-Specific Risk Assessment (including COVID-19 protection measures and unexploded ordnance if relevant);
- the Quality Assurance Plan; and
- the procedures for on-site and off-site security and emergency response plan (including environmental incidents).

10.0 MONITORING, PROGRESS REPORTS AND MEETINGS

10.1.1 To ensure that archaeological work is conducted in accordance with the agreed OWSI and RAMS, fieldwork and post-fieldwork analysis may be monitored by the Applicant's Archaeological Representative and the HEO for NLC.

10.1.2 The monitors are not liable in any way for any failings of the archaeological contractor and such monitoring is not intended to take the place of proper self-regulation.

10.1.3 Verbal progress reports will be provided to the Applicant's Archaeological Representative upon request and weekly written progress reports will be provided to the Applicant's Archaeological Representative if requested. In addition, progress meetings between the Applicant's Archaeological Representative, the HEO for NLC and the Archaeological Contractor may be held on site during the course of the works.

10.1.4 The Archaeological Contractor will only accept instruction from the Applicant's Archaeological Representative.

11.0 COMPLETION OF ARCHAEOLOGICAL FIELDWORK

11.1.1 The Archaeological Contractor shall prepare and submit a Completion Statement to the Applicant's Archaeological Representative within one working day of completing each stage of archaeological works. The Completion Statement will be issued to the Applicant and the HEO for NLC.

11.1.2 The site will be left in a tidy, professional, and safe condition, and the Archaeological Contractor will ensure that all materials brought onto site are removed.

11.1.3 An OASIS entry shall be completed at the end of each stage of archaeological works, irrespective of whether a formal report is required. The Archaeological Contractor will complete the online form at http://ads.ahds.ac.uk/project/oasis/ within one month following completion of the fieldwork. Archaeological Contractors are advised to contact OASIS (oasis@ads.ahds.ac.uk) for technical advice.

12.0 DELIVERABLES

12.1 Overview

12.1.1 Following the completion of each phase of archaeological fieldwork, be it at the evaluation or mitigation stage, the Archaeological Contractor will prepare an appropriate fieldwork report deliverable. The reporting requirements for each type of investigation is described below.

12.2 Geoarchaeological Assessment Deliverables

Interim Report

12.2.1 An interim summary assessment report will be produced within one week of the completion of the fieldwork in order to inform the design of any subsequent archaeological mitigation.

12.2.2 A preliminary interpretation of the soil and sediment characteristics of the core 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.

Assessment Report

12.2.3 A final geoarchaeological assessment report shall be prepared and will include a complete lithological description, following standard sedimentary conventions and the Troels-Smith system (1955) and incorporating the results of specialist assessment and dating.

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

12.2.5 The geoarchaeological assessment will be placed within the context of any previous investigations and assessment work undertaken in the vicinity of the Proposed Development Site to aid the interpretation of the deposit sequence.

12.3 Archaeological Trial Trenching and Archaeological Monitoring Deliverables

Interim Report

12.3.1 Within two weeks of completion of the evaluation or mitigation works, an interim statement will be prepared and submitted to the Applicant's Archaeological Representative and the HEO for NLC. It will include:

- a brief summary of the results;
- a plan of each trench/ mitigation area at an appropriate scale, showing the mapped features;
- a preliminary outline description of the archaeological remains; and
- a quantification of the primary archive including contexts, finds and samples.

12.3.2 The finds and samples will be processed (cleaned and marked) as appropriate. Each category of find or environmental/industrial material will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the fieldwork report.

12.4 Fieldwork Report

12.4.1 A fieldwork report will be submitted in draft to the Applicant's Archaeological Representative within eight weeks of the completion of the evaluation/ mitigation works. This timescale can be amended if approved by the Applicant's Archaeological Representative and the HEO for NLC.

12.4.2 The report will include the following, as a minimum:

- a signed QA sheet detailing as a minimum - title, author, version, date, checked by, approved by;
- a non-technical summary;
- a site location drawing;
- the archaeological and historical background (including the results of previous phases of fieldwork);
- the methodology employed for the evaluation/ mitigation works;
- the aims and objectives of the evaluation/ mitigation works;
- the results of the evaluation/ mitigation works (to include full description, assessment of condition, quality and significance of the remains);
- if human remains are encountered the report will include a statement that addresses the future retention of the material, including if appropriate, options for reburial;

- an appendix containing specialist artefact reports, palaeoenvironmental reports or their equivalent;
- an appendix illustrating specific finds and general working shots or portraits of specific features or structures as appropriate;
- a list of all finds that fall within the scope of the Treasure Act and associated legislation;
- a stratigraphic matrix for each trench/ mitigation area (as appropriate);
- assessment/ conclusion and a statement of potential with recommendations for further work and analysis;
- a statement of the significance of the results in their local, regional and national context cross-referenced to the Regional Research Framework;
- publication proposals if warranted;
- the current and proposed arrangements for long term conservation and archive storage (including details of the accredited repository details);
- general and detailed plans showing the location of the survey area accurately positioned on an O.S. base map (at an appropriate and recognised scale);
- detailed plans and sections illustrating archaeological features and relationships between features (at an appropriate and recognised scale);
- colour photographic plates illustrating the site setting, work in progress and archaeological discoveries; and
- a cross-referenced index of the project archive.

12.4.3 One digital pdf copy (complete with illustrations and plates) of the completed draft report will be submitted to the Applicant's Archaeological Representative . The Applicant's Archaeological Representative will submit a copy of the draft report to the HEO for NLC for comment. In finalising the report, the comments of the Applicant's Archaeological Representative and the HEO for NLC will be taken into account.

12.4.4 Following the receipt of comments on the draft report, a final digital version (PDF) will be submitted to the Applicant's Archaeological Representative within one week of the receipt of comments. The final report shall be provided to the Applicant and the HEO for NLC.

12.4.5 Digital image files shall be submitted in JPEG or TIFF format, digital text files shall be submitted in Microsoft Word format, digital illustrations shall be submitted in AutoCAD format or ArcGIS shapefile format. A fully collated version of the report shall be included in PDF format.

12.5 Detailed Excavation Deliverables

Interim Report

12.5.1 Within two weeks of the completion of the detailed excavation, an interim statement will be prepared and submitted to the Applicant's Archaeological Representative and the HEO for NLC. It will include:

- a brief summary of the results for each mitigation area;
- a draft or sketch plan of each mitigation area; and
- a quantification of the primary archive including contexts, finds and samples.

12.5.2 The finds and samples will be processed (cleaned and marked) as appropriate. Each category of find or environmental/ industrial material will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the report.

Fieldwork Report/ Post-Excavation Report

12.5.3 If the results of the detailed excavation are decided by the Applicant's Archaeological Representative and the HEO for NLC to be not significant enough to warrant detailed analysis and publication, then a fieldwork report will be produced in line with the requirements of the fieldwork report for trial trenching.

12.5.4 If the results of the detailed excavation are of sufficient significance to warrant publication, the deliverable, following on from the interim report, may take the form of a Post-excavation Assessment Report and will include an Updated Project Design (UPD) in accordance with the guidance and standards set out in Historic England's Management of Research Projects in the Historic Environment (Historic England, 2015). The report will incorporate into it the results from all other phases of archaeological work that have been undertaken for the Proposed Development. A copy of the report will be provided to the Applicant's Archaeological Representative as a draft for comment.

12.5.5 The Post-excavation Assessment Report and UPD will as a minimum present:

- a summary of the project background, original aims and objectives;
- an integrated description of the results by period for each area of archaeological mitigation;
- a quantification of each artefact and ecofact type recovered during the mitigation works;
- an assessment of how the results of the archaeological mitigation address the original and any new research objectives;

- a proposal for a revised set of research objectives; and
- recommendations for further analysis and publication.

12.5.6 If detailed analysis and publication are recommended by UPD, a stage of post-excavation analysis and publication will be required. The post-excavation analysis stage of the project will comprise the detailed quantification, analysis and reporting of the recorded archaeological remains (contextual records), artefacts and ecofacts recovered during the programme of archaeological mitigation. The post-excavation analysis will be undertaken by the Archaeological Contractor supported by external specialists as appropriate.

Publication

12.5.7 If significant results are obtained and it is likely that further stages of archaeological work will be required (i.e. additional watching brief areas); or, if investigation of a single site (or several closely related sites) is undertaken over several phases of archaeological work; publication shall be deferred until such time as the archaeological works are substantially complete.

12.5.8 The format of any publication shall be commensurate with the significance of the archaeological results and will be agreed with the Applicant's Archaeological Representative and consulted on with the HEO for NLC. Online publication formats as well as traditional publication formats will be considered.

12.5.9 If the results merit it, a popular publication report and illustrated document explaining the results in layman's terms should be produced. The popular report should inform the non-expert audience about the discoveries and their significance in an accessible manner. Popular booklets may be produced both for children and for adult audiences.

Monitoring

12.5.10 The preparation of the post-excavation assessment and publication report will be subject to regular monitoring meetings with the Applicant's Archaeological Representative to ensure adherence to agreed programme and budget. A timetable for the progress meetings will be agreed with the Applicant's Archaeological Representative prior to the commencement of the post-excavation assessment.

12.6 East Midlands Historic Environment Research Framework Entry

12.6.1 In addition to uploading each fieldwork report to OASIS, upon completion of the fieldwork the Archaeological Contractor will contribute to the Agenda Themes and Topics set out in the EMHERF to further the strategy for research in the East Midlands region (EMHERF, 2020).

13.0 ARCHIVE PREPARATION AND DEPOSITION

13.1 Preparation

13.1.1 Archaeological material recovered from fieldwork is irreplaceable and data recorded in the course of fieldwork should be copied and held securely in a separate location in line with current good practice, until it can be deposited in the recipient repository (refer to **Appendix A**).

13.1.2 The Archaeological Contractor should compile a Data Management Plan in line with CIfA guidelines (2020d) and include it in their RAMS.

13.1.3 The Proposed Development Site records and assemblages (list of fieldwork interventions, notebooks/ diaries, context records, feature records, structure records, site geometry (drawings), photographs and films, finds records and associated data files) will constitute the primary Site Archive. This is the key archive of the fieldwork project and the raw data upon which all subsequent assessment and analysis and future interpretation will be based. The Site Archive will therefore not be altered or compromised.

13.1.4 The Site Archive should be quantified, ordered, indexed, and made internally consistent, and in line with current good practice (refer to **Appendix A**) and local authority guidelines. All finds and coarse-sieved, and flotation samples will have been processed and stored under appropriate conditions. The Site Archive will also contain a site matrix, a summary of key findings and descriptions of artefactual and environmental assemblages. Arrangements should be made for the proper cataloguing and storage of the archive during the project lifecycle (it may be appropriate to liaise with an archive specialist). The content of an outline structure for a fieldwork archive is presented in MoRPHE, Appendix 1, Product P1 and Product P3 (MoRPHE, 2008, PPN3).

13.1.5 The Archaeological Contractor will, prior to the preparation of their RAMS, liaise with the recipient museum to obtain agreement in principle to accept the physical, documentary, and photographic archive for long-term storage.

13.1.6 The digital archive must be deposited with a Trusted Digital Repository and thus made publicly accessible (such as the ADS).

13.1.7 The Archaeological Contractor will be responsible for identifying any specific requirements, archiving costs or policies of the recipient repository in respect of the archive, and for adhering to those requirements.

13.1.8 Relevant reference numbers will be obtained from the recipient repositories in advance of the preparation of the Archaeological Contractor's RAMS, to ensure that the project is recorded in accordance with the requirements of the local authority.

13.1.9 The archive of finds and records generated during the fieldwork will be removed from the Proposed Development Site at the end of each day and kept secure at all stages of the project until it is deposited with the recipient

repository. The Site Archive will be produced to current national standards (refer to **Appendix A**).

13.2 Deposition

13.2.1 The deposition of the archive forms the final stage pf the project. The Archaeological Contractor shall provide the Applicant's Archaeological Representative with copies of communication with the accredited repository and written confirmation of the deposition of the archive. The Archaeological Contractor will deal with the transfer of ownership and copyright issues.

14.0 GENERAL PROJECT REQUIREMENTS

14.1 Resources

14.1.1 All archaeological personnel involved in the project shall be suitably qualified and experienced professionals. All staff will be fully briefed and aware of the work required under this specification and will understand the objectives of the investigation and methodologies to be employed.

14.1.2 The fieldwork will be directed and supervised by an appropriately experienced senior archaeologist employed by the Archaeological Contractor who will be a corporate member of the Chartered Institute for Archaeologists.

14.1.3 Communication and dissemination of relevant site information are essential in all fieldwork projects. The OWSI and RAMS will be available to all site staff and a copy will be held on site for this purpose.

14.1.4 Where appropriate, initial processing of artefactual and ecofactual material will be carried out concurrent with fieldwork. The project team will include relevant specialists to advise on collection and sampling techniques and to ensure compliance with the approved RAMS. Updated methodologies devised on site will be agreed with the Applicant's Archaeological Representative and consulted on with the HEO for NLC as appropriate.

14.1.5 Regular progress meetings for site staff will be held as appropriate and relevant; information will be passed on to all contributors to ensure that all team members are kept informed of emerging site strategies and site narratives.

14.2 Programme

14.2.1 The programme for each stage of archaeological investigation shall be agreed between the Applicant, the Applicant's Archaeological Representative and the Archaeological Contractor. The HEO for NLC will be notified of the programme for fieldwork in a timely manner, so that monitoring arrangements can be put in place.

14.2.2 Changes to the agreed programme will only be accepted with the agreement of the Applicant, the Applicant's Archaeological Representative and the Archaeological Contractor. The Archaeological Contractor shall provide early warnings for any delays to the agreed works programme.

14.3 Access Arrangements

14.3.1 Access to the Proposed Development Site, to carry-out the archaeological works, will be arranged and organised with the Applicant, as appropriate. Designated routes into and out of the work area(s) will be identified and will be adhered to at all times.

14.3.2 The locations for welfare facilities and vehicle parking will be agreed with the Applicant or their appointed EPC Contractor prior to the start of the works and shall be included in the Archaeological Contractor's RAMS.

14.4 Confidentiality

14.4.1 All communication regarding this project is to be direct through the Applicant and the Applicant's Archaeological Representative The Archaeological Contractor will refer all inquiries to the Applicant and the Applicant's Archaeological Representative without making any unauthorised statements or comments.

14.5 Publicity

14.5.1 The Archaeological Contractor will not disseminate information or images associated with the project for publicity or information purposes without the prior written consent of the Applicant.

14.6 Copyright

14.6.1 The Archaeological Contractor shall assign copyright in all reports and documentation/ images produced as part of this project to the Applicant. The Archaeological Contractor shall retain the right to be identified as the author/ originator of the material. This applies to all aspects of the project. It is the responsibility of the Archaeological Contractor to obtain such rights from sub-contracted specialists.

14.6.2 The Archaeological Contractor may apply in writing to use/ disseminate any of the project archive or documentation (including images). Such permission will not be unreasonably withheld.

14.6.3 The results of the archaeological works will ultimately be made available for public access.

14.7 Adherence to OWSI

14.7.1 The Archaeological Contractor will undertake the works in accordance with this OWSI and in accordance with the relevant RAMS. No variation from, or changes to, the OWSI and/ or RAMS will occur except by prior agreement with the Applicant and the Applicant's Archaeological Representative, and where appropriate, consulted on with the HEO for NLC.

15.0 INSURANCES AND HEALTH & SAFETY

15.1.1 The Applicant or their appointed EPC Contractor will be responsible for identifying all hazards on site and shall be aware of the hazards of working close to overhead and buried services, including high voltage overhead cables, and shall be responsible for taking the necessary precautions to ensure all personnel, including the Archaeological Contractor, maintain a safe working distance at all times.

15.1.2 The Archaeological Contractor shall, at all times, follow the health and safety policies and procedures of the Applicant or their appointed EPC Contractor as well as any site-specific instructions highlighted during the on-site induction.

15.1.3 The Archaeological Contractor will provide the Applicant with details of their public and professional indemnity insurance cover.

15.1.4 The Archaeological Contractor will have their own Health and Safety policies compiled using national guidelines, which conform to all relevant Health and Safety legislation and best practice. A copy of the Archaeological Contractor's Health and Safety policy will be submitted to the Applicant and the Applicant's Archaeological Representative prior to the start of the archaeological investigations.

15.1.5 The Archaeological Contractor shall prepare a RAMS for each stage of evaluation/ mitigation works, and a project specific Health and Safety Plan and submit these to the Applicant and the Applicant's Archaeological Representative for approval prior to starting on site. The Archaeological Contractor will not be permitted to start works at the Proposed Development Site until the Applicant has received confirmation that the RAMS are acceptable for the proposed works. If amendments are required to these reports during the works, the Applicant, the Applicant's Archaeological Representative and any other relevant party must be provided with the revised document at the earliest opportunity.

15.1.6 The RAMS compiled by the Archaeological Contractor will include a section on undertaking fieldwork during the Coronavirus COVID-19 pandemic or any prevailing similar national emergencies including pandemics or high consequence infection disease (HCID) outbreaks (defined in the National Risk Register 2020 (UK Government, 2020)) which may influence the works proposed within this OWSI. At a minimum, all work should be undertaken in line with current government advice, noting that current advice at the time of writing includes the *Site Operating Procedures* (Construction Leadership Council (CLC), 2021). The RAMS will be required to be updated should any changes to government advice be issued prior to the commencement of and during the archaeological fieldwork.

15.1.7 All staff involved in the archaeological fieldwork should be Construction Skills Certification Scheme (CSCS) qualified to a minimum standard as an 'Archaeological Technician' (for Construction Related Occupation card),

'Professionally Qualified Person' (through accreditation with CIfA) or 'Academically Qualified Person' (through an archaeology degree) and hold a valid CSCS card.

15.1.8 All site personnel will familiarise themselves with the following:

- site emergency and evacuation procedures;
- the site's health and safety coordinator;
- the first aider; and
- the location of the nearest hospital and doctor's surgery.

15.1.9 The Archaeological Contractor's supervisor will maintain a record of site attendance and complete a daily briefing at the start of work for each day that there is a team in the field.

15.1.10 All site personnel will wear personal protective equipment (PPE) as defined by the Archaeological Contractor's risk assessment undertaken in accordance with mandatory requirements and in line with the requirements of the Applicant. As a minimum, the PPE should consist of a hardhat, steel toe-capped boots with mid-sole protection, high-visibility vest or jacket, high visibility trousers, safety glasses and gloves. All personnel will complete a site induction as set out by the Applicant and adhere to site specific safety rules and regulations outlined therein. All equipment that is used in the course of the fieldwork must be 'fit for purpose' and be maintained in a sound working condition that complies with all relevant Health and Safety regulations and recommendations.

15.1.11 The Archaeological Contractor will assure the provision and maintenance of adequate, suitable, and sufficient welfare and sanitary facilities at appropriate locations for the duration of the works.

16.0 COVID-19/ OTHER PANDEMICS OR HIGH CONSEQUENCE INFECTIOUS DISEASES

16.1.1 The Health and Safety policies, Risk Assessments and project-specific Health and Safety Plan compiled by the Archaeological Contractor will address undertaking fieldwork during the Coronavirus COVID-19 pandemic, or any prevailing pandemic/ HCID outbreak at the relevant time prior to works being undertaken. All work should be undertaken in line with the Applicant's health and safety guidance for site/ project works at that time. At the time of writing, this is based on current government advice, including the Site Operating Procedures (CLC, 2021).

16.1.2 The Archaeological Contractor's Risk Assessment and Health and Safety Plan shall address COVID-19 or other prevailing pandemic/ HCID specific hazard controls; travel, site, welfare, and accommodation; PPE and hygiene provisions; mental health and effects on people the site workers live with; and reporting procedures for site workers to raise any issues or concerns. They shall take account of changes to emergency procedures, factoring in, for example, increased emergency service response times and potential closures of Accident & Emergency departments. Toolbox talks will adhere to social distancing or other prevailing pandemic/ HCID controls prevailing at the time.

16.1.3 The Risk Assessment and Health and Safety Plan will be clearly communicated to site workers with sufficient time prior to travel or commencement of work. All site personnel will familiarise themselves with site-specific COVID-19 or other prevailing pandemic/ HCID mitigation measures. Signatures will be required to record that all site workers have attended appropriate site briefings and understood COVID-19 or other prevailing pandemic/ HCID procedures. Site workers must be aware that COVID-19 or other prevailing pandemic/ HCID controls (e.g. maintaining social distancing and hygiene standards) will take precedence until further notice. Site workers must adhere to the COVID-19 or other prevailing pandemic/ HCID measures, controls, and restrictions.

16.1.4 If tasks are identified that cannot be compliant with COVID-19 or other prevailing pandemic/ HCID procedures, then work must not take place until further mitigation is put in place to remain compliant.

16.1.5 COVID-19 or other prevailing pandemic/ HCID procedures will be under constant review as the situation evolves. The Applicant will ensure that Risk Assessments are updated to reflect any changes to government advice be issued prior to the commencement of or during the archaeological fieldwork.

16.1.6 It will be the Archaeological Contractor's responsibility to determine the relevant requirements, including any restrictions, at the time that works are undertaken.

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