

Great Yarmouth Third River Crossing Application for Development Consent Order

Document 6.9: Archaeological Written Scheme of Investigation

Planning Act 2008

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009 (as amended) (“APFP”)**

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Foreword

This document accompanies an application (“the Application”) submitted by Norfolk County Council (“the Applicant”) to the Secretary of State for a Development Consent Order (‘DCO’) under the Planning Act 2008¹.

If made by the Secretary of State, the DCO would grant development consent for construction, operation and maintenance of a new bascule bridge highway crossing of the River Yare in Great Yarmouth, and which is referred to in the Application as the Great Yarmouth Third River Crossing (or ‘the Scheme’).

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) require that an application for a DCO be accompanied by the documents specified at Regulation 5(2)(a) to (r). This is one of those documents and is specified at Regulation 5(2)(q).

¹ References to legislation in this document are to that legislation as amended at the date of this document.

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Glossary of Defined Terms and Acronyms

Defined Terms

Term	Definition
Application Site	The land bounded by the Order Limits, as shown by a red line on the Land Plans (document reference 2.5) and the Works Plans (document reference 2.6) and being land within which the authorised development may be carried out.
Crossing	The combined double-leaf bascule bridge and the Southtown Road bridge structure (i.e. from its junction with the new roundabout on William Adams Way to the new junction on South Denes Road).
NCC	Norfolk County Council (other than in its Highway Authority role as Applicant of the Scheme).
Order Limits	Limits of land within which the authorised development may be carried out, as shown on the Land Plans (document reference 2.5) and the Works Plans (document reference 2.6)
Principal Application Site	The land comprised in the Application Site but excluding the Satellite Application Sites
Satellite Application Sites	The parts of the Application Site within which Work Number 12 may be carried out, as shown on the Works Plans (document reference 2.6) and described in Schedule 1 to the draft DCO (document reference 3.1)
Vessel waiting facilities	Provision of vessel waiting facilities to the north and south of the Crossing, either as floating pontoons or additional fendering to the existing berths, including any dredging and quay strengthening works that may be required
The APFP Regulations	The Infrastructure Planning (Applications - Prescribed Forms and Procedure) Regulations 2009 (SI 2009/2264)
The Applicant	Norfolk County Council (in its capacity as Highway Authority and promoter of the Scheme).
Scheme	The Great Yarmouth Third River Crossing project for which the Applicant seeks development consent.

Acronyms

Acronym	Definition
AOD	Above Ordnance Datum
CIfA	Chartered Institute for Archaeologists
DCO	Development Consent Order
FAME	Federation of Archaeological Employers and Managers
FLO	Finds Liaison Officer
NCC	Norfolk County Council (in all capacities other than Highway Authority acting as promoter of the Proposed Scheme)
NCCHT	Norfolk County Council's Historic Environment Team
NHER	Norfolk Historic Environment Record
NHLE	National Heritage List for England
NSIP	Nationally Significant Infrastructure Project
OS	Ordnance Survey
OSL	Optically Stimulated Luminescence
PPE	Personal Protective Equipment
RO	Registered Organisation
VMS	Variable Message Sign
WSI	Written Scheme of Investigation

1 Introduction

1.1 Project Background

- 1.1.1** WSP has been commissioned by Norfolk County Council (NCC) as Highway Authority and Applicant to provide heritage consultancy services with regard to an application for development consent for the construction, operation and maintenance of a new crossing of the river Yare in Great Yarmouth, Norfolk ('the Scheme'). This Written Scheme of Investigation (WSI) has been produced by WSP as part of the DCO application to outline the approach to the post-consent archaeological investigative works prior to the construction phase with regard to potential below-ground archaeological remains, palaeoenvironmental remains and building appraisal / recording. The results of the archaeological investigative works will inform any mitigation strategies either before or during the construction phase, where necessary. It should be read in conjunction with the Environmental Statement Chapter 9 (Cultural Heritage).
- 1.1.2** The land on which the Scheme would be build comprises of one Principal Application Site and six Satellite Application Sites, collectively referred to as the Application Site. The Application Site is shown by a red line on the Land Plans (document reference 2.5) and the Works Plans (document reference 2.6) and being land within which the authorised development may be carried out.
- 1.1.3** This WSI relates to the Principal Application Site only. The six Satellite Application Sites are for the construction of Variable Message Signs (VMSs) and any mitigation required during the construction phase will be set out in a separate WSI.
- 1.1.4** The Principal Application Site contains a working industrial site and residential properties. Due to these constraints, no intrusive pre-consent archaeological evaluation has yet been undertaken, however a Historic Environment Desk-based Assessment (Ref. 1) and a geoarchaeological borehole review and deposit modelling (Ref. 2) have been undertaken to support the Development Consent Order (DCO).
- 1.1.5** The archaeological investigative work is required in accordance to the National Policy Statement for National Networks (paragraph 5.142). The post-consent phase archaeological fieldwork, palaeoenvironmental assessment and building appraisal / recording would be undertaken in accordance with the requirements of this WSI document, compliance with which forms a requirement of the DCO if made. Any mitigation required as a result of the archaeological investigative work would be set out in a separate WSI.

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- 1.1.6 The relevant archaeological measures set out in this document, agreed with NCC's Historic Environment Team (hereafter the 'NCCHT'), is secured through a DCO requirement and its implementation overseen by the NCCHT. Any subsequent method statements and/or WSIs produced will also be agreed with NCCHT.

1.2 Principal Application Site Description

- 1.2.1 The Principal Application Site is located approximately 800m to the south of the town centre of Great Yarmouth (centred at TG 52469 05894; Figure 1.1 (document reference 6.3)). The area on the west side of the River Yare is a mix of residential and commercial properties. The land on the east is an operating port known as Fish Wharf.
- 1.2.2 The Principal Application Site is situated on bedrock geology of the Crag Group - Sand and Gravel. This is a sedimentary bedrock formed in the Quaternary and Neogene periods. These rocks were formed in shallow seas with mainly siliciclastic sediments (comprising of fragments or clasts of silicate minerals) deposited as mud, silt, sand and gravel.
- 1.2.3 The Principal Application Site has multiple superficial geological deposits. Deposits on the eastern bank of the River Yare consist of clays and silts of the Breydon Formation and sands and gravels of the North Denes Formation. The eastern bank has deposits of sand of the Happisburgh Glacigenic Formation, peat of the Breydon Formation and clays and silts, also of the Breydon Formation. The River Yare itself flows over deposits of clay and silt.
- 1.2.4 A detailed description of the results of the palaeoenvironmental modelling is presented in the Wessex Archaeology (2018) borehole log review and deposit modelling report (Ref 2), summarised in Section 2.3 below.
- 1.2.5 The topography of the Principal Application Site is a flat and low lying at approximately 1.2m above Ordnance Datum (AOD).

1.3 Scheme Description

- 1.3.1 The following is a summary of the Scheme description, where it is relevant to this WSI. A detailed description of the Scheme is available in Chapter 2 of the Environmental Statement (document reference 6.1).
- 1.3.2 The Scheme involves the construction, operation and maintenance of a new crossing of the River Yare in Great Yarmouth. The Scheme consists of a new dual carriageway road, including a road bridge across the river, linking the A47 at Harfrey's Roundabout on the western side of the river to the A1243 South Denes Road on the eastern side. The Scheme would feature

an opening span double leaf bascule (lifting) bridge across the river, involving the construction of two new 'knuckles' extending the quay wall into the river to support the bridge. The Scheme would include a bridge span over the existing Southtown Road on the western side of the river, and a bridge span on the eastern side of the river to provide an underpass for existing businesses, enabling the new dual carriageway road to rise westwards towards the crest of the new crossing.

- 1.3.3** Works on the western side of the River Yare include the construction of a new five-arm roundabout to the east of the A47, connecting the new dual carriageway road with Suffolk Road, William Adams Way and the western end of Queen Anne's Road. Sections of the new five arm roundabout would be supported on driven piles where deep soft ground is encountered.
- 1.3.4** A single-span bridge will be constructed over Southtown Road, with reinforced earth embankments joining that bridge to the new roundabout at William Adams Way. Both Southtown Road bridge and the reinforced earth embankments would be supported on driven piles.
- 1.3.5** In order to accommodate the new road and bridge, residential and commercial properties with the Scheme footprint on the west side of the River Yare will be demolished on Southtown Road, Queen Road and Cromwell Road.
- 1.3.6** On the eastern side of the river, a single-span bridge will be constructed to provide an accommodation underpass, with reinforced earth embankments joining that single span bridge to South Denes Road. The underpass and reinforced earth embankments will be supported on driven piles.
- 1.3.7** The Scheme will include the provision of new utilities and services and the diversion of existing utilities, and the provision of drainage infrastructure, lighting and landscaping. Details of these will be confirmed at a later stage.
- 1.3.8** A main works compound area will be established on the eastern side of the river and a satellite compound is proposed at the west side, near the Kings Centre. Intrusive works required to establish these compound sites has yet to be determined, however for the main works compound it is anticipated to be limited given the presence of existing infrastructure.
- 1.3.9** Other elements of the Scheme which are not relevant to the WSI as they will not have a direct physical impact on historic environment include the demolition of an existing footbridge on William Adams Way, modifications and/or improvements to the existing local highway networks and the provision of a vessel waiting facility within the River Yare.

1.4 Consultation

- 1.4.1 This WSI has been prepared as an indication of how any post-consent intrusive works and building appraisals on site would advance. It been prepared in consultation with NCCHT. All further Method Statements and WSIs would require further consultation with NCCHT.

2 Archaeological and Historical Summary

2.1 Introduction

2.1.1 The Scheme has been the subject of a Historic Environment Desk-Based Assessment (Ref 1), which presented archaeological and historical data gathered from the Norfolk Historic Environment Record (NHER), the National Heritage List for England (NHLE) a site walkover and map regression exercise. The Desk-Based Assessment included data from within the footprint of the Scheme, and from a 1km Study Area around it for designated heritage assets and 500m for non-designated remains. This section of the WSI provides a brief summary of the archaeological and historic background detailed in the Desk-Based Assessment.

2.2 Archaeological and Historical Summary

Summary of Key Heritage Asset

2.2.1 There are no designated heritage assets within the Principal Application Site and it does not lie in a Conservation Area. The Grade II listed Dolphin Public House (NHLE 1096829), an early 20th century building, is located adjacent to the Principal Application Site, on the east side of the River Yare and there will be no direct physical impacts on it.

2.2.2 Designated heritage assets in the wider (1km) Study Area consist of:

- Four Scheduled Monuments;
- Four Grade I Listed Buildings;
- Eight Grade II* Listed Buildings;
- 102 Grade II Listed Buildings; and
- Six Conservation Areas.

2.2.3 No World Heritage Sites, Registered Battlefields, Registered Parks, Gardens or Protected Wreck sites have been identified within 1km of the Principal Application Site.

Chronological Summary

2.2.4 There is very little evidence for prehistoric settlement activity around the Principal Application Site activity. Where Great Yarmouth now stands started out as the mouth of a large estuary. Since the last Ice Age, a southerly coastal current has laid a spit of sand across the north of the estuary, from the north end to the south. The sand spit blocked off the estuary, leading to the formation of the peat in the Broads. The sand spit was breached by the

sea, and left as either a low tidal island or a shoal until about 1,300 years ago, gradually rising to become permanently dry. This is now the area known as South Denes.

- 2.2.5** The only evidence currently for prehistoric activity in Great Yarmouth is provided by a single find of a Neolithic scraper (NHER 12936), recovered at the junction of Boundary Road and Suffolk Road, adjacent to the Principal Application Boundary.
- 2.2.6** The inclusion of Great Yarmouth (then known just as Yarmouth) in the Domesday Book of 1086 indicates the presence of a settlement here prior to the Norman conquest. Excavations have identified Fuller's Hill, located approximately 2km north of the Principal Application Site, as the likely location of the later Saxon settlement (e.g NHER 32585). In 1208, Great Yarmouth received its town charter and the settlement expanded rapidly. The economy of the town was driven by fishing, and by the end of the 13th century, three ecclesiastical centres had been established within the town, including the Dominican or Blackfriars Friary, located approximately 450m north of the Main Application Site (NHER 4266). The extent of the medieval town is represented by the well-preserved remains of the defence walls (NHLE 1003782) which is designated as a Scheduled Monument. Construction of the walls began in the late 13th century, although they have been subjected to periodic remodelling, including during the refortification of the town in the 17th century during the Civil War.
- 2.2.7** Settlement was not limited to the walled town in the medieval period. A settlement known as Southtown was established, on the western side of the River Yare. Approximately 250m to the south of the Principal Application Site are the remains of the house of the Austin Friars comprising a church, priory and leper hospital located on Burnt Lane (NHER 60531). This friary was founded in the 13th century, although the earliest known buildings date to the 15th century. Much of the priory has been destroyed, although the west gate is recorded to have still been standing up to the beginning of the last century.
- 2.2.8** In 2013, a watching brief revealed beam slots and post holes associated with a late medieval timber-framed building located on Burnt Lane (NHER 60518), approximately 450m south of the Principal Application Area. Finds recovered from these features included late medieval brick, roof tile and wall plaster that could be high status.
- 2.2.9** Great Yarmouth underwent considerable redevelopment and expansion during the post-medieval period. The area east of the River Yare lies in the area known as South Denes, which was occupied by a Naval base until the mid-19th century. Early 19th century mapping shows the spit of land to the east of the river and south of Great Yarmouth as forming the naval base. There are a number of military structures along the coastline apparent,

including the site of the South Star Battery (NHER 4238) approximately 250m to the east of the Order limits. Other heritage assets in the Study Area associated with the Naval base are the Grade I Listed Nelsons Monument (NHLE 1246057), also known as the Norfolk Pillar, and the Grade II* and Grade II buildings forming St Nicholas Hospital, located 350m north-west (Main Entrance Range (NHLE 1245984) Main Block (NHLE 1245983), walls and railings (NHLE 1245986) and South Block (NHLE 1245985)).

- 2.2.10** The majority of the non-designated heritage assets in the Study Area relate to the post-medieval period, primarily the late 18th to 19th centuries, and include villas, a lodge, mileposts and boundary posts and two churches. There are also industrial areas with railways, a coal power station, gas works, potteries, fish curing works, workshop ranges, utility blocks and a rope walk.
- 2.2.11** Cartographic sources from 1818 and 1850 identify three buildings on the west bank of the river that fall within the Main Application Site. No function for the buildings are recorded.
- 2.2.12** Proposals to develop the east side of the river as Fish Wharf began in the mid-19th century and a plan held by the Norfolk Archives from 1866 shows how the area was to be set out. This included three covered markets structures along the river side. To the east of the markets, ran the urban tramway (NHER 13576), and then a set of areas earmarked for “swills and packages”. The northern plot is marked as ‘site of Refreshment Room’, which later was occupied by the Dolphin Public House (NHLE 1096829). East of these, the land was divided into 39 plots to be let as fishing trade premises. The proposed layout of the Fish Wharfs on this plan is reflect on the subsequent Ordnance Survey (OS) maps and therefore are assumed to have been built to the plan.
- 2.2.13** Due to the success of the market, proposals were soon made for an extension, with the addition of another building along the river side. The latter half the 19th century also saw the development of terraced housing on the west side of the river. The terraced housing along Southtown Road have a date stone of 1873. The west of the Principal Application Site is occupied primarily by fields which are criss-crossed by drainage channels. The later mapping also shows the route of a tramway running north-south along Southtown Road. Other features of note on the later maps are the Icehouses (NHER 55685), located to the eastern side of the Principal Application Site, and the Gas Works, located to the east (NHLE 1096789).

2.3 Known Buried Heritage Assets

- 2.3.1** Sixteen non-designated heritage assets have been identified in the DBA within the Principal Application Site:

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- Site of late 19th century icehouse and three salt stores (HER 55685);
 - Site of late 19th century Fish Wharf (WSP10)
 - Site of wharf side buildings (WSP09)
 - The Site of three buildings on west side of Southtown Road (WSP11, WSP12 and WSP13)
 - The Route of Norfolk and Suffolk Joint Railway (HER 13575);
 - Routes of Great Yarmouth urban railways (HER 13576);
 - Site of a 20th century timber yard and saw mill (WSP14);
 - Site of World War II defences (HER 27697);
 - Site of World War II craters (HER 27700, 43589, and 43741);
 - Site of World War II anti invasion defences at Southtown (HER 42355 and 42353); and
 - Site of World War II road blocks (HER 43304).

2.3.2 The Icehouse and Three Salt Stores (HER 56658), Site of Wharf Side Buildings (WSP09), and Site of Fish Wharf Buildings (WSP09) all relate to the fishing industry and the development of the South Denes area to support this industry. The historic mapping shows the site of three buildings on Southtown which appear to predate the later 19th century expansion into this area (WSP11 to WSP13). They therefore have the potential to provide archaeological and historical evidence for the nature of land-use and occupation in the area between the settlement cores of Southtown and Gorleston.

2.3.3 The routes of the two urban railways would have left little in the way of below ground evidence and are very unlikely to survive as below ground features due to subsequent development.

2.3.4 The site of a timber yard and saw mill (WSP14) is shown on the early 20th century OS mapping. The site had been removed by the later 20th century. There is potential for below ground remains associated with the sheds to be preserved as below ground remains, however due to the modern date they are judged to be of negligible value.

2.3.5 The World War II defence remains recorded in the Principal Application Site were temporary features and following the end of the war were removed, and no below remains are predicted to survive. Where present, they would be of negligible value. The World War II crater is similarly judged to be of negligible value.

2.3.6 There is potential for currently unknown buried archaeological assets to be present within the Principal Application Site on the west side of the River

Yare, including deeply stratified deposits which may not have been disturbed by modern development. There is a potential for remains from the prehistoric period through the post-medieval period, including waterlogged remains which could preserve remains of timber structures or vessels.

- 2.3.7 The potential for buried archaeological remains on the east side of the River Yare is limited due to the comparatively modern date of the land mass. There is a potential, however, for remains associated with the former Fish Wharf and quay side activities.

2.4 Built Heritage Assets

- 2.4.1 The Scheme would require the demolition of one set of late 19th century terraced buildings on Southtown Road (WSP06) and one terrace along Queen Anne’s Road (WSP04). The remaining built heritage assets would be retained and therefore would not be subject to direct physical impacts.

- 2.4.2 A date stone on the buildings along Southtown Road names the row of properties as “Brighton Terrace” and dates their construction as 1873. This date is supported by the historic mapping consulted. The terrace is made up of nine separate “two up to down”-style properties, set back slightly from Southtown Road. The properties on Queen Anne’s Road comprise a terrace of ten separate “two up two down” properties, and appear to belong to a single phase of development.

2.5 Palaeoenvironmental Deposits

- 2.5.1 An assessment of the palaeoenvironmental resource has been undertaken by Wessex Archaeology in 2018 (Ref 2). A total of 48 geotechnical borehole logs were reviewed as part of the borehole review, with the aim of identifying deposits of potential geoarchaeological significance within the Principal Application Site. The stratigraphy of the deposits within the Principal Application Site are summarised in Table 2.1 below.

Table 2.1: Summary of the Stratigraphy of Deposits within the Principal Application Site

Unit Name (Age)	Sediment Characteristics	Depositional History	Geoarchaeological Potential
Modern Alluvium and Made Ground (Modern)	Silt and clay or heterogeneous clay, silt, sand and gravel inc. concrete and brick.	Influenced by human activity post-medieval.	Low (although Made Ground may include near-surface archaeology)

Unit Name (Age)	Sediment Characteristics	Depositional History	Geoarchaeological Potential
North Denes Formation (Holocene)	Sand with subordinate layers of gravel and thin layers of silty clay.	Coastal barrier / spit that has developed from AD 500 to present day.	Low (although may contain archaeology)
Breydon Formation – peat (Holocene)	Peat comprised of partially decomposed organics matter.	Deposited in and around the valleys of the River Yare and associated tributaries during the Holocene under the influence of rising sea level.	High (preservation palaeoenvironmental material likely)
Breydon Formation – alluvium (Holocene)	Silt and clay, occasionally organic rich with shelly marine fauna. Sand is generally subordinate but may be substantial locally.	Deposited in the valleys of the River Yare and associated tributaries during sea-level rise when the area became an estuary with associated saltmarsh and mudflats.	Medium (preservation of palaeoenvironmental material is possible).
Happisburgh Glacigenic Formation – sand and gravel (Anglian)	Sands and gravels.	Glaciofluvial deposits.	Low (landscape not suitable for occupation)
Crag Group - Wroxham Crag Formation (Pleistocene)	Sands interbedded with silt and clay.	Deposited in shallow marine-estuarine setting on the edge of the North Sea Basin.	Low (predates occupation)
London Clay (Eocene)	Silt and clay.	Marine.	Low (predates occupation)

2.5.2 Based on the results of the borehole review and deposit modelling, Breydon Formation deposits interpreted to have high (peat) and medium (alluvium)

geoarchaeological potential, were identified with the Principal Application Site to the west of the River Yare. They are located at elevations between -4 m OD and -6.85 m OD and reach a maximum depth of -10.35 m OD (BH2). In BH2, there are two discrete beds of peat separated by a thin (0.6 m) lens of alluvium. There is potential for these deposits to be impacted during the construction phase of the Scheme, depending on the depth of ground works. This WSI sets out the approach to evaluating the impacts on the palaeoenvironmental deposits.

3 Aims and Objectives

3.1 Aims (below ground archaeology)

3.1.1 The general aims of the archaeological investigative works are:

- To determine the location, extent, date, character, condition, significance and quality of any below ground archaeology in the Principal Application Site;
- To record, as far as reasonably possible, the location, extent, condition, significance and quality of any survival archaeological remains discovered and observed;
- To assess the artefactual and environmental potential of the archaeological deposits encountered;
- To assess the archaeological features in line with relevant research agendas;
- To consider the site within its local, regional and national context as appropriate;
- To inform the scope and nature of any further archaeological work that may be required or the formation of a mitigation strategy or a management strategy;
- To preserve the archaeological evidence contained within the site by record and to attempt a reconstruction of the history and use of the site; and
- To produce a site archive for deposition with an appropriate museum, and to provide information for accession to the Norfolk HER, to ensure the long-term survival of the excavated data.

3.2 Objectives (below ground archaeology)

3.2.1 The objectives of the archaeological investigative works are:

- To undertake a programme of archaeological investigative works before the commencement of construction;
- To record any archaeological remains identified;
- To prepare a report detailing the results of the works;
- To prepare and deposit the site archive to the required standard; and
- To provide sufficient information to inform any further archaeological mitigation required either prior to or during the construction phase.

3.3 Aims (historic buildings)

3.3.1 The general aims of the historic building assessment and recording are:

- To carry out a Level 1 Survey, in accordance with Historic England's 2016 guide, titled 'Understanding Historic Buildings. A Guide to Good Recording Practice' (Ref 3) of the terraced properties on Southtown Road and Queen Anne's Road which will be demolished;
- To determine if additional, more detailed, building recording or monitoring is required prior to or during demolition; and
- To produce a building recording archive for deposition with an appropriate museum, and to provide information for accession to the Norfolk HER, to ensure the long-term survival of the excavated data.

3.4 Objectives (historic buildings)

3.4.1 The objectives of the historic building assessment are to:

- To undertake a Level 1 Survey by undertaking a visual inspection of the properties due for demolition, in accordance to Historic England's 2016 guidance (Ref 3);
- To create a basic documentary record (including simple drawings, photographs and a brief written account);
- To determine if the properties are significant enough to warrant a more detailed Historic Building Survey (Level 2 or Level 3);
- To mitigate the impacts on any built heritage assets located within the Principal Application Site during the construction stage by ensuring they are preserved in record;
- To prepare a report detailing the results of the works; and
- To prepare and deposit the site archive to the required standard.

3.5 Aims (palaeoenvironmental assessment)

3.5.1 The general aims of the palaeoenvironmental assessment are:

- To clarify in more detail the extent, depth, date and value of palaeoenvironmental deposits to the west of the River Yare;
- To establish the potential for the preservation of any artefacts or ecofacts associated with past human activity;
- To assess potential impacts of the development on the palaeoenvironmental resource;

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- To inform the scope and nature of any further palaeoenvironmental work that may be required or the formation of a mitigation strategy or a management strategy;
 - To assess the palaeoenvironmental remains in line with relevant research agendas; and
 - To consider the palaeoenvironmental remains within the Principal Application Site within the local, regional and national context as appropriate.
 - To produce a site archive for deposition with an appropriate museum, and to provide information for accession to the Norfolk HER, to ensure the long-term survival of the data.

3.6 Objectives (palaeoenvironmental assessment)

3.6.1 The objectives of the palaeoenvironmental assessment are:

- To undertake the removal of additional borehole samples from the west side of the River Yare. As a minimum, this would comprise a single borehole to a maximum depth of 15m in close proximity to BH2, in order to capture the most extensive sequence of deposits (the position of this, and any other proposed boreholes, would need to be reviewed against other environmental constraints identified in the ES, such as the assessment for groundwater pollution pathway risks);
- To undertake laboratory analysis of the samples to a level sufficient to enable the value of the palaeoenvironmental material surviving within the cores to be identified;
- To undertake a full analysis of pollen, diatoms and/or foraminifera, including scientific dating (e.g. radiocarbon or Optically Stimulated Luminescence (OSL));
- To mitigate the impacts on any palaeoenvironmental remains within the Principal Application Site during the construction stage by ensuring they are preserved in record;
- To prepare a report detailing the results of the works; and
- To prepare and deposit the site archive to the required standard.

4 Methodology

4.1 General Requirements

4.1.1 The post-consent archaeological investigative works will be undertaken by a suitably qualified archaeological contractor. The contractor will be a Registered Organisation (RO) with the Chartered Institute for Archaeologists (CIfA). The work will be undertaken in adherence to the following guidance and standards:

- Historic England's 'Understanding Historic Buildings. A Guide to Good Recording Practice' (Ref. 3);
- Norfolk County Council Environment Service's Standards for Development-Led Archaeological Projects in Norfolk (Ref. 4)
- CIfA's 'Code of Conduct and the Standards' (Ref. 5);
- CIfA's 'Standard and Guidance for Archaeological Field Evaluation' (Ref. 6);
- CIfA's 'Standard and Guidance for the Archaeological investigation and recording of standing buildings or structures' (Ref. 7); and
- English Heritage's [now Historic England] 'Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record' (Ref. 8).

4.2 Historic Building Assessment and Recording

4.2.1 The historic building assessment and recording will be undertaken prior to the commencement of the main phase of construction and before demolition.

4.2.2 The archaeological contractor will prepare a Method Statement for the Historic Building Assessment. As a minimum, it will adhere to the Historic England's 2016 guidance for a Level 1 survey (Ref. 3), which comprises a basic visual record, supplemented by the minimum of information needed to identify the building's location, age and type. The work will consist of a drawing, photography and a written account of each of the properties.

4.2.3 The work will adhere to NCC's 2018 standards (Ref. 4) and the scope of the assessment and any subsequent historic building recording or archaeological monitoring required prior to or during demolition will be agreed with NCCHT.

4.3 Archaeological Investigative Works

- 4.3.1 The archaeological investigative works will be undertaken post-consent and prior to the commencement of the main phase of construction. It may be necessary, however, for the investigative works to be undertaken following the demolition and clearance of the Principal Application Site.
- 4.3.2 The archaeological contractor will prepare a Method Statement for the archaeological investigative works in the areas of potential impact within the Principal Application Site, taking into consideration the presence of any on-site constraints (drains, utilities, etc). The Method Statement will adhere to NCC Standards for Development- Led Archaeological Projects (Ref. 4) and will include details of trench locations, the archaeological contractor's excavation and recording methodologies, finds and environmental processing methodologies, archiving, reporting and dissemination, staff to be involved in the project, the proposed programme, contingencies and details of any specialists. The Method Statement for archaeological investigative works will be submitted to NCCHT for comment and approval prior to work commencing.

4.4 Palaeoenvironmental Assessment

- 4.4.1 The palaeoenvironmental assessment will be undertaken prior to the commencement of the main phase of construction. It may be necessary, however, for the investigative works to be undertaken following the demolition and clearance of the Principal Application Site.
- 4.4.2 The palaeoenvironmental assessment will comprise a dedicated geoarchaeological borehole survey in order to recover undisturbed core samples from the Breydon Formation deposits. Drilling a single borehole to a maximum depth of 15m in close proximity to a borehole sample previously extracted during the Ground Investigation (GI) works (BH2) is considered adequate to capture the most extensive sequence of deposits. The sample will then be subject to analysis, to a level sufficient to enable the value of the palaeoenvironmental material surviving within the cores to be identified. This may include some scientific dating (e.g. radiocarbon or OSL) to provide chronological context.
- 4.4.3 The archaeological contractor will prepare a Method Statement for the paleoenvironmental assessment. The Method Statement will adhere to NCC Standards for Development- Led Archaeological Projects (Ref. 4) and will include the location(s) of the boreholes, the archaeological contractor's excavation and recording methodologies in the field, the methodology for the laboratory analysis, the approach to updating the deposit model, archiving, reporting and dissemination, staff to be involved in the project, the proposed programme, contingencies and details of any specialists. The Method

Statement for palaeoenvironmental will be submitted to NCCHT for comment and approval prior to work commencing.

4.5 Mitigation

4.5.1 The scale and scope of any mitigation required prior to, or during the construction will be determined following the completion of the archaeological investigative works, palaeoenvironmental assessment and historic building assessment. The programme for mitigation set out in a subsequent WSI and Method Statement, to be agreed with NCCHT.

4.6 Mechanical Excavation

4.6.1 Prior to the start of any archaeological works the location of the agreed trial trenches will be laid out accurately, in relation to the OS National Grid. The position of the areas will be scanned for any live services using a cable avoidance tool, as works progress they will be rescanned.

4.6.2 There is the potential for trenches to be located in areas of hardstanding (concrete, tarmac etc). If this is the case, then the archaeological contractor will be responsible for the hire of a breaker.

4.6.3 The trenches will be opened by a suitable mechanical excavator using a toothless ditching bucket operating under archaeological supervision. Excavation will cease at either the surface of the natural geology or at the first archaeological horizon. Excavated material will be stored at least 1m from the trench edge. Where required, topsoil, subsoil and other deposits will be kept separate.

4.6.4 Excavations will extend to a safe depth and will not exceed a total depth of 1.2m. Where excavations are required to extend beyond a safe depth, the trenches will be stepped. Fencing will be used to demark the location of deep excavations.

4.7 Hand Excavation

4.7.1 All archaeological deposits, features and finds will be recorded according to accepted professional standards (see references section), NCC's Standards for Development- Led Archaeological Projects (Ref. 4) and in line with the archaeological contractor's established recording systems.

4.7.2 A site diary, comprising a description and discussion of the archaeology, is to be maintained on a daily basis.

4.7.3 All survey will be completed relative to OS National Grid in 3D at a resolution sufficient to fulfil the requirements of reporting.

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- 4.7.4 All features (subject to access constraints) shall be recorded in plan at least 1:20 scale and in section at least 1:10 scale. All site drawings will be completed on plastic drafting film.
 - 4.7.5 A 'Harris Matrix' stratification diagram will be used to record all stratigraphic relationships. Spot dating should be incorporated where applicable.
 - 4.7.6 A photographic record of the work shall be made and incorporated into the site archive. This will consist of high quality, colour digital photographs taken in approved formats as directed by the digital archive policies of the relevant archive repository.

4.8 Artefacts

- 4.8.1 Any artefacts recovered will be treated in accordance to accepted professional standards.
- 4.8.2 Any artefacts that fall under the statutory definition of Treasure (as defined by the Treasure Act of 1996 and its revision of 2002) will be reported immediately to the relevant Coroner's Office and Finds Liaison Officer (FLO), the landowner and the NCCHT. A Treasure receipt must be completed and a report submitted to the Coroner's Office and the FLO within 14 days of understanding the find is Treasure. Failure to report within 14 days is a criminal offence.
- 4.8.3 Artefacts will be carefully recovered by hand and initial conservation and storage will follow First Aid for Finds (Ref 9). Bulk artefacts will be collected and bagged according to their archaeological context. The location of registered finds, including in-situ worked flint will be recorded three dimensionally. If necessary, an appropriately qualified and experienced archaeological conservator will be appointed to advise and assist in the lifting of fragile finds of significance and or value and to arrange for the X-raying and investigative conservation of objects as may be necessary.
- 4.8.4 All pottery, bone and worked flint will be washed and then marked in accordance with the archive depository guidelines to identify the site and context. Most building material and burnt flint (not including significant diagnostic material) will be identified, counted, weighed and discarded. Samples will be retained as appropriate. The finds identification and specialist work will be undertaken by specialists agreed with the NCCHT and will use relevant county or region-specific type series, where available.
- 4.8.5 Records of artefact assemblages will clearly state how they were recovered, sub-sampled and processed. Sub-sampling procedures will be agreed with the NCCHT and follow the guidance and advice of the depository in which the site archive will be deposited.

4.8.6 All artefacts will be suitably packed in accordance with the United Kingdom Institute for Conservation, Conservation Guidelines No.2 (Ref 10), and ClfA's 'Standard and guidance for the collection, documentation, conservation and research of archaeological materials' (Ref 11).

4.8.7 Consideration should be given for donation of appropriate artefacts to type series reference collections.

4.9 Environmental (archaeological investigative works)

4.9.1 Bulk environmental soil samples for the recovery of plant macro fossils, wood charcoal, small animal bones, small artefacts and industrial residue will be taken as appropriate from well-sealed and dateable contexts or features. The samples will be of an appropriate size (e.g. 40 - 60 litres for charred material, 10 - 30 litres for waterlogged deposits) in accordance with Historic England's guidelines (Ref 12).

4.9.2 The archaeological contractor will arrange for bulk environmental soil samples to be processed by standard flotation methods and scanned to assess the environmental potential of deposits. Full assessment will only be undertaken following consultation with the NCCHT. The flot will be retained on a 0.25/0.5mm mesh, with residues fractionated into 5.6/4mm, 2mm, 1mm and 0.5mm and dried as appropriate. Coarse fraction (>5.6/4mm) will be sorted, weighed and discarded, with any finds recovered given to the appropriate specialist. Finer residues will be retained until after analysis.

4.9.3 If waterlogged deposits are encountered, an appropriate environmental sampling strategy will be devised and agreed with the NCCHT as appropriate. These samples would then be processed by standard waterlogged flotation / wet sieving methods.

4.9.4 Monolith and/or contiguous column samples will be taken where appropriate for the recovery of molluscs and to consider sub-sampling for pollen and/or diatom assessment, and for consideration of soil micromorphological and soil chemical analyses. Appropriate specialist advice will be sought where needed.

4.9.5 Samples may be taken and sieved to aid in artefact recovery. Any artefacts recovered will be assessed and processed following the procedure set out above. For inhumations and cremation related deposits, the burial deposit will be sampled and processed following the specialist guidelines.

4.10 Human Remains

4.10.1 Human remains are not expected to be present on the site but if they are found they will, if possible, be addressed in line with the relevant article in the DCO.

4.11 Health and Safety

4.11.1 All relevant health and safety regulations and codes of practice will be respected. The archaeological contractor will provide a Health and Safety Statement prior to the commencement of the archaeological investigation. All site procedures will be carried out in accordance with the guidance set out in the Health and Safety Manual compiled by the Federation of Archaeological Employers and Managers (FAME) and in accordance with current legislation which includes:

- The Health and Safety at Work Act (1974);
- Management of Health and Safety at Work Regulations (1999);
- The Construction (Design and Management) Regulations (2015);
- The Control of Asbestos Regulations (2006);
- Construction (Health, Safety and Welfare) Regulations (1996);
- The Health and Safety (Miscellaneous Amendments) Regulations (2002);
- The Control of Substances Hazardous to Health Regulations (2002);
- The Health and Safety (First-Aid) Regulations (1981);
- The Regulatory Reform (Fire Safety) Order (2005);
- The Provision and Use of Work Equipment Regulations (1998); and
- Lifting Operations and Lifting Equipment Regulations (1998).

4.11.2 Prior to the start of the archaeological investigation, risk and method statements will be produced and submitted to the Client and/or Contractor. All staff involved or associated with the investigation will be provided with copies of the documents prior to the beginning of the works and they will be required to read them before commencing construction works.

4.11.3 The archaeological contractor will be responsible for the safeguarding of its staff, as far as reasonably practicable, and others who may be affected by the works on site.

4.11.4 Personal Protective Equipment (PPE) will be worn by all staff as appropriate.

4.12 Working Conditions

- 4.12.1 The Scheme will be monitored, on behalf of the client, by an archaeological contractor who will liaise with the Local Planning Authority. The monitoring will ensure that the works are conducted within the limits as set out by the agreed WSI, and to the satisfaction of the Local Planning Authority.
- 4.12.2 It is anticipated that there will be regular progress meetings and access to the Principal Application Site will be granted to representatives of the NCCHT who may wish to inspect the Principal Application Site.
- 4.12.3 It is not normal practice for the archaeological contractor to be asked to work evenings, weekends, bank holidays and any requests for work during this time will require a contract variation to cover additional costs.
- 4.12.4 If there are more complex or deeper deposits than anticipated from the current evidence available there may need to be a review of working conditions and the approach to the work.

5 Reporting

5.1 General Requirements

- 5.1.1 A report on the fieldwork, analysis and archive will be completed and will adhere to NCC Standards for Development- Led Archaeological Projects (Ref. 4) and ClfA guidance (Ref. 6). Its conclusions will include a clear statement of the archaeological value of the results, and their significance. The results will be related to the relevant known archaeological information held by the NHER.
- 5.1.2 The report may include an opinion as to the necessity and scope of further archaeological work (including archaeological monitoring or historic building recording), although the final decision regarding any further work will be determined following consultation with the NCCHT.
- 5.1.3 The draft report will be submitted by the archaeological contractor to the NCCHT for approval. After approval of the report, a single hard copy and a digital copy will be presented to the HCCHT.

5.2 Report Content

- 5.2.1 The report will include, as a minimum:
- A summary sheet providing the following information:
 - Name and grid reference;
 - Site activity (i.e. type of investigation);
 - Date and duration;
 - Contractor site code;
 - Area of site;
 - Summary of results;
 - Monuments identified; and
 - Location and reference of archive.
 - And the following main sections, as appropriate to results:
 - Summary;
 - Location;
 - Methodology;
 - Description of results (including stratigraphic description, if necessary);

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- Interpretation of the results in the appropriate context;
 - Summary of the archaeological potential of the site and its immediate surrounding area;
 - Consideration of the significance of the findings on a local, regional and national basis;
 - Critical review of the effectiveness of the methodology;
 - References;
 - Appropriate photographs in colour;
 - Location Plan (no smaller than 1:10,000);
 - Site layout plans on an OS base, with north point and scale with the location of trial pits / trenches;
 - Plans and sections of significant archaeological remains, as necessary, including Cardinal Points, Ordnance Datum, vertical and horizontal scales;
 - Site matrices (where appropriate);
 - Specialist descriptions of artefacts and ecofacts as required;
 - Summary of the contents of the project archive and its location (including summary catalogues of finds);
 - Photographic Register; and
 - Copy of the OASIS record form.

5.3 Dissemination

- 5.3.1 If the archaeological works discover significant archaeological remains the archaeological contractor will prepare a summary report for wider dissemination. This could be in the form of short note in a local archaeological journal or a larger contribution / monograph where appropriate.

6 Archive

6.1 General Requirements

- 6.1.1 All recovered artefacts are the property of the Landowner. The archaeological contractor will contact the landowner(s) to commence the transfer title of artefacts so that the archive, including all artefacts, can be deposited with an appropriate museum (usually Norfolk Museums Service).
- 6.1.2 The archive will be assembled in accordance with the appropriate museum's guidelines and in accordance with the recommendations in the 'Standards in the Museum Care of Archaeological Collections' (Ref. 10), the 'Guidelines for the Preparation of Excavation Archives for Long-term Storage' (Ref. 12), MoRPHE (Ref. 13), NCC's Standard (Ref. 4) and relevant ClfA standards and guidance (Refs 6 and 11).
- 6.1.3 The archive will contain all the data collected during the fieldwork, including records and finds, and all reports. The archaeological contractor will ensure that the archive is quantified, ordered, indexed and internally consistent, and adequate resources will be provided to ensure that all records are checked. Archive consolidation will be undertaken immediately following the conclusion of fieldwork.
- 6.1.4 The archaeological contractor will contact the appropriate museum (usually Norfolk Museums Service) to determine costs and accession arrangements for the archive prior to deposition.
- 6.1.5 The archaeological contractor will ensure that the archaeological monitoring is recorded on the OASIS database. All parts of the OASIS online form (Ref 14) will be completed and a copy will be included in the final report and also with the site archive. A digital copy of the approved report will be uploaded to the OASIS website.

7 Operational Factors

7.1 Project Timetable and Monitoring Arrangements

- 7.1.1 The programme of works, recording and access will be agreed by NCCHT, the Client, Contractor, and the archaeological contractor before the project commences.
- 7.1.2 The Client will be kept informed of progress by the archaeological contractor to allow for any monitoring visits by the NCCHT to be conducted during the course of the fieldwork.
- 7.1.3 The archaeological monitoring will be undertaken in accordance with the Contractor's schedule.

7.2 Insurance

- 7.2.1 Full details of the insurance and copies of certificates covering the archaeological contractor shall be supplied upon request.

7.3 Team

- 7.3.1 The work will be undertaken by a Contractor who is a Registered Organisation with the ClfA or by a contractor who will agree to abide by the standards and guidance documents of ClfA.
- 7.3.2 Details of the team and specialist staff including post-excavation specialists will be provided once the archaeological contractor has been appointed. CVs of the key members of staff will be available upon request.

7.4 Copyright

- 7.4.1 Copyright will remain with the archaeological contractor under the Copyright, Designs and Patents Act 1988 with all rights reserved. An exclusive licence will be provided to the client, or their appointed representative, for use of all records and reports in all matters directly relating to the Scheme. The archaeological contractor retains the right to be identified as the author of all documentation and reports.

8 References

Ref 1: WSP (2018). Great Yarmouth Third River Crossing, Historic Environment Desk-Based Assessment Unpublished.

Ref 2: Wessex Archaeology (2018). Great Yarmouth Third River Crossing Borehole Log Review and Deposit Modelling Report.

Ref 3: Historic England (2016). Understanding Historic Buildings. A Guide to Good Recording Practice.

Ref 4. Norfolk County Council Environmental Service (2018) Standards for Development-Led Archaeological Projects in Norfolk

Ref 5: ClfA (2014). Code of Conduct and the Standards.

Ref 6: ClfA (2014) Standards and Guidance for Archaeological Evaluation.

Ref 7: ClfA 2014 Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures.

Ref 8: English Heritage [now Historic England] (2015). Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record.

Ref 9: Watkinson D and Neal V (1998). First Aid for Finds: Practical Guide for Archaeologists, United Kingdom Institute for Conservation of Historic & Artistic Works.

Ref 10: United Kingdom Institute for Conservation (1990) Guidelines for the Preparation of Excavation Archives for Long-term Storage.

Ref 11: ClfA (2014) Standard and guidance for the collection, documentation, conservation and research of archaeological materials.

Ref 12: Historic England (2011) Environmental Archaeology: A Guide to the Theory and Practice of Methods from Sampling and Recovery to Post Excavation.

Ref 13: Historic England (2015) MoRPHE (Management of Research Projects in the Historic Environment).

Ref 14: OASIS (online).