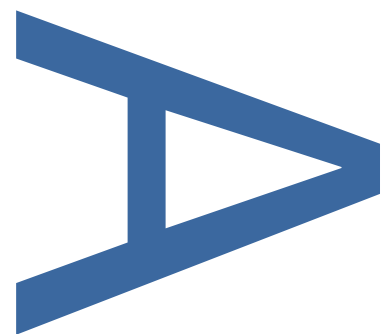
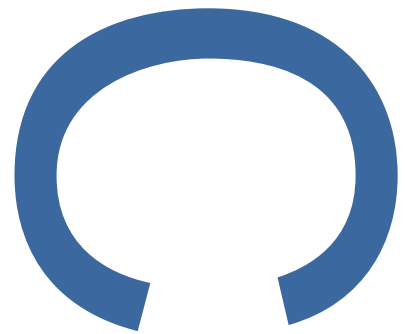


**NAGS HEAD LANE CAR PARK,
WELLING, LONDON BOROUGH OF
BEXLEY**

**AN ARCHAEOLOGICAL WATCHING
BRIEF ON GEOTECHNICAL SITE
INVESTIGATION**

SITE CODE: NHL18

MAY 2018



PRE-CONSTRUCT ARCHAEOLOGY

DOCUMENT VERIFICATION

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NAGS HEAD LAND CAR PARK, WELLING, LONDON BOROUGH OF BEXLEY
AN ARCHAEOLOGICAL WATCHING BRIEF ON GEOTECHNICAL SITE
INVESTIGATION

SITE CODE: NHL18

NATIONAL GRID REFERENCE: TQ 46808 75886

LOCAL PLANNING AUTHORITY: LONDON BOROUGH OF BEXLEY

PLANNING APPLICATION NUMBER: 17/03108/FULM

COMMISSIONING CLIENT: ARCADIS CONSULTING (UK) LIMITED

WRITTEN AND RESEARCHED BY: TANYA JONES, PCA

PROJECT MANAGER: ZBIGNIEW POZORSKI ACIFA, PCA

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MAY 2018

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1 ABSTRACT

- 1.1 This report presents the results of an archaeological monitoring of geotechnical investigations conducted by Pre-Construct Archaeology Limited at Nags Head Lane Car Park, Welling, London. The site is located within the London Borough of Bexley and is centred at National Grid Reference TQ 46808 75886.
- 1.2 Following the Written Scheme of Investigation prepared by Pre-Construct Archaeology Limited (Pozorski 2018), archaeological monitoring was conducted between the 9th and 11th April 2018 prior to the construction works related to a new residential development on the site (London Borough of Bexley Planning Ref. 17/03108/FULM). The work comprised monitoring of a geotechnical site investigation.
- 1.3 Two cable percussive boreholes and four windowless sample boreholes were executed on the site and hand excavated inspection pits were to be carried out in the locations of the boreholes. The pits were abandoned by the contractor due to sufficient geotechnical information from the boreholes and sample boreholes.
- 1.4 The site appears to contain significant amounts of made ground consisting mainly of the gravels with the late 19th and 20th century building materials. No sign of any sealed or trapped occupation layers of earlier periods below made ground layers was found.

2 INTRODUCTION

- 2.1 Pre-Construct Archaeology Limited (PCA) has undertaken an archaeological watching brief on geotechnical site investigation at Nags Head Lane Car Park, Welling, London (Figures 1 - 2). The boreholes were located within the site which is occupied by a public car park, centred at National Grid Reference TQ 46808 75886. The project was designed and managed by Zbigniew Pozorski (PCA) and was commissioned by Arcadis Consulting (UK). The archaeological work was conducted between the 9th and 11th April 2018 and was supervised by Tanya Jones of PCA.
- 2.2 Planning permission has been sought for the for the erection of a three-storey building to provide 25 residential units comprising 14 x 1 bed, 10 x 2 bed, 1 x 3 bed flats together with car parking, pedestrian public route through, landscaping and other associated works (London Borough of Bexley Planning Ref. 17/03108/FULM).
- 2.3 The archaeological watching brief programme for the geotechnical site investigation was proposed by Arcadis Consulting (UK) Ltd to better understand site conditions and inform the nature of future archaeological works required by the recommended planning condition. PCA has been instructed by James Goad of Arcadis Consulting (UK) Ltd to follow the agreed scope of works in relation to the geotechnical boreholes and test pits which comprised the monitoring of 4 geotechnical test pits in the locations of boreholes excavated by the geotechnical contractor on the site.
- 2.4 The site lies within two areas of high archaeological potential as designated by Bexley Council in the Unitary Development Plan (UDP) 2004: AHAP10 which is based around the areas of significant archaeological potential relating to the Roman settlement of Welling and AHAP9 which follows the route of the Roman road (Watling Street) matching today's Welling High Street.
- 2.5 In 2017 Arcadis Consulting (UK) Ltd have prepared a desk-based assessment for the site (Latham 2017). It concluded that there is a high potential for evidence of Roman activity on the site, related to the Roman Welling and Watling Street. There is also a low to medium potential for medieval remains.
- 2.6 The primary objective was to mitigate any archaeological impacts during the geotechnical investigation. The monitoring was also designed to determine the presence or absence of surviving deposits and features at the site and, if present, to investigate and record them. The investigation will also seek to clarify the nature and extent of existing disturbance and intrusions and hence assess the degree of archaeological survival. The research questions for the project were as follows:
- Are there Roman remains present on the site and can they be associated with the Roman settlement and the road?
 - Are medieval and post-medieval remains present, in particular those of ponds pictured on historic maps?
 - Are there any other archaeological remains present?

2.7 All works were undertaken in accordance with the following documents:

- The Written Scheme of Investigation for this project (Pozorski 2018)
- Historic England Greater London Archaeology Advisory Service: *Standards for Archaeological Work* (HE GLAAS 2015)
- *'Standard and guidance for an archaeological watching brief'* (Chartered Institute for Archaeologists ClfA 2014).
- *Management of Research Projects in the Historic Environment* (MoRPHE) Historic England 2016)

3 PLANNING BACKGROUND

3.1 National Guidance: National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF) was adopted on 27th March 2012, and now supersedes the Planning Policy Statements (PPSs). The NPPF constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications. Chapter 12 of the NPPF concerns the conservation and enhancement of the historic environment.

3.1.2 In considering any proposal for development, including allocations in emerging development plans, the local planning authority will be mindful of the policy framework set by government guidance, existing development plan policy and of other material considerations.

3.2 Regional Guidance: The London Plan

3.2.1 Additional relevant planning strategy framework is provided by The London Plan, published January 2011. It includes the following policy of relevance to archaeology within central London:

Historic environments and landscapes

POLICY 7.8 HERITAGE ASSETS AND ARCHAEOLOGY

Strategic

A London's heritage assets and historical environment, including listed buildings, registered historic parks and gardens and other natural and historic landscapes, conservation areas, World Heritage Sites, registered battlefields, scheduled monuments, archaeological remains and memorials should be identified, so that the desirability of sustaining and enhancing their significance and utilising their positive role in place shaping can be taken into account.

B Development should incorporate measures that identify, record, interpret, protect and, where appropriate, present the site's archaeology.

Planning decision

C Development should identify, value, conserve, restore, re-use and incorporate heritage assets, where appropriate.

- D Development affecting heritage assets and their setting should conserve their significance, by being sympathetic to their form, scale, materials and architectural detail.
- E New development should make provision for the protection of archaeological resources, landscapes and significant memorials. The physical assets should, where possible, be made available to the public on-site. Where the archaeological assets or memorial cannot be preserved or managed on-site, provision must be made for the investigation, understanding, recording, dissemination and archiving of that assets.

LDF preparation

- F Boroughs should, in LDF policies, seek to maintain and enhance the contribution of built, landscaped and buried heritage to London's environmental quality, cultural identity and economy as part of managing London's ability to accommodate change and regeneration.
- G Boroughs, in consultation with English Heritage, Natural England and other relevant statutory organizations, should include appropriate policies in their LDFs for identifying, protecting, enhancing and improving access to the historic environment and heritage assets and their setting where appropriate, and to archaeological assets, memorials and historic and natural landscape character within their area.

3.3 Local Policy: Bexley Core Strategy

- 3.3.1 The Bexley Core Strategy was formally adopted on 22nd February 2012. The relevant policy is found within Chapter 4, 'Managing the built and natural environment.'

Policy CS19: Heritage and archaeology

The Council will manage its heritage and archaeological assets, whilst seeking opportunities to make the most of these assets, including adapting to and mitigating the effects of climate change. This will enhance the local sense of place and underpin the revitalisation and development of the borough, including promoting the visitor economy. This will be achieved by:

- a) promoting the borough's heritage assets, such as Danson Mansion, Hall Place and Gardens, Crossness Beam Engine House and Red House;*
- b) reviewing the status of existing and identifying new heritage and archaeological assets;*
- c) conserving and enhancing the significance of heritage assets, their setting, and the wider historic environment, including statutorily listed buildings; locally listed buildings of architectural or historic interest, conservation areas, registered parks and gardens, and archaeological sites;*
- d) protecting heritage assets from development that is likely to adversely impact on the significance, integrity, character or appearance of an asset or its setting;*
- e) supporting historic restoration schemes through partnership working and seeking funding to enhance heritage and archaeological assets in an appropriate and sympathetic manner; and*
- f) retaining, in situ, archaeological evidence within sites, wherever possible.*

Where archaeological evidence cannot be retained, the appropriate levels of archaeological investigation and recording should be undertaken prior to the redevelopment of the site.

3.4 Site Specific Background

- 3.4.1 Planning permission has been sought for the erection of a three-storey building to provide 25 residential units comprising 14 x 1 bed, 10 x 2 bed, 1 x 3 bed flats together with car parking, pedestrian public route through, landscaping and other associated works (LB Bexley Planning Ref. 17/03108/FULM).
- 3.4.2 The site lies within two areas of high archaeological potential as designed by Bexley Council in the Unitary Development Plan (UDP) 2004: AHAP10 which is based around the areas of significant archaeological potential relating to the Roman settlement of Welling and AHAP9 which follows the route of the Roman road (Watling Street) matching today's Welling High Street.

4 SITE BACKGROUND

4.1 Geology and Topography

- 4.1.1 According to the British Geological Survey (BGS) of England and Wales (Sheet 270, South London), the local solid geology consists of sand and gravel of the Harwich Formation. The site has no superficial geology.
- 4.1.2 The area of the site lies at c.45m OD. The site is located c. 5.1km south of the River Thames.
- 4.1.3 The site is bounded to the west by Nags Head Lane, to the north by brick walls and a metal fence which mark the rear of the properties of Orchard Road. To the east is a metal fence and Bulls Alley, to the south is more metal fencing, the rear of the Nags Head (public house) car park and the rear of an industrial property (Figures 1 & 2).
- 4.1.4 The current land use for the site is a ground level car park with access and egress onto Nags Head Lane. The car park, known as Nags Head Lane Car Park, has the capacity for 76 cars.

4.2 Archaeological and Historical Background

The following background is drawn from a detailed desk-based assessment prepared for the site by Arcadis Consulting (UK) Ltd (Latham 2017). In summary:

- 4.2.1 The site lies within two areas of high archaeological potential as designated by Bexley Council in the Unitary Development Plan (UDP) 2004: AHAP10 which is based around the areas of significant archaeological potential relating to the Roman settlement of Welling and AHAP19 which follows the route of the Roman road (Watling Street) matching today's Welling High Street.

- 4.2.2 The Roman settlement of Welling as well as Watling Street are considered to be of local and regional significance. The Roman settlement of Welling, which also includes funerary remains, straddles the Roman road of Watling Street (AHAP9, now known as A207 Welling High Street). The estimated location for the settlement is between Welling High Street, Upper Wickham Road, Welling Sports Ground (south of Welling High Street) and Warwick Road. The extent of the settlement is unknown due to the urbanisation of Welling and lack of archaeological investigations. Excavations to the south-west of the site have revealed a thriving settlement dated to the 1st and 2nd century AD. The Roman road known as Watling Street (now A207 Welling High Street) connects Shooters Hill to Dover.
- 4.2.3 Works c. 125m to the south-west and south of the site revealed roadside structures, ditches, pits and cremation burials. The cremations consisted of urns, cremated bone, charcoal and objects identified as votive offerings. Further cremations were found c. 250m to the south-east. Road side ditches were also recorded in various locations along the Watling Street. The wider area to the south-west, south and south-east contained several Roman findings.
- 4.2.4 The medieval evidence is very limited, but the proximity of the road suggests some potential for remains of that date. Post-medieval linear features have been found in the area and the Nags Head PH has 18th century origins. The site is partially located within PH's site and according to historic maps at least two ponds were located to the far back of the property within the current car park site.
- 4.2.5 The site has a high potential for Roman and low to medium potential for medieval archaeological remains to be present.
- 4.2.6 In a conclusion it was assessed that an archaeological watching brief on geotechnical borehole and test pit survey should be carried out to better understand depths and levels of preservation, the results of such a survey can then be used to inform the nature of future archaeological works.

5 ARCHAEOLOGICAL METHODOLOGY

- 5.1 The geotechnical site investigation required the execution of two cable percussive boreholes and four windowless sample bore holes on the site followed by four hand excavated inspection pits in the locations of the boreholes (Figure 2). Due to the site conditions (made ground depths) the test pits were abandoned by the geotechnical contractor during the fieldwork.
- 5.2 In accordance with the Written Scheme of Investigation (Pozorski 2018), all elements of the proposed works were excavated by the geotechnical contractor appointed by Arcadis Consulting (UK) Ltd under archaeological supervision. Due to the significant amount of made ground revealed in two boreholes, test pits of any meaningful size were abandoned and four interventions of borehole-size (c.200mm in diameter) to obtain window samples only were carried out. Those were excavated using a geotechnical drilling rig and by hand and were monitored.

- 5.3 During the insertion of the pits/boreholes themselves, the attending archaeologist monitored excavation through all deposits to the level of the geological sub-strata. Records were made onto pro-forma borehole recording sheets. A full digital photographic record of the watching brief was compiled.
- 5.4 The excavations were located to site engineering plans provided by the client which were overlaid in CAD to the Ordnance Survey base map. Levels were derived from engineering spot heights established by the client using a GPS system.
- 5.5 All recording systems adopted during the investigations were fully compatible with those developed out of the Department of Urban Archaeology Site Manual and presented in PCA's Operations Manual (Taylor 2009).

6 RESULTS OF THE INVESTIGATION

6.1 Window Sample 1

- 6.1.1 WS 1 was located in the north-west corner of the site c. 8m south of the northern and 1.50m of the western boundaries of the site. It was c.0.20m in diameter and excavated to a depth of 2.25m below existing ground level (bgl).
- 6.1.2 The lowest layer encountered was a natural light brown sandy gravel [5] identified as the one of belonging to the Harwich Formation. It was present at 1.70m bgl. Above was a layer of made ground [4] consisting of a loose light brown sand and gravel with CBM fragments. The layer was 0.50m thick and it was capped by [3], a relatively thin (0.10m) layer of a light brown sandy gravel with fragments of glass and CBM. [2], a thick (0.70m) layer of dark brown sandy gravel with CBM fragments, glass and debris was present above. This was sealed by brick stones [1] (0.15m thick) and tarmac with underlying gravel (0.25m thick), a contemporary surface of the car park.

6.2 Window Sample 2

- 6.2.1 WS 2 was located in the west/central part of the site. It was c.0.20m in diameter and excavated to a depth of 3.15m.
- 6.2.2 Only one thick (1.80m) deposit of made ground [6] was present below the tarmac and stones at the top of the sequence (0.40m thick in total) and natural gravel and sand [5]. The made ground consisted of loose to medium dense dark brown sandy gravel with CBM and glass fragments. The natural [5] was encountered at 2.20m bgl.

6.3 Window Sample 3

- 6.3.1 WS 3 was located in the eastern/central part of the site. It was c.0.20m in diameter and excavated to a depth of 2.15m.

6.3.2 The natural sandy gravel [5] was present at 1.40m bgl. Above it was [8], a layer of made ground consisting of dense dark brown sandy gravel with sand and flint. The layer was 0.20m thick and it was overlay by [7], a light brown sandy gravel with CBM fragments (0.95m thick). The uppermost deposit was modern tarmac with underlying gravel (0.25m thick).

6.4 Window Sample 4

6.4.1 WS 4 was located in the south-west corner of the car park. It was c.0.20m in diameter and excavated to 2.25m in depth.

6.4.2 The sample exhibited the same sequence to WS 3 with an addition of made ground [2] (0.42m thick) below the tarmac/gravel (0.25m thick). The natural gravel [5] was encountered at 1.60m bgl with made ground [8] above 0.40m thick and [7]: 0.53m thick.

6.5 Borehole 1

6.5.1 The borehole was located close to the northern boundary of the site. It was c.0.20m in diameter and excavated to 12.43m bgl.

6.5.2 Superficial deposits present within the borehole proved to be similar to those known from the window samples, comprised of made ground over natural gravel. The made ground [9] (0.80m thick) consisting of black sand and gravel with CBM fragments overlay layer [10] which was a 1.00m thick deposit of loose light brown gravelly silt with pockets of peat and silt and with CBM fragments. The natural gravel [5] was present at 2.00m bgl.

6.6 Borehole 2

6.6.1 Borehole 2 was located in the south-west corner of the site. It was c.0.20m in diameter and excavated to 9.50m bgl.

6.6.2 The tarmac and grave of the car park surface (0.20m thick) overlay layer of brick stones (1) which was 0.20m thick. The made ground [11] consisted of dense black and brownish orange clayey sandy gravel and it was 1.00m thick. It overlay other natural deposits of gravel [5] encountered at 1.40m bgl.

6.7 The archaeological sequence and phase discussion

6.7.1 Phase 1: Natural deposits

The earliest deposit encountered was natural dense to medium dense, light brown and dark grey, slightly silty sandy gravel and sand and it was attributed to the Harwich Formation. This was recorded between 1.40 and 2.20m bgl across the site. Lower natural deposits of gravel were also reported in Boreholes 1 and 2.

6.7.2 Phase 2: 19th – mid 20th century

Deposits of made ground [3], [4], [6], [8], [10] and [11] consisted of sandy gravel and silt with CBM fragments. The made ground of this phase was between 0.20m and 0.93m thick.

6.7.3 Phase 3: Modern (later 20th century)

The contemporary car park surface consisting of tarmac was present across the entire yard and was c. 0.20m thick. In the north western part of the site it overlay possible earlier surface [1] which comprised brick pavement stones (0.15m thick). Below and in some places directly beneath the tarmac, were layers of made ground comprising gravel with CBM fragments [2], [7], [9]. The modern made ground was between 0.95 and 1.20m thick.

6.8 Conclusions

6.8.1 The four window samples and two boreholes revealed a similar sequence of below-ground made ground layers. The modern 20th century tarmac surface sealed earlier but also modern surface [1] made of brick stones covering the western and southern areas of the site. Layers of 20th century made ground were present below.

6.8.2 Lower made ground seemed to contain materials which could assigned to earlier 19th/20th century activity and did possess a degree of occupation material within it, mainly building materials. Deposits of this made ground may have been associated with levelling the site and this may have been related to infilling of the ponds which are known to have existed to the north/north-east and within the site.

6.8.3 The examination of the samples and data from the boreholes suggest no sign of any sealed or trapped occupation layers of earlier periods below made ground layers and above the natural gravel [5].

6.8.4 The level of modern truncation may have had adverse effect on the potentially surviving archaeological remains within the site. The results of the investigation suggest a low potential for the archaeological evidence to be present; however, the boreholes and window samples data may not be applicable to the entire site as the information retrieved during this type of geotechnical investigation is limited by its nature.

7 ACKNOWLEDGEMENTS

7.1.1 Pre-Construct Archaeology Limited would like to thank James Goad of Arcadis Consulting (UK) Ltd for commissioning the work. We would also like to thank Ms Sophie Firth of Arcadis Consulting (UK) Ltd for her assistance and providing geotechnical data.

7.1.2 The author would like to thank Hailey Baxter for the illustrations and Zbigniew Pozorski for his project management and editing.

8 BIBLIOGRAPHY

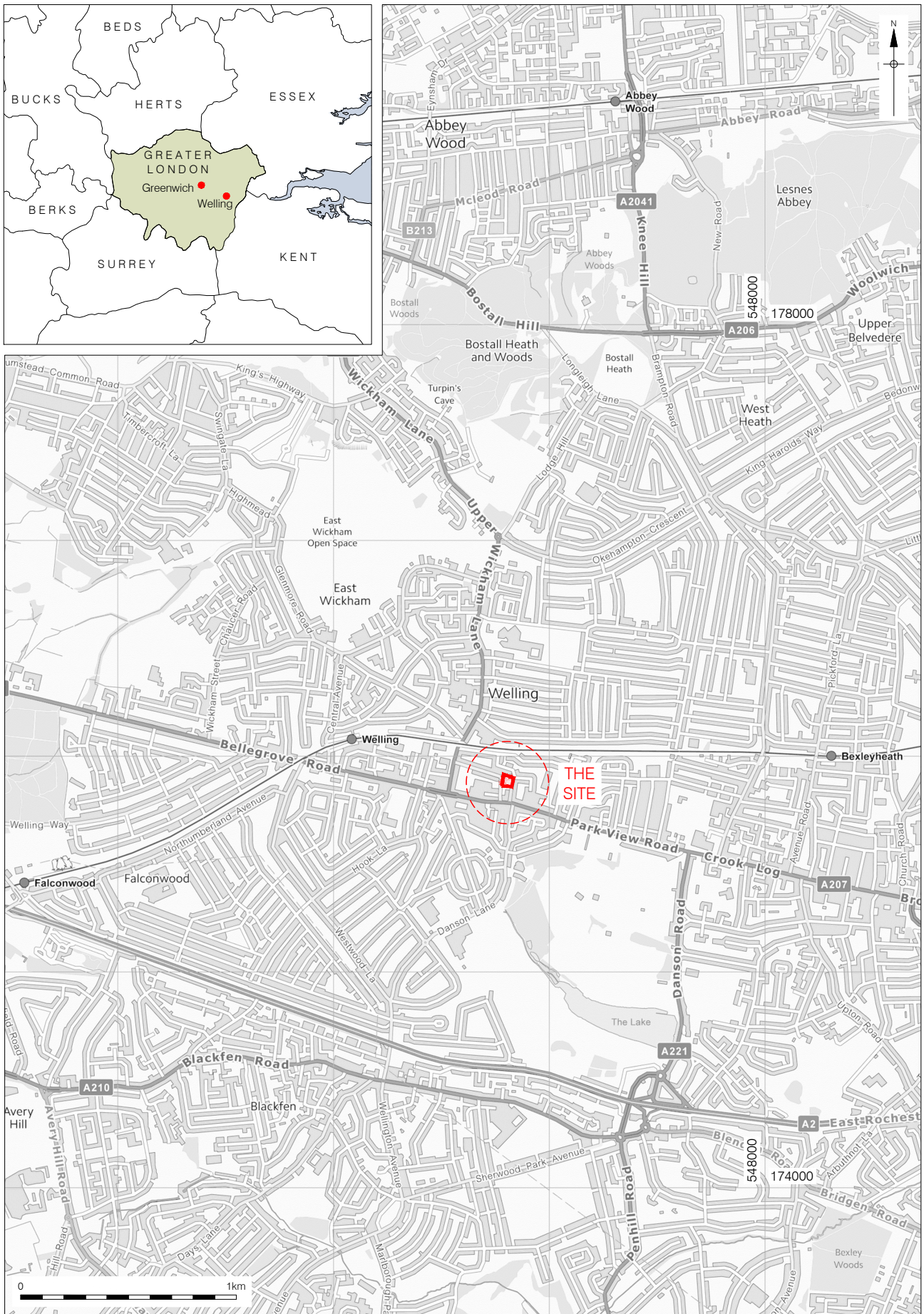
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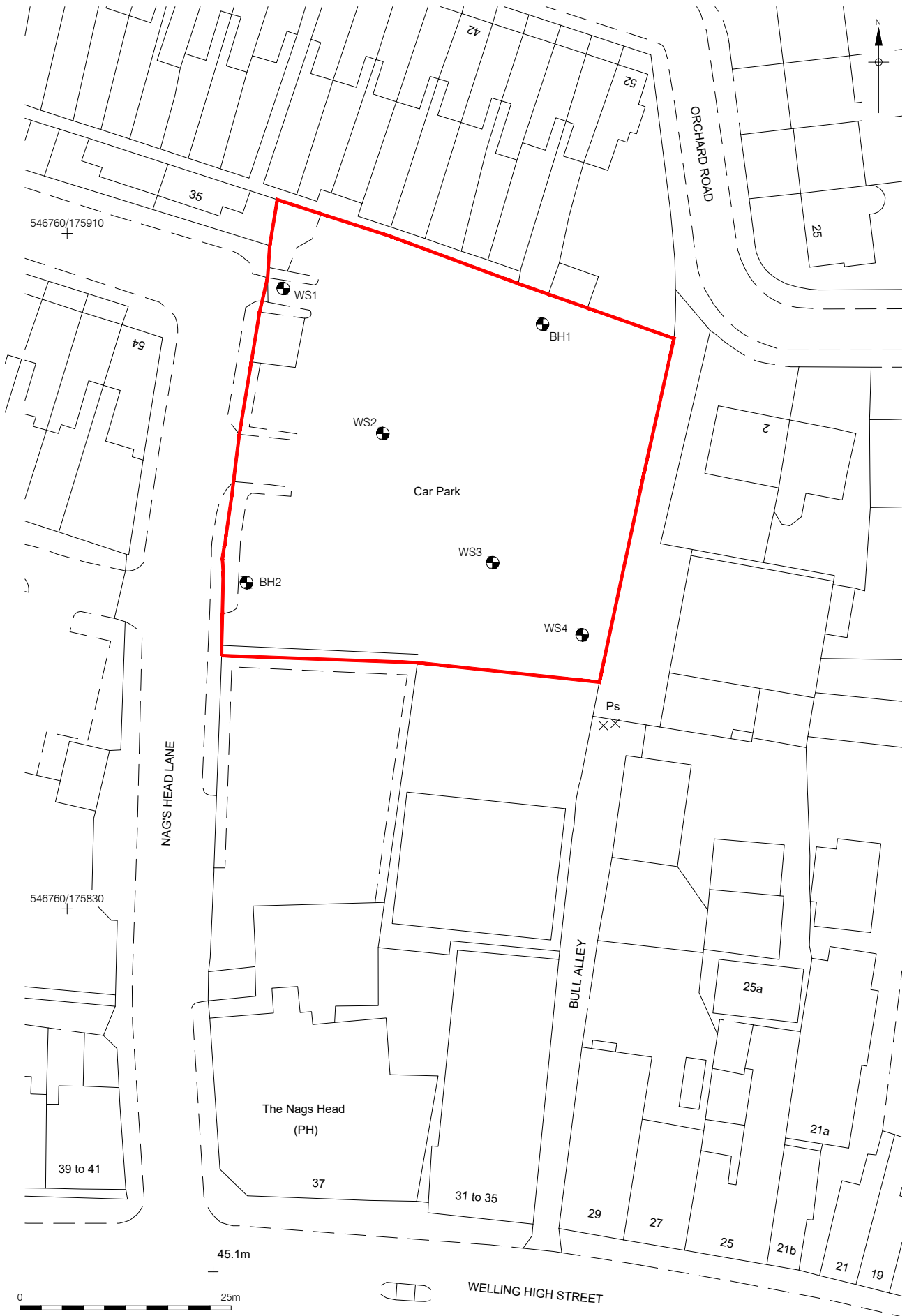
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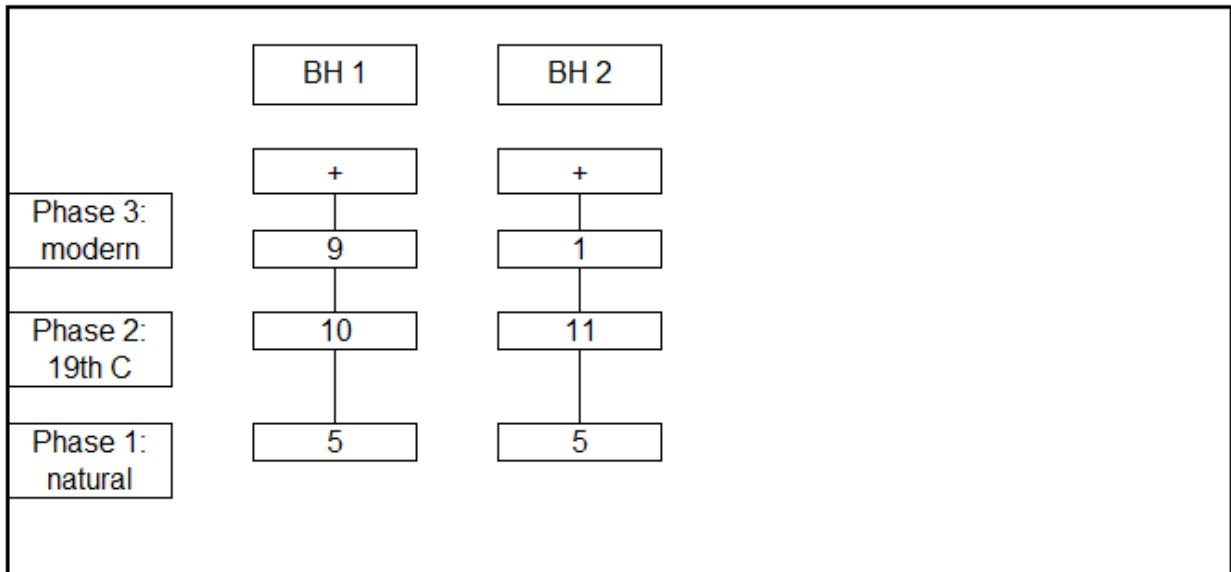
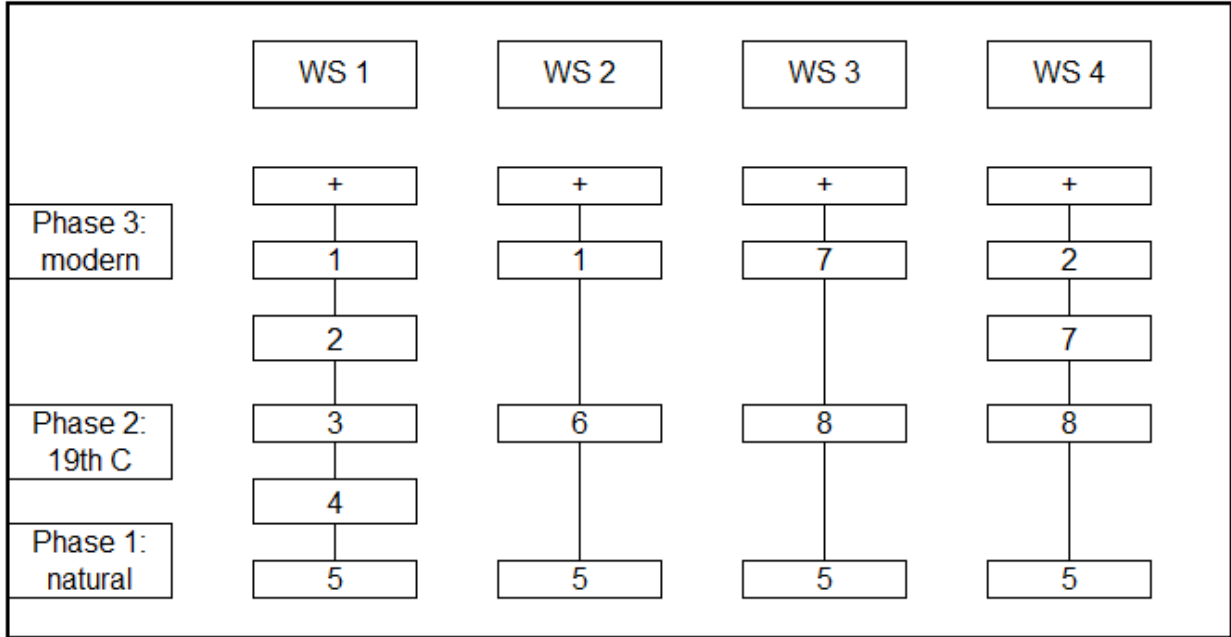
Figure 1
 Site Location
 1:25,000 at A4



APPENDIX 1: CONTEXT INDEX

Context	Type	Location	Description	Levels (m OD)		Date	Phase
				Highest	Lowest		
1	Layer	WS 1 & 2, BH 2	Brick cobbles			Modern	3
2	Layer	WS 1 & 4	Made ground			Early modern/Modern	3
3	Layer	WS 1	Made ground			Early modern/Modern	2
4	Layer	WS 1	Made ground			Early modern/Modern	2
5	Layer	All WSs and BHs	Natural gravel			Natural deposits	1
6	Layer	WS 2	Made ground			Early modern/Modern	2
7	Layer	WS 3 & 4	Made ground			Modern	3
8	Layer	WS 3 & 4	Made ground			Early modern/Modern	2
9	Layer	BH 1	Made ground			Early modern/Modern	2
10	Layer	BH 1	Made ground			Early modern/Modern	2
11	Layer	BH 2	Made ground			Early modern/Modern	2

APPENDIX 2: STRATIGRAPHIC MATRIX



APPENDIX 3: GEOTECHNICAL DATA (BOREHOLES)

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)

Northing (OS mN)

Start Date
09/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 1 of 2

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA				Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description		Legend				
0.20 - 0.50 0.20 - 0.50 0.20 - 0.50 0.50 - 1.00 0.50 - 1.00 0.50 - 1.00	B4 D3 ES1 B6 D5 ES2	0.50	PID	<1ppm		09/04/2018 11:00	0.00	MADE GROUND: Grey bituminous GRAVEL. Gravel is angular to subangular fine to medium of mixed igneous lithologies.	[Pattern]		(0.20)			
1.00 - 1.20 1.00 - 1.20 1.00 - 1.20 1.20 - 2.00 1.20 - 2.00	B8 D7 ES9 D11 ES10	1.20	SPT(C) PID	N=10 (2,3/2,2,3,3) <1ppm				MADE GROUND: Loose light brown slightly sandy gravelly SILT with minor black pockets of possible peat and green pockets of silt. Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint, clinker and minor amounts of orange brick.	[Pattern]		(1.00)			
2.00 - 2.50 2.00 - 2.50 2.00 - 2.50	B14 D13 ES12	2.00	SPT(C) PID	N>50 (7,12/17,15,18,0 for 0mm) <1ppm				Dense becoming loose with depth light brown SAND & GRAVEL with minor amounts of cobble. Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint. Cobble is 2 no. approx. 500 mm x 500 mm. [HARWICH FORMATION]	[Pattern]		(2.00)			
2.50 - 3.00 2.50 - 3.00 2.50 - 3.00	B17 D16 ES15													
3.00 - 3.50 3.00 - 3.50 3.00 - 4.00	B19 D18 ES30	3.00	SPT(C) PID	N>50 (5,8/14,18,18,0 for 0mm) <1ppm										
3.50 - 4.00 3.50 - 4.00	B21 D20													
4.00 - 4.50 4.00 - 4.50 4.00 - 5.00	B23 D22 ES31	4.00	SPT(C) PID	N>50 (6,8/13,16,15,6 for 10mm) <1ppm		10/04/2018 08:00	3.50 3.51				(3.50)			
4.50 - 5.00 4.50 - 5.00	B25 D24													
5.00 - 5.50 5.00 - 5.50 5.00 - 6.00	B27 D26 ES32	5.00	SPT(C) PID	N=10 (4,3/3,3,2,2) <1ppm	5.20									
5.50 - 6.00 5.50 - 6.00	B29 D28													
6.00 - 6.50 6.00 - 6.50 6.00 - 7.00	B33 D34 ES37	6.00	SPT(C) PID	N=49 (4,6/10,14,12,13) <1ppm	3.51						(1.50)			
6.50 - 7.00 6.50 - 7.00	B35 D36					09/04/2018 17:30	6.15 3.51							
7.00 - 7.60 7.00 - 7.60 7.00 - 7.60	B38 D39 ES40	7.00	SPT(C)	N=27 (5,6/6,7,6,8)	3.51			Medium dense light brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subrounded to well rounded fine to coarse of flint. [HARWICH FORMATION]	[Pattern]		(0.60)			
7.60 - 8.00 7.60 - 8.00 7.60 - 8.00	B41 D42 ES43													
8.00 - 8.45 8.00 - 8.70 8.00 - 8.70 8.00 - 8.70	D44 B45 D46 ES47							Medium dense becoming dense grey mottled brown slightly sandy SILT with pockets of light brown sand. Sand is fine to medium. [LAMBETH GROUP] Dense grey SAND with pockets of light brown sand. [LAMBETH GROUP]	[Pattern]		(0.40) (0.70)			
8.70 - 9.00 8.70 - 9.00	B48 D49							No solid recovery. Only recovery consisted of water made of light brown SILT with minor amount of white shells. [LAMBETH GROUP]	[Pattern]		(0.30)			
9.00 - 9.30	D50							Dense white bivalve shell CONGLOMERATE. [LAMBETH GROUP]	[Pattern]		(0.30)			
9.30 - 9.40 9.40 - 9.70 9.40 - 9.70 9.40 - 9.70	B51 B52 D53 ES54							No solid recovery. Only recovery consisted of water composed of light brown SILT with minor amount of white shells. [LAMBETH GROUP] Dense white bivalve shell CONGLOMERATE with frequent amounts of loose fine to coarse flint sand. [LAMBETH GROUP]	[Pattern]		(0.85)			
10.00 - 10.45	D55													

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED				
From	To	Type	From	To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00	1.20	Inspection Pit Cable Percussion	3.20	4.10	00:20	09/04/2018 13:00	5.20	30	3.51	4.70			12.43	150	12.00			
			9.10	9.30	00:50													
			9.20	9.30	00:50													
			9.60	9.70	00:50													

Remarks
Terminated at scheduled depth. No percolation test required due to poor ground stability within the Sand & Gravel.

Termination Depth:
12.43m



Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (MOD).

Equipment Used
DANDO 2000

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
SF

Checked By

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
09/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 2 of 2

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA			Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Date Time	Casing Water	Description	Legend				
10.50 - 11.00	D56						Dense white bivalve shell CONGLOMERATE with frequent amounts of loose fine to coarse flint sand. [LAMBETH GROUP]	○○○○	10.25				
10.50 - 11.00	ES57						Dense grey slightly fossiliferous SILT with frequent amounts of black organic fragments becoming less fossiliferous with depth. Fossils are white and mainly of shells. [LAMBETH GROUP]	××××	(1.75)				
11.00 - 11.45	UT60												
11.50 - 12.00	D58												
11.50 - 12.00	ES59												
12.00 - 12.43	D61						Dense blueish grey slightly mottled yellow SILT with minor amounts of black organic fragments. [LAMBETH GROUP]	××××	12.00 (0.43)				
					10/04/2018 16:00	8.90 3.51							

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED				
From	To	Type	From	To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00	1.20	Inspection Pit Cable Percussion	3.20	4.10	00:20	09/04/2018 13:00	5.20	30	3.51	4.70			12.43	150	12.00			
	12.43		9.10	9.30	00:50													
			9.20	9.30	00:50													
			9.60	9.70	00:50													

Remarks
Terminated at scheduled depth. No percolation test required due to poor ground stability within the Sand & Gravel.

Termination Depth:
12.43m



Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
DANDO 2000

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
SF

Checked By

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
10/04/2018
End Date
11/04/2018

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA			Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend				
0.00 - 1.20	B1 D13				10/04/2018 17:00	0.00	MADE GROUND: Grey bituminous GRAVEL. Gravel is angular to subangular fine to medium of mixed igneous lithologies. MADE GROUND: Yellow and red subangular cobbles of brick.		(0.20)				
0.00 - 1.20							MADE GROUND: Dense black and brownish orange clayey sandy GRAVEL. Gravel is subangular to rounded fine to medium flint, tarmac, limestone and clinker. Sand is fine to coarse. With 100mm pockets of soft light brownish grey clay. Hydrocarbon smell.		(0.20)				
1.20 - 1.40		1.20	SPT(C)	N=42 (6,5/7,10,11,14)	10/04/2018 18:00	1.20			(1.00)				
1.40 - 2.00	B2 D14				11/04/2018 08:00	9.00	Dense becoming medium dense light brown and dark grey slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is angular to rounded fine to coarse flint. [HARWICH FORMATION]		1.40				
2.00 - 2.40	B3 D15	2.00	SPT(C)	N>50 (7,8/8,15,16,11 for 55mm)			Gravel becomes fine to medium.						
2.40 - 3.00	B4 D16												
3.00 - 3.50	B5 D17	3.00	SPT(C)	N>50 (12,13 for 65mm/16,15,14,5 for 25mm)									
3.50 - 4.00	B6 D18								(4.30)				
4.00 - 4.50	B7 D19	4.00	SPT(C)	N>50 (9,10/11,13,12,14 for 65mm)									
4.50 - 5.00	B8 D20						Contains low cobble content. Cobbles are subangular flint.						
5.00 - 5.50	B9 D21	5.00	SPT(C)	N=13 (2,3/3,3,3,4)		5.10	Becoming very sandy.						
5.70 - 6.00	B10 D22						Stiff bluish grey mottled light orangish brown slightly gravelly slightly sandy CLAY. Sand is fine. Gravel is black rounded fine flint. [LAMBETH GROUP]		5.70				
6.60 - 6.95	B11 D23						Black GRAVEL. Gravel is rounded fine to medium flint. [LAMBETH GROUP]		6.40				
6.60 - 6.95							Stiff to very stiff bluish grey mottled dark orangish brown and purple slightly gravelly slightly sandy CLAY. Sand is fine. Gravel is rounded fine to medium flint. [LAMBETH GROUP]		(0.20)				
7.00 - 7.45	D24	7.00	SPT(S)	N=36 (8,5/5,8,10,13)		3.82	Dense light bluish grey mottled light orangish brown clayey fine SAND. With 100mm pockets of firm bluish grey clay and frequent white shell fragments. Clay become less frequent with depth. [LAMBETH GROUP]		6.60				
7.50 - 8.00	B12								(2.15)				
		9.00	SPT(C)	N>50 (25 for 45mm/50 for 30mm,0,0,0)		3.82	Dense white bivalve shell CONGLOMERATE. [LAMBETH GROUP]		9.10				
					11/04/2018 19:00	5.10			(0.40)				
									9.50				

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED				
From	To	Type	From	To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00	1.20	Inspection Pit Cable Percussion	9.10	9.50	01:34	11/04/2018 00:00	5.10	20	3.82	4.70			9.50	150	9.00			

Remarks
Terminated on clients request. Percolation test undertaken at 3.0mbgl.

Termination Depth:
9.50m



Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
DANDO 2000

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
MT

Checked By

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
10/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.40 - 0.60	ES6					MADE GROUND: Grey bituminous GRAVEL becoming sandy with depth. Gravel is angular to subangular fine to medium of mixed igneous lithologies.		(0.25)		
0.40 - 0.80	B2					MADE GROUND: Orange Brick COBBLES (approx. 80 mm x 80 mm)		0.25		
0.40 - 0.80	D1							(0.15)		
0.60 - 1.10	ES7					MADE GROUND: Dark brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint, pottery, clinker, yellow brick, orange brick and minor amounts of glass fragments.		0.40		
0.80 - 1.10	B4							(0.70)		
0.80 - 1.10	D3									
1.10 - 1.20	D5							1.10		
1.10 - 1.20	ES8	1.20	SPT(S)	N=1 (1,0/0,0,1,0)		MADE GROUND: Light brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of flint, glass, orange brick.		1.20		
1.20 - 1.65	D11							(0.50)		
1.20 - 1.70	D10									
1.20 - 1.70	ES9					MADE GROUND: Loose light brown SAND & GRAVEL with pockets of dark brown sandy silt and frequent rootlets (approx. 1 mm diameter). Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of flint, clinker and minor amounts of orange brick.		1.70		
1.70 - 2.00	D12									
1.70 - 2.00	ES13	1.80	SPT(S)	N=50 (7,6/8,13,16,13)		Dense light brown sandy GRAVEL. Sand is fine to coarse. Gravel is subrounded to well rounded fine to coarse of flint.		(0.55)		
2.00 - 2.25	D14					[HARWICH FORMATION]		2.25		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit								2.25			0.00	0.50	Bentonite
1.20	2.25	Dynamic Sample											0.50	1.70	Gravel
													1.70	2.25	Arisings

Remarks
Terminated on SPT refusal. No groundwater encountered.

Termination Depth:
2.25m

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
10/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.40 - 0.60	ES5					MADE GROUND: Grey bituminous GRAVEL. Gravel is angular to subangular fine to medium of mixed igneous lithologies.		(0.25)		
0.40 - 0.80	B2					MADE GROUND: Orange Brick COBBLES (approx. 80 mm x 80 mm)		0.25		
0.40 - 0.80	D1							(0.15)		
0.60 - 1.00	ES6					MADE GROUND: Loose becoming medium dense dark brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint, pottery, clinker, yellow brick, orange brick and minor amounts of glass fragments.		0.40		
0.80 - 1.20	B4									
0.80 - 1.20	D3									
1.00 - 1.20	ES7									
1.20 - 1.65	D15	1.20	SPT(S)	N=5 (1,0/1,1,1,2)						
1.20 - 2.00	ES12									
1.20 - 2.20	B9									
1.20 - 2.20	D8							(1.80)		
2.00 - 2.20	ES13	2.00	SPT(S)	N=27 (4,5/4,6,8,9)						
2.00 - 2.45	D16									
2.20 - 2.70	B11									
2.20 - 2.70	D10									
2.20 - 2.70	ES14					Dense light brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of flint. [HARWICH FORMATION]		2.20		
2.70 - 3.15	D17	2.70	SPT(S)	N=50 (5,29/31,19,0,0)				(0.95)		
								3.15		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit								3.15			0.00	0.50	Bentonite
1.20	3.15	Dynamic Sample											0.50	2.20	Gravel
													2.20	3.15	Arisings

Remarks
Terminated on SPT refusal. No groundwater encountered.

Termination Depth:
3.15m

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
10/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.25 - 0.50	ES5					MADE GROUND: Grey bituminous GRAVEL. Gravel is angular to subangular fine to medium of mixed igneous lithologies.		(0.25)		
0.25 - 0.60	B2					MADE GROUND: Light brown slightly silty sandy GRAVEL with minor amounts of brick cobbles (approx. 50 mm x 60 mm). Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint, yellow brick, orange brick, clinker.		0.25		
0.25 - 0.60	D1							(0.95)		
0.50 - 1.00	ES6									
0.60 - 1.20	B4									
0.60 - 1.20	D3									
1.00 - 1.20	ES7									
1.20 - 1.40	D8	1.20	SPT(S)	N=32 (1,2/2,6,9,15)						
1.20 - 1.40	ES9					MADE GROUND: Dense dark brown sandy GRAVEL with 1 no. flint cobble (approx. 80 mm x 80 mm). Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint.		1.20		
1.20 - 1.65	D13					MADE GROUND: Dense light brown sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded of flint. [HARWICH FORMATION]		(0.20)		
1.40 - 1.70	D10							1.40		
1.40 - 1.70	D11	1.70	SPT(S)	N=50 (13,15/24,26,0,0)						
1.40 - 1.70	ES12								(0.75)	
1.40 - 1.70	D14									
1.70 - 1.95	D14							2.15		

DRILLING TECHNIQUE			WATER OBSERVATIONS					HOLE/CASING DIAMETER				BACKFILL			
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit								2.15			0.00	0.50	Bentonite
1.20	2.15	Dynamic Sample											0.50	1.40	Gravel
													1.40	2.15	Arisings

Remarks
Terminated on SPT refusal. No groundwater encountered.

Termination Depth:
2.15m



Unless otherwise stated:
Depth (m), Diameter(mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Terrier

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
SF

Checked By

Project
Nags Head Lane
Client
Bexley Council

Project No.
10013253
Easting (OS mE)

Ground Level (mAOD)
Northing (OS mN)

Start Date
10/04/2018
End Date
10/04/2018

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.25 - 0.67	B1					MADE GROUND: Grey bituminous GRAVEL. Gravel is angular to subangular fine to medium of mixed igneous lithologies.		(0.25)		
0.25 - 0.67	D2					MADE GROUND: Dark brown sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of orange brick		0.25		
0.25 - 0.67	ES5							(0.42)		
0.67 - 1.00	ES6					MADE GROUND: Light brown slightly silty gravelly SAND with occasional grey concrete cobble and orange brick (approx. 50 mm x 60 mm). Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of orange brick, flint, clinker.		0.67		
0.67 - 1.20	B3							(0.53)		
0.67 - 1.20	D4									
1.00 - 1.20	ES7									
1.20 - 1.60	B9	1.20	SPT(S)	N=12 (1,0/1,0,4,7)		MADE GROUND: Medium dense dark brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint with minor amounts of orange brick and clinker.		1.20		
1.20 - 1.60	D8							(0.40)		
1.20 - 1.60	ES10									
1.20 - 1.65	D13									
1.60 - 1.80	D11							1.60		
1.60 - 1.80	ES12	1.80	SPT(S)	N=80 (14,12/14,21,15,30)		Very dense light brown sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to well rounded fine to coarse of flint. [HARWICH FORMATION]		(0.65)		
1.80 - 2.25	D14									

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit								2.25			0.00	0.50	Bentonite
1.20	2.25	Dynamic Sample											0.50	1.60	Gravel
													1.60	2.25	Arisings

Remarks
Terminated on SPT refusal. No groundwater encountered.

Termination Depth:
2.25m



Unless otherwise stated:
Depth (m), Diameter(mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Terrier

Contractor
Arcadis Consulting (UK) Ltd.

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SF

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APPENDIX 4: OASIS FORM

OASIS ID: preconst1-317798

Project details

Project name	Nags Head Lane Car Park, Welling
Short description of the project	Archaeological Watching Brief on Geotechnical Site Investigation. 2 boreholes and 4 window samples
Project dates	Start: 09-04-2018 End: 11-04-2018
Previous/future work	No / Not known
Any associated project reference codes	NHL18 - Sitecode
Type of project	Recording project
Site status	Local Authority Designated Archaeological Area
Current Land use	Transport and Utilities 2 - Other transport infrastructure

Project location

Country	England
Site location	GREATER LONDON BEXLEY BEXLEY Nags Head Lane Car Park, Welling
Postcode	DA16 1QN
Study area	2300 Square metres
Site coordinates	TQ 46808 75886 51.462369711618 0.113572467451 51 27 44 N 000 06 48 E Point
Height OD / Depth	Min: 45m Max: 45m

Project creators

Name of Organisation	Pre-Construct Archaeology Limited
Project brief originator	Mark Stevenson
Project design originator	Arcadis Consulting
Project director/manager	Zbigniew Pozorski
Project supervisor	Tanya Jones
Type of sponsor/funding body	Consultants
Name of sponsor/funding body	Arcadis Consulting (UK) Ltd

Project archives

Physical Archive Exists?	No
Physical Archive recipient	Bexley Museum
Digital Archive Exists?	No
Digital Archive recipient	Bexley Museum
Paper Archive recipient	Bexley Museum

Paper Contents "Stratigraphic"

Paper Media available "Report"

Entered by Zbigniew Pozorski (zpozorski@pre-construct.com)

Entered on 14 May 2018

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