A Geoarchaeological and Palaeoenvironmental Assessment and Archaeological Watching Brief at Jempson's Store, Station Approach, Rye, East Sussex

NGR: 591905 120484 (TQ 91886 20468)

Planning Ref: RR/2010/2036/P

ASE Project No: 3277 Site Code: BSR13

ASE Report No: 2017304 OASIS id: archaeol6-289232 Rye Museum, Accession No: TBC

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Abstract

This report presents the results of a geoarchaeological assessment carried out by Archaeology South-East at Jempson's Store, Station Approach, Rye, East Sussex, between 15th May and 21st June 2017. The fieldwork was commissioned by Jempson's Ltd. in advance of an extension to the retail store.

The geoarchaeological assessment did not encounter any significant deposits, environmental remains or dating material and the assemblage of finds was very limited. The site was comprised of made ground, followed by weathered alluvium and some lower units of slightly laminated silts and some redeposited peat within alluvium. It is very likely that in situ peat deposits from the Walland Marsh/ Dungeness Foreland depositional complex, lie beneath the deepest extent of the site, and would be interesting to analyse in any future projects.

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1.0 INTRODUCTION

1.1 Site Background

- 1.1.1 Archaeology South-East was commissioned by Jempson's Ltd. to undertake an archaeological watching brief during groundworks associated with the construction of an extension to the existing Jempson's Store, Station Approach, Rye, East Sussex. The site is centred on National Grid Reference (NGR) TQ 91905 20484 and its location is shown in Figure 1. It was agreed that the watching brief would be conducted during site investigation works.
- 1.1.2 In the event the works went ahead without ASE being informed. In consultation with Chris Greatorex (Archaeologist, East Sussex Country Council) it was subsequently decided to target geoarchaeological deposits present at the site via hand auguring. An archaeological watching brief was maintained on the excavation of deep service trenches. Where geoarchaeological deposits were encountered these were subject to hand auguring and subsequent palaeoenvironmental assessment.

1.2 Geology and Topography

- 1.2.1 According to the British Geological Survey, the site is located on the Wadhurst Clay Formation, a sandstone formed approximately 134 to 140 million years ago, and the superficial geology is comprised of clay and silt, tidal flat deposits (BGS 2017).
- 1.2.2 Historically drilled boreholes near to the site, demonstrate that clay and silt deposits are preserved down to 4.88m and that a compact peat unit is preserved underneath these clays and silts (BGS 2017). These deposits belong to the Walland Marsh/ Dungeness Foreland depositional complex.
- 1.2.3 The site lies immediately to the north of the historic core of the town of Rye and currently comprises an existing supermarket with associated car parking. The site is bounded to the northeast and northwest and southwest by Station Approach (the A268) and to the south and southeast by retail units.

1.3 Planning Background

1.3.1 Planning permission was granted for the erection of an extension to the existing supermarket and alterations to the associated carpark layout. (ref: RR/2010/2036/P). Due to the archaeological potential of the site, Condition 6 of the decision notice stated that:

"No development shall take place until the applicant, or their agents or successors in title, have secured the implementation of a programme of archaeological works in accordance with a written scheme of investigation, including a timetable for the investigation, which has been submitted to and approved in writing by the local planning authority and the works shall be undertaken in accordance with the approved details

Reason: The development is likely to disturb features of archaeological interest, which need to be examined and recorded in accordance with Policy GC1 (viii) of the Rother Local Plan"

1.3.2 A Written Scheme of Investigation (ASE 2013) was submitted to the ESCC Archaeologist for approval prior to commencement of the work. The document outlined an archaeological investigation that would comprise a watching brief, where any intrusive groundworks will be monitored by an Archaeologist. Subsequently it was decided that work would comprise an archaeological watching brief on deep service trenches as well as investigation of geoarchaeological deposits via hand auguring and subsequent palaeoenvironmental assessment. All work was carried out in accordance with the preceding WSI (ASE 2013), as well as with the Standards of the Chartered Institute for Archaeologists (CIfA 2017) and the Sussex Archaeological Standards (ESCC 2015).

1.4 Scope of Report

1.4.1 This report details the results of the archaeological watching brief and geoarchaeological sampling carried out on the site over two days; the 15th May and 21st June 2017, and has been prepared in accordance with the WSI (ASE 2013).

2.0 GEOARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The proposed development is situated within an Archaeological Notification Area, associated with the historic town of Rye. Whilst the archaeological potential of the site was low, there was geoarchaeological potential, which was indicated in nearby borehole records. These borehole records noted the presence of 1.20m of compact peat, overlain by a sequence of alluvium. These deposits have been particularly under explored in the local area, and have the potential to preserve palaeoenvironmental evidence and dating material. The sedimentary units found at Rye are part of the Walland Marsh/ Dungeness Foreland depositional complex, which comprise a particularly dynamic area for changes in environment.

2.2 Archaeological context

2.2.1 A settlement at Rye has been long documented, which may be dated back to the Domesday Book. It has a long history of being a growing and wealthy port town, particularly growing in the Tudor period (ASE 2013). After the Tudor period the river estuary completely silted up and cut Rye off from the sea. The site is situated immediately outside the medieval walled town, but within the designated Archaeological Notification Area associated with Rye. According to the Rye Historic Character Assessment Report, the site lies with Historic Urban Character Area (HUCA) 9 (Station), described as outside the extent of the pre-1840 town and consequently of limited archaeological potential (Harris 2009, 48) and with a Historic Environment Value of 2 (with 1 being lowest and 5 highest).

2.3 Project Aims and Objectives

- 2.3.1 The aims of the project were as follows
 - To establish the presence/absence of archaeological remains within the proposed development area, with particular interest in finding a peat deposit;
 - To determine the extent, condition, nature, character, quality and date of any archaeological remains present;
 - To establish the ecofactual/environmental potential of the site and any archaeological features.
 - To assess what options should be considered for mitigation.
 - To make public the results of the archaeological watching brief, subject to any confidentiality restrictions.
- 2.3.2 The only research aims established in the Rye EUS (Harris 2009) which relate to the site were:

RQ13: What different zones (e.g. social differentiation, or types of activity: especially consider industry, the market, the Courton, the extent of the built-up area within and without the walls, the development of the religious houses, and the suburbs) were there during this period, and how did they change?

RQ20: What different zones (e.g. social differentiation, or types of activity: especially consider industries), were there during this period, and how did they change?

2.3.3 Objectives to meet the aims:

- To make a lithological record of deposits, using the open sections from service trenches dug on site
- To recover samples for palaeoenvironmental assessment and dating
- To record and interpret any archaeology encountered on site
- To provide recommendations for further work

3.0 GEOARCHAEOLOGICAL METHODOLOGY

3.1 Fieldwork Methodology

- 3.1.1 On two separate days, two service trenches (Trenches 1 and 2; Figure 2) were excavated using a mechanical excavator down to 3.30m. An archaeologist monitored and inspected these areas for any significant archaeological deposits or structures. Trench 1 was excavated using a toothless ditching bucket and excavated in spits of no more than 0.20m. Care was taken that archaeological deposits were not damaged.
- 3.1.2 The sedimentary sequence was logged from the top of excavation. All deposits observed were recorded according to the Historic England Guidelines for Environmental Archaeology and Geoarchaeology (Historic England 2015a; 2015b).
- 3.1.3 An attempt was made to recover sediments that lay deeper than the 3.30m extent of the machine excavated trenches, by using a Russian hand auger. It was not possible to obtain a core sample from Trench 1, due to the compact nature of the sediments. A second attempt to use the hand auger was made in Trench 2 with some success, 0.74m of sediment was recovered, below the 3.30m depth of the service trench.
- 3.1.4 All deposits were recorded according to standard ASE practise and described on standard ASE *pro-forma* recording sheets. A photographic record was made in digital format.

3.2 Fieldwork constraints

3.2.1 The compact nature of the sediments made it very difficult to obtain any core samples by hand. No further attempt was made at recovering more samples from Trench 2, due to the compact nature of the sediment, and the fact that water was slowly seeping into the base of the trench, which made it slippery.

3.3 Palaeoenvironmental assessment methodology

Russian hand auger sample

3.3.1 The sediment core taken using the Russian hand auger, was taken back to the office and analysed. To do so, the sediment was scraped clean, in order to see the stratigraphy clearly. The core was then logged using the standardised system: Troels-Smith (1955), photographed and rewrapped. The core is currently stored at the Archaeology South-East office.

3.4 Archive

3.4.1 ASE informed Rye Museum prior to the commencement of fieldwork that a site archive would be generated. The site archive is currently held at the offices of ASE and will be deposited at Rye Museum in due course. Rye Museum does not give out archive accession numbers. The contents of the archive are tabulated below (Table 1).

Borehole/test pit sheets	2
Section sheets	0
Plans sheets	0
Colour photographs	0
B&W photos	0
Digital photos	27
Sample register	1
Drawing register	0
Watching brief forms	2
Trench Record forms	1

Table 1: Quantification of site paper archive

Bulk finds (quantity e.g. 1 bag, 1 box, 0.5 box	1 bag
0.5 of a box)	
Registered finds (number of)	0
Flots and environmental remains from bulk	0
samples	
Palaeoenvironmental specialists sample	1 core
samples (e.g. columns, prepared slides)	
Waterlogged wood	0
Wet sieved environmental remains from bulk	0
samples	

Table 2: Quantification of artefact and environmental samples

3.4.2 A county wide policy of selection and retention of archaeological finds is currently under review by the Sussex Archaeological Museum Group working party. Once the policy is agreed and in place, it will be implemented by Archaeology South East. The finds archive will be revised in accordance with this policy in the event that it is implemented before deposition of the archive occurs.

4.0 RESULTS (Figures 2 and 3)

4.1 Lithology

4.1.1 Trench 1

			Length	Width	Depth m
Context	Type	Interpretation	m	m	
1/100	Layer	Made ground	Tr.	Tr.	0.45
1/101	Layer	Made ground	Tr.	Tr.	0.30
1/102	Layer	Made ground	Tr.	Tr.	0.30
1/103	Layer	Made ground	Tr.	Tr.	0.20
1/104	Deposit	Alluvium	Tr.	Tr.	0.70
1/105	Deposit	Alluvium	Tr.	Tr.	>1.85

Table 3: Trench 1 list of recorded contexts

The deepest deposit was alluvium [1/105] encountered at the west end of the trench. This was a dark blueish grey organic alluvial clayey silt, which was not bottomed, from 1.45-3.30mbgl. A single piece of medieval or post-medieval peg-tile was recovered from this deposit. Overlying [1/105] was an upper alluvium [1/104] from 0.75-1.45mbgl, a light bluish grey sandy silt with yellow mottling and moderate gravel inclusions. This was in turn overlain by four different types of made ground covering different areas of the trench but all from 0.45-0.75mbgl: [1/103] was a stiff mottled pale grey brown silty clay with frequent rootlets, [1/102] was a dark grey clay silt with occasional ceramic building material (CBM), and [1/101] was a loose overburden of gravel and CBM. This was all capped by a layer of tarmac [1/100] from 0.00-0.45mbgl.

4.1.2 Trench 2

			Length	Width	Depth m
Context	Type	Interpretation	m	m	
2/100	Layer	Made ground	Tr.	Tr.	0.45
2/102	Layer	Made ground	Tr.	Tr.	0.25
2/104	Deposit	Alluvium	Tr.	Tr.	0.60
2/105	Deposit	Alluvium	Tr.	Tr.	1.15
2/106	Deposit	Alluvium	Tr.	Tr.	0.28
2/107	Deposit	Alluvium with	Tr.	Tr.	>0.31
		Peat			

Table 4: Trench 2 list of recorded contexts

The deepest deposit encountered was the lowest alluvium [2/107], a soft light blue grey clayey silt with redeposited peat, which was not bottomed. This unit was captured in a Russian core <1001> from 3.73-4.04mbgl.

The alluvium [2/106] overlying this, was a fine greenish grey clayey silt, with darker grey-black laminations that contain an organic substance. This unit was also captured in a Russian core <1001> from 3.45-3.73mbgl.

The deposit [2/105] overlying this was a bluish grey clayey silt with very occasional organics. This unit was partially captured in a Russian core <1001> but mostly observed in section, it spanned from 2.30-3.45mbgl. This deposit appears quite mixed and is not an in situ unit.

The deposit [2/104] overlying this was a soft light blue grey sandy silt with yellow mottling and gravel inclusions. This unit was observed in section from 0.70-2.30mbgl. This deposit was again mixed, not in situ, and was oxidised, demonstrating the effects of drainage on the site.

This was then overlain by made ground [1/102] from 0.45-0.70mbgl, a dark grey clay silt with occasional CBM. This was capped by a layer of tarmac [1/100] from 0.00-0.45mbgl.

5.0 THE FINDS

5.1 Summary

5.1.1 A small assemblage comprising a single find was recovered during the watching brief at Jempson's Store, Rye. It was washed and dried or air dried as appropriate and subsequently quantified by count and weight and bagged by material and context (Table 5). All finds have been packed and stored following ClfA guidelines (2017).

Context	СВМ	Weight (g)
1/105	1	26
Total	1	26

Table 5: Finds quantification

5.2 The Ceramic Building Material by Isa Benedetti-Whitton

5.2.1 A single fragment of peg tile weighing 26g was collected from context [1/105]. It is well-fired and made from a dense red clay. Peg tile cannot be dated with any precision, and this fragment could be of any medieval or post-medieval date prior to c.1800.

6.0 THE ENVIRONMENTAL SAMPLES by Alice Dowsett

6.1 Introduction

6.1.1 The watching brief trenches encountered units of alluvium and a lower unit of redeposited peat. A core using a Russian hand auger was taken from Trench 2 for palaeoenvironmental assessment. A breakdown of the stratigraphy can found in Appendix 1.

6.2 Results (Figure 3)

- 6.2.1 The deepest deposit encountered [2/107] was a soft light blue grey clayey silt with redeposited peat, which was not bottomed. This unit was captured in a Russian core <1001> from 3.73-4.04mbgl. This deposit got more organic and contained more peat with depth.
- 6.2.2 The deposit overlying this [2/106] was a fine greenish grey clayey silt, with darker grey-black laminations that contain a humous organic substance. This unit was also captured in a Russian core <1001> from 3.45-3.73mbgl. This depositional environment was low energy and is comprised of fluctuating water levels, occasionally allowing the peat to form during lower water levels.
- 6.2.3 The deposit [2/105] overlying this was a bluish grey clayey silt with very occasional organics. This unit was partially captured in a Russian core <1001> from 3.30-3.45mbgl. This deposit appears quite mixed and is not an in situ unit.

Sample number	Туре	Depth	Purpose
1001	Russian 0.74m	3.30-4.04mbgl	Recording the potential of the sediment

Table 6: The environmental samples

7.0 DISCUSSION AND CONCLUSIONS

7.1 Overview of lithological sequence

- 7.1.1 The stratigraphy recorded on site was mostly comprised of mixed and oxidised deposits. The site was covered by a layer of tarmac for the store carpark. Modern layers of made ground, loose rubble, lie underneath the tarmac and overlay the upper alluvium. The upper units of alluvium are particularly mixed and oxidised, with the lowest unit containing redeposited peat and some organic laminations. A single piece of peg tile comprised the archaeology on site.
- 7.1.2 The sediments observed on site would be unproductive for palaeoenvironmental evidence due to their mixed and oxidised nature. In order to ascertain whether there are sediments with more palaeoenvironmental potential, analysis of the deeper stratigraphy would be necessary.

7.2 Deposit survival and existing impacts

7.2.1 Historical mapping from 1875 (Ordnance Survey) shows that, although the site remains undeveloped, the northern boundary appears to incorporate a change of slope that might indicate the site has been subject to terracing or ground levelling operations. The upper disturbance to the site is superficial and relates to the recent development of the surrounding retail stores, comprising and area of hardstanding and associated drainage.

7.3 Discussion of deposits

- 7.3.1 The sediments recorded at the Jempson's Store site are part of the wider Walland Marsh/Dungeness Foreland depositional complex. The Dungeness Foreland complex is a gravel beach ridge that lies along the nearby coast, which is the largest expanse of sand and gravel barrier in the British Isles (Long et al 2007). This acts as a coastal barrier and protects the associated hinterland of Walland Marsh, where the site is located. This makes the area of Walland Marsh a particularly dynamic area, comprising changes in tidal flooding, land reclamation and differential land movement (Long et al 2007). These sediments are usually thick and contain a rich archive of coastal change, as well as variations in the local catchment rivers; namely the Rivers Rother, Brede and Tillingham (Long et al 2007).
- 7.3.2 The sediments within this depositional complex are a well-preserved suite of minerogenic and organic peat deposits, and can give information on the interaction between physical and human process that occurred in the last 6000 years (Long et al 2007). If these deposits could be reached in the local area to Jempson's Store, Rye, it could provide insights into shifts in climate and landuse history.
- 7.3.3 The sediments found during this watching brief contained no datable material. The deposits are interpreted as being oxidised and quite mixed, and therefore not in situ. The sequence of deposits studied at Jempson's, down to 4.04m, is therefore not suitable for any in-depth palaeoenvironmental analysis.

7.4 Consideration of research aims

7.4.1 No research questions may be answered from this site, due to the absence of any substantial archaeology or environmental evidence. However the condition of the deposits have been assessed in detail.

7.5 Updated Research Agenda

7.5.1 If any future work were to occur in this area, due to the dynamic depositional environment in Rye during the last 6000 years, it would be interesting to gain added insight into these deposits by drilling deeper into the sediments for further analysis.

7.6 Conclusions

7.6.1 Due to the absence of any substantial archaeology or environmental remains, this site could not address any research aims. However, the site does have the potential to hold in situ, well-preserved peat deposits, which lie much deeper in the ground than the present limits of the site. These deeper deposits relate to the Walland Marsh/Dungeness Foreland depositional complex, and could hold information about changes in past climate and land-use history.

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HER Summary

HER enquiry no.	N/A								
Site code	BSR13								
Project code	3277	3277							
Planning reference	RR/2010/2	2036/P							
Site address	Jempson's	s Store,	Station	n Appro	oach, F	Rye,	TN31 7A	۱F	
District/Borough	Rother								
NGR (12 figures)	591905 12	20484							
Geology	Wadhurst	Clay Fo	ormatio	n, Tida	I Flat [Depo	sits - Cla	ау .	And Silt.
Fieldwork type			WE	B/GA					
Date of fieldwork	15/05/201	7- 21/0	6/2017						
Sponsor/client	Jempson's	s Ltd.							
Project manager	Neil Griffir	n/Andy I	Margett	s					
Project supervisor	Alice Dow	sett							
Period summary	unknown								
Project summary (100 word max)	A geoarchaeological watching brief was conducted at Jempson's Store, Rye, East Sussex NGR 591905 120484, between the 15th May and 21st June 2017. Two service trenches measuring up to 15m in length were excavated. No substantial archaeology was found on site, the date of the sediments is unknown. One hand auger sample was taken in an attempt to locate a peat unit, but at a depth of 4.04m, no in situ peat was found.								
Museum/Accession	Rye Muse	eum							

OASIS Form

OASIS ID: archaeol6-289232

Project details

Project name

A Geoarchaeological and Palaeoenvironmental Assessment

at Jempson's Store, Station Approach, Rye, East Sussex

A geoarchaeological watching brief was undertaken at Jempson's Store, Rye, during groundworks which were being carried out in order to extend the store. Two service trenches were placed and monitored. No archaeology was found during the site work. The groundworks impacted up to 3.3m into the ground and two units of alluvial sites and clave were

Short description of the project

into the ground and two units of alluvial silts and clays were uncovered. A hand auger was taken down to 4.04m, through the bottom of tench 2, which contained some redeposited peat. There was no potential for palaeoenvironmental analysis. It is suggested that for any future work in the area, it would be interesting to drill deeper boreholes, in order to

reach the deeper peat unit.

Project dates Start: 15-05-2017 End: 21-06-2017

Previous/future

work

No / No

Any associated

project reference

3277 - Contracting Unit No.

codes

Any associated

project reference

codes

BSR13 - Sitecode

Type of project Environmental assessment

Site status None

Current Land use Industry and Commerce 3 - Retailing

Monument type NONE None
Significant Finds NONE None
Survey techniques Archaeology

Survey techniques Soils

Project location

Country England

Site location EAST SUSSEX ROTHER RYE Jempson's Store, Rye

Postcode TN31 7AF

Study area 1000 Square metres

Site coordinates TQ 91886 20468 50.9511111111111 0.73222222222 50 57

04 N 000 43 56 E Point

Project creators

Name of Organisation

Archaeology South-East

Project brief originator

Jempson's Ltd.

[©] Archaeology South-East UCL

Project design originator

Archaeology South-East

Project

director/manager

Neil Griffin/Dan Swift

Project supervisor

Alice Dowsett

Type of

sponsor/funding

client

body

Name of

sponsor/funding

Jempson's Ltd.

body

Project archives

Physical Archive

No

Exists?

Digital Archive

recipient

Rye or Bexhill

Digital Contents

"Environmental", "Stratigraphic"

Digital Media

available

"Images raster / digital photography", "Text"

Paper Archive recipient

Rye or Bexhill

Paper Contents

"Environmental", "Stratigraphic"

Paper Media available

"Plan","Report","Section"

Project bibliography

Grey literature (unpublished document/manuscript) Publication type

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Appendix 1

Lithological logs

Trench 1					
0.0-0.45m	Tarmac				
0.45-0.75m	Made ground, loose, CBM, dark grey clay silt with occasional flint gravel and rootlets				
0.75-1.45m	Pale bluish grey sandy silt with yellow mottling, soft, friable with occasional gravel				
1.45-3.30m	Blueish grey clayey silt with darker areas of organic sediment, alluvium				
Trench 2					
0.0-0.45m	Tarmac				
0.45-0.70m	Dark grey clayey silt with occasional gravel, loose, with CBM, Made Ground				
0.70-2.30m	Light blue grey soft sandy silt with yellow mottling and occasional gravel, oxidised alluvium?				
2.30-3.30m	Darker blue grey clayey silt, slightly organic, quite a mixed deposit				
<1001> core log	from hand auger (Troels-Smith 1955) – continuation of trench 2				
3.30-3.45m	DA ST EL SICC UB 2 0 1 2 - As1 AG3 Ga+ Greenish grey clayey silt, salt crystals. Very tiny occasional organics.				
3.45-3.73m	DA ST EL SICC UB 1+3 2 1 2 0 As1 Ag3 Ga+ Sh+ Fine greenish grey clayey silt with darker grey black laminations that contain humous/ redeposited peat. Salt crystals present.				
3.73-4.04m	DA ST EL SICC UB 3 1 1 1 1 As1 Ag2 Sh1 Ga+ Gg(maj)+ Light blue grey clayey silt with redeposited peat. Quite dry, occasional small subangular gravel, getting more organic and				

peaty with depth.

Appendix 2

Troels-Smith table

Darkness	
nig.4	black
nig.3	
nig.2	
nig.1	
nig.0	white

_		
L	Degree	e of Stratification
	strf.4	well stratified
	strf.3	
	strf.2	
	strf.1	
	strf.0	no stratification

Degree	of Elasticity
elas.4	very elastic
elas.3	
elas.2	
elas.1	
elas.0	no elasticity

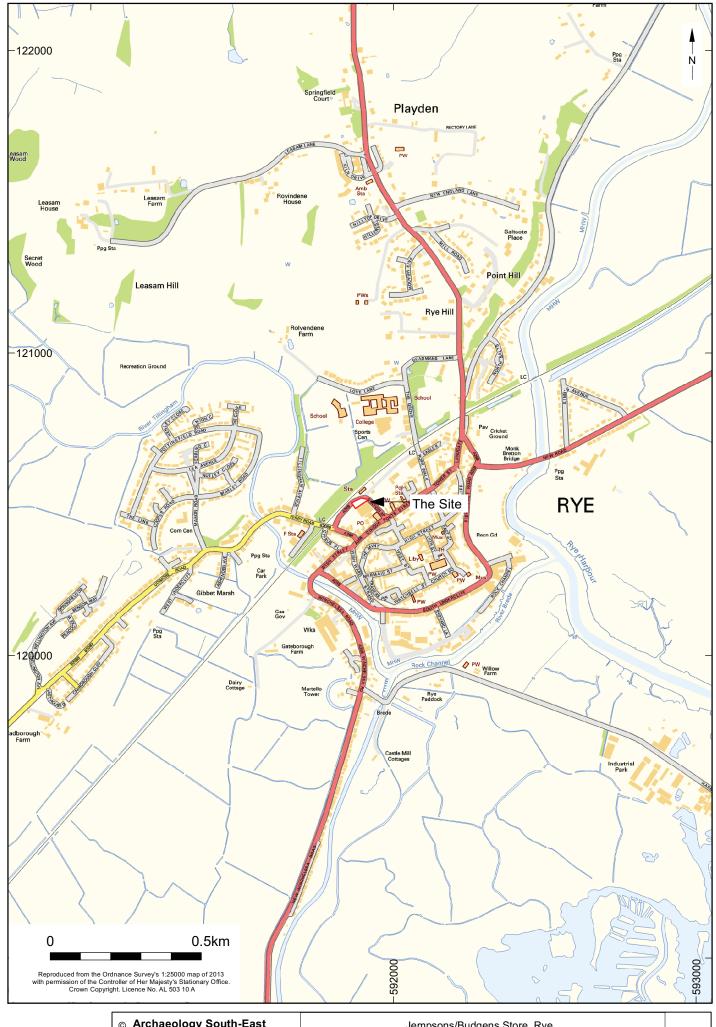
Degree	of Dryness
sicc.4	very dry
sicc.3	
sicc.2	
sicc.1	
sicc.0	water

	Sharpness of Upper Boundary		
lim.4	< 0.5mm		
lim.3	< 1.0 & > 0.5mm		
lim.2	< 2.0 & > 1.0mm		
lim.1	< 10.0 & > 2.0mm		
lim.0	> 10.0mm		

	Sh	Substantia humosa	Humous substance, homogeneous microscopic structure
	Tb	T. bryophytica	Mosses +/- humous substance
I Turfa	TI	T. lignosa	Stumps, roots, intertwined rootlets, of ligneous plants
	Th	T. herbacea	Roots, intertwined rootlets, rhizomes of herbaceous plants
	DI	D. lignosus	Fragments of ligneous plants >2mm
II Detritus	Dh	D. herbosus	Fragments of herbaceous plants >2mm
	Dg	D. granosus	Fragments of ligneous and herbaceous plants <2mm >0.1mm
III Limus	Lf	L. ferrugineus	Rust, non-hardened. Particles <0.1mm
	As	A.steatodes	Particles of clay
IV Argilla	Ag	A. granosa	Particles of silt
	Ga	G. arenosa	Mineral particles 0.6 to 0.2mm
V Grana	Gs	G. saburralia	Mineral particles 2.0 to 0.6mm
	Gg(min)	G. glareosa minora	Mineral particles 6.0 to 2.0mm
	Gg(maj)	G. glareosa majora	Mineral particles 20.0 to 6.0mm
	Ptm	Particulae testae molloscorum	Fragments of calcareous shells

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Physical and sedimentary properties of deposits according to Troels-Smith (1955)



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Project Ref: 3277 Ju	uly 2017	Site location	1 19. 1
Report Ref: 2017304 Dr	rawn by: AR	Site location	

