Cotswold Archaeology

Lyminster Bypass, Lyminster, West Sussex

Archaeological Trial Trench and Geoarchaeological Bore Hole Evaluation

for
WSP Heritage & Archaeology

on behalf of
West Sussex County Council

CA Project: 770525
CA Report: 17431

November 2017

Andover Cirencester Exeter Milton Keynes

Lyminster Bypass
Lyminster
West Sussex

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SUMMARY

Project Name:	Lyminster Bypass
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In May 2017 Cotswold Archaeology carried out an archaeological trial trench and geo-archaeological borehole evaluation for WSP Heritage & Archaeology on behalf of the client, West Sussex County Council on the 3.34 ha site east of Lyminster in West Sussex. The evaluation was carried out in advance of a proposed north-south road just east of the village of Lyminster and consisted of 15no, *c*. 30.0m long by 2.0m wide machine-excavated trenches, comprising a 3.1% sample of the proposed development area, along with 2no. geoarchaeological boreholes located in close proximity to the Black Ditch, an east-west tributary of the River Arun running across the southern part of the Site.

The evaluation was informed by an archaeological desk-based assessment carried out in 2014 and a subsequent geoarchaeological desk-based assessment in 2017. The former identified potential for prehistoric and Roman remains based on finds made in the vicinity, whilst in the medieval period and later the Site lay within open fields beyond the main settlements. No features were identified within the Site that allowed the targeting of trenches, and these were instead distributed evenly across the Site. The geoarchaeological assessment included a subsurface deposit model which used historic British Geological Survey borehole data and the results of a 2014 geotechnical investigation (not archaeologically monitored) to produce transects across the site and assess the likely nature and depth of deposits. It noted Chalk bedrock with an outcrop of Reading Formation at the extreme north end of the route overlain by possible 'raised beach' deposits of Ipswichian Interglacial Age (123–130,000 Before Present (BP)). The presence of a deep palaeochannel (ancient channel) was noted in the area of Black Ditch, along with fine-grained deposits outcropping south of Black Ditch.

In the northern part of the Site, on an east/west ridge of slightly higher ground between the Brookfield Stream and Black Ditch. the trial trenches revealed two Roman probable field boundary ditches, an undated gully, and a small possible (prehistoric?) palaeochannel (the fills were samples but revealed limited palaeoenvironmental information). An undated ditch and undated gully were found in the centre and at the southern end of the Site respectively. The small finds assemblage comprised Roman pottery fragments and unstratified prehistoric worked flint (mostly waste flakes, along with three scrapers from the topsoil). The limited results of the evaluation trenches suggests low density activity of Neolithic/Bronze Age and Roman date. The results are generally consistent with the findings from recent investigations at Toddington Nurseries', 780m to the southeast. The ditches are considered of medium heritage significance. The residual flint is of low significance.

The two geo-archaeological bore holes were drilled on the south side of Black Ditch. Additional geotechnical boreholes were drilled nearby for engineering purposes and the information form these was used to inform the assessment. The results revealed a very deep sequence of up to 21.1m thick of marine and intertidal clays, silts and sands overlying 0.4m of peat, over weathered Chalk at 18.6–21.1m below ground surface (BGL). The entire sequence overlying the Chalk is considered to be of Holocene (11,500BP), and indicate that at one time the sea extended right up to the extent of the Black Ditch, prior to marine regression and subsequent marshland reclamation (probably during the later medieval period). Given the outcrop elevation, the organic strata are likely to date from 10,000–8500 BP, while the overlying clays, silts and sands probably date from the Early Holocene until the recent past. These superficial deposits have potential to hold palaeo-environmental evidence of past environments in which prehistoric and later people lived, of low or medium heritage significance. Due to non-archaeological constraints, it was not possible to examine the possible 'raised beach deposits' at the northern end of the Site.

1. INTRODUCTION

1.1 In May 2017 Cotswold Archaeology (CA) carried out an archaeological trial trench and bore hole evaluation for WSP Heritage & Archaeology on behalf of the client, West Sussex County Council (WSCC) at the 3.34 ha site (centred at NGR: 502960 104630; Figure 1). The evaluation was undertaken to support a planning application which will be made to WSCC for the construction of a bypass to link the A284 Lyminster Road (in Lyminster village) to Toddington Nurseries just north of Littlehampton (previously withdrawn outline planning application WSCC/049/15/LY).

1.2 The trial trench evaluation consisted of 15no, *c*. 30m long by 2.0m wide machine-excavated trenches evenly spaced across the four irregularly-shaped fields of the Site, which comprised a 3.1% sample (by area) of the proposed development area. The borehole evaluation comprised two geo-archaeological boreholes drilled within an area extending 120m southwards from Black Ditch. The fieldwork was carried out in accordance with a request for an archaeological evaluation by John Mills, Senior Archaeologist West Sussex County Council, and with a subsequent detailed *Written Scheme of Investigation* (WSI) produced by CA (2017) and approved by John Mills. The fieldwork also followed *Standard and guidance: Archaeological field evaluation* (CIfA 2014). It was monitored by John Mills, including a site visit on 4th May 2017.

The Site

1.3 The proposed development area is approximately 3.34 hectares, and comprises cultivated and pastoral fields, with an area of brownfield land to the south at Toddington Lane. It is bounded to the south by Toddington Lane, to the north by the A284, Lyminster Road and to the east and west by agricultural fields. The Site is largely currently under pasture and cultivation with the southern section (a former nursery) currently under construction for housing. The Site lies at *c*. 1-2m above Ordnance Datum (aOD) in the south, rising to *c*. 5-6m (aOD) in the north.

1.5 Across the Site, the bedrock geology varies and consists of a mixture of New Pit Chalk Formation, Lewes Nodular Chalk Formation, Newhaven Chalk Formation and, Culver Chalk Formation; with superficial deposits of river terrace gravels.

2. ARCHAEOLOGICAL BACKGROUND

2.1 The archaeological background given below is a copy of the information garnered from a heritage Desk-Based Assessment undertaken by WSP (2014), along with the results of a geoarchaeological desk-based assessment produced by Dr Keith Wilkinson and Nick Watson for WSP in February 2017 (ARCA 2017 – see Appendix E). The latter comprised a Rockworks subsurface deposit model which used historic British Geological Survey borehole data and the results of a 2014 geotechnical investigation (not archaeologically monitored) to produce transects across the site and assess the likely nature and depth of deposits.

Geoarchaeology

2.2 In the ARCA assessment, the bedrock was found to comprise Chalk bedrock with a relatively level surface at 2.0m (aOD). Deposits on the Reading Formation may outcrop at the extreme north end of the route. BGS mapping indicates that this is overlain by 'raised beach' deposits of Ipswichian Interglacial Age (123 – 130,000 Before Present/BP). The borehole data did not provide clarity regarding the formation of the raised beach deposits, and the report noted that further work would be required to establish this.

2.3 In addition, the geo-archaeological assessment states that; 'The raised beach deposits along the Bypass route are likely on elevation grounds to be of the Pagham Formation. They will therefore date to the Ipswichian interglacial (MIS 5e, 123-130 Ka [thousands of years before the present]). The Ipswichian is a period in which hominins were probably absent from Britain (Sutcliffe 1995) and they did not re-colonise until MIS 3 (i.e. after 57 Ka) (Pettitt and White 2012). Although discoveries of artefacts at Dartford dated by optically stimulated luminescence to MIS 5a-d (82-123 Ka), suggests the presence of humans during the early part of the Devensian (Wenban-Smith 2010), there remains no similar evidence for the Ipswichian. In other words, were the raised beach deposits in the local area to be of the Pagham Formation, they would have a LOW archaeological potential' (ARCA 2017 – Appendix E, para 4.2.1).

2.4 A deep palaeochannel was identified in the area of the Black Ditch at the southern end of the route, which may date to the Early Holocene, or during the Ipswichian/Middle Pleistocene. The descriptions given in the 2014 geotechnical boreholes are not sufficiently detailed to allow definite identifications for

geoarchaeological purposes, i.e. in confirming the deposits' archaeological and palaeo-environmental potential (ARCA 2017; John Mills *email comm.* 21/03/2017)

Prehistoric

2.5 No known archaeological assets dating to the prehistoric periods are recorded within the Site boundary. The immediate environs of the site contains a number of records relating to the prehistoric period, with the majority of these noted during archaeological works in the form of evaluations and trial trenches.

2.6 At Highfield Farm, located *c*. 700m to the south of the Site, an archaeological evaluation, which included three trial trenches, produced a range of archaeological material, including several sherds of late prehistoric pottery, burnt and worked flint.

2.7 Some 580m to the southeast of the Site lies Toddington Nursery, an area that has been the subject of a number of archaeological investigations (OA 2005, TVAS 2014-16, Dinwiddy 2012), yielding a range of archaeological material dating from the Mesolithic period to the Post-medieval period. The evaluation revealed Mesolithic (10,000 – 4000 BC) and Neolithic flint as well as a few sherds of Neolithic pottery, a possible Neolithic ditch (4000 – 2400 BC) and several Bronze Age (2400 – 700 BC) ditches and pits. Diagnostic worked flints included a fragmentary chisel, a Mesolithic or Neolithic axe, a leaf-shaped (Early Neolithic, 4000 – 3000 BC) arrowhead, a flake from a polished implement and a Middle Neolithic oblique arrowhead. The features suggest localised Neolithic/Early Bronze Age (4000 – 1500 BC) activity within the area, which later developed into a significant Bronze Age landscape. The Neolithic ditch contained pottery dating to the early to Middle Neolithic period and a late Neolithic/Early Bronze Age scraper. The ditch was possibly a boundary ditch and was suggestive of Neolithic settlement within the area. Worked and burnt flints were found along with pits, ditches and a complete bucket funerary urn was found although the vessel had been vertically placed its lack of both base and rim suggest that it had been redeposited.

2.8 A further nursery site in Toddington some 780m to the south-east, evaluated by Oxford Archaeology in 2004 (OA 2005) and excavated by Wessex Archaeology in 2005 (Dinwiddy 2012) identified both Mesolithic and Neolithic activity including activity deposits and ditches.

2.9 Located just over 1km to the south-west of the Site, an archaeological evaluation was undertaken at Land off Courtwick Lane, Littlehampton (TVAS 2010). The trenches revealed archaeological evidence of predominantly Bronze Age, Late Iron Age (100 BC – AD 43), and Romano-British (43 – 410 AD) activity with isolated Saxon (410 – 1066 AD) and Medieval (1066 – 1539 AD) features also present. The majority of the finds came from the south-eastern part of the site and were interpreted as the site of a Late Iron Age/Romano British settlement, preceded by potential Bronze Age activity.

2.10 Within the wider environs, the Victoria County History notes that traces of Iron Age and Romano-British settlements have been found to the south of the parish, both west of Wick and east of Toddington, on sites close to the River Arun and Black Ditch.

Romano-British (43 – 410 AD)

2.11 There are no recorded heritage assets dating to the Romano-British period within the development boundary, however within the immediate environs there are several sites dating to this period, indicating substantial Roman activity in the area.

2.12 Approximately 840m from the Site, two Roman sites were observed in the 1970s, adjacent to or close by the former Arundel Rd, on the higher ground. It has been speculated that a Roman Road ran east from Chichester to the Brighton area in the east and that this line of communication was subsequently replaced by the former Arundel Road.

2.13 During the aforementioned investigations at Toddington Nurseries (OA 2005) a Romano-British ditch was identified and a quantity of redeposited Saxon pottery were recovered as well as a series of re-cut 12th or 13th century boundary ditches which may have marked the eastern edge of Toddington. The second nursery site at Toddington excavated by Wessex Archaeology in 2005 (Dinwiddy 2012) identified a system of Romano-British enclosure ditches with associated tracks.

2.14 During a watching brief on the Rustington By-pass (A259), located 1.5km to the south-east of the Site, an area of soft fill, which is almost certainly the top of a truncated rubbish pit, contained Roman pottery of the 1st – 2nd centuries AD, together with some transitional Late Iron Age/Romano-British examples.

2.15 To the immediate north-west of the Rustington by-pass lies the industrial site of Watersmead Industrial Estate. Prior to construction an archaeological watching brief was undertaken, revealing a series of features and spreads of occupation associated with an Early Roman settlement (AD43 – 200). A number of ditches were observed; two were traced running in a north-east/south-west direction parallel to each other for *c*. 44m, and *c*. 9m apart. This suggests that the parallel ditches may be contemporary, forming part of a trackway. Both were 'V'-shaped in profile, measuring *c*. 1.5m deep, backfilled with domestic debris, including animal bones (some with signs of butchery), daub, fragmentary tile, pottery dating to the late 1st and 2nd century AD and quernstone fragments. To the west of the ditches a series of rubbish pits, postholes and possible beam slots mark the site of a timber building. An originally intact 2nd century pottery vessel may have been a cremation burial, although no bones were recovered. A second rubbish pit was located to the north with the only diagnostic find being a fragment of an upper rotary quernstone of probable 2nd century AD date. A concentration of 2nd century AD pottery was located to the northeast of the ditches, along with occupation debris. Other finds included a small concentration of Middle to Late Iron Age pottery (400 BC – AD 43) and a more dispersed concentration of 14th century and later medieval pottery. The main period of occupation on the Watersmead Industrial Estate site would appear to have been during the 1st and 2nd centuries AD. There were no finds of a demonstrably later date, although it is possible that Romano-British activity continued into the 3rd century AD. The series of ditches would appear to indicate at least two main phases of use within a relatively short time.

2.16 Located 2km to the east of the Site lies the site of a Romano-British villa near New Barn. The villa buildings are situated on a slightly raised east-west aligned tongue of land that was originally bounded to the north and south by streams, and to the west by marshland. The buildings survive in the form of buried flint rubble and brick footings and were revealed (during excavations covering the 1930s and 1940s) to be the result of at least three phases of development and remodelling between the 1st and 3rd centuries AD. The main domestic range was represented by a roughly rectangular, aligned building measuring 46m by 21m, which lies towards the north-western edge of the monument. Approximately 80m to the east of the main range, and separated from it by a ditched enclosure, was a detached bath house, constructed around AD 65, which had mosaic and *opus signinum* floors and Sussex and Italian marble fittings. Excavations indicated that the bath house was dismantled during the first half of the 2nd century AD. Finds from the excavations include a

metal door lock, a pair of bronze and silver tweezers, bronze jewellery and coins. Four other masonry buildings and several timber buildings have been noted within the villa complex including another bath house, possible temple and agricultural building. During the excavation it was noted that the site had been occupied during the Iron Age period as indicated by part of a boundary ditch and associated pits containing pottery fragments and animal bones.

Anglo Saxon (410 – 1066 AD)

2.17 No known archaeological assets of Post-Roman or Anglo-Saxon date are known within the Site boundary. Within the immediate environs of the Site a few key sites are noted as well as documented. Within the village of Lyminster there is no evidence for a settlement prior to the Anglo-Saxon period. By the 9th century Lyminster was a royal estate and a place of great importance, located on a promontory in an area of marshland. The earliest mention of Lyminster dates to AD 901 when Alfred the Great bequeathed the settlement to his nephew Osfred in his will, under the name of *Lullyngminster*, where it remained a royal manor throughout the Saxon period it was subsequently mentioned in Domesday Book (AD 1086). In 930, King Athelstan issued a charter at Lyminster in favour of the bishop of Selsey.

2.18 The origins of the Grade I Listed Parish Church of St. Mary of Magdalen, located on the western edge of Lyminster, extends back to the Anglo-Saxon period. The church is a long building consisting of a chancel with a chapel or vestry, a nave with a north aisle, north porch and west tower. The chancel and nave date to the Anglo-Saxon period and are noted as being exceptionally long, three times longer than it is wide. Over the subsequent centuries, the church was subject to regular alteration. In the 13th century the nave arcade is transitional Norman, the lower part of the tower dates to the 13th century, the north porch dates to the 15th century and the north chapel or Vestry dates to the 19th century. The church is also purported to be located on the site of an early nunnery or minster, becoming a Benedictine alien priory in AD 1083. After the Norman Conquest, the Nunnery was re-founded by Roger de Montgomeri, Earl of Arundel, as a priory of the Norman Abbey of Almanesches, and at one time there were twenty-six nuns living there. The last prioress was not appointed until AD 1450. The Priory was suppressed by Henry VI and all its possessions were given to the new foundation of Eton College. Excavations within the churches grounds revealed fragmentary foundations, but it cannot be verified these were part of the nunnery. The association of Lyminster with

a Saxon nunnery is derived from conjectural association with `*Nonneminstre*' in Domesday Book.

2.19 Within the wider area, at Arundel, to the northwest of Lyminster, the church of St. Nicholas was first recorded in Domesday Book. In AD1087 a Dean of Arundel is noted and by the late 11th and early 12th century St. Nicholas' church had a total of ten clergy with Domesday Book recording that the clergy held six hides of land in Harting and had done so before the Conquest. It is therefore considered that the origins of the church at Arundel are that of a pre-Conquest minister church.

Medieval (AD 1066 – 1539) and Post-medieval (1540–present)

2.20 To the north of the Black Ditch much of the land remained part of Lyminster manor, whose home farm had four ploughing teams in AD 1086. In the late 14th century the home farm comprised of 275ha, by the early 15th century the size of the home farm had increased to 468ha. Although by the late 14th and 15th centuries the land was predominantly used for pasture and meadow rather than arable, nevertheless in AD 1386 , wheat, barley, oats and vetch were still being grown alongside 58 head of cattle and 250 sheep. The main settlement was at Lyminster, probably in the area of the current village, just west of the Site.

2.21 The Wessex Archaeology 2005 investigation at one of the Toddington Nursery sites identified a metalled medieval holloway (sunken road), running east-west with enclosures of a similar medieval date associated with it, extending northwards (Dinwiddy 2012).

2.22 Historic maps indicate that the Site was open fields east of the Lyminster settlement throughout the post-medieval period (WSP 2014).

3. FIELD EVALUATION

Aims and objectives

3.1 The general aims of the evaluation are to provide information about the archaeological and palaeoenvironmental resource within the Site, including its presence/absence, character, extent, date, integrity, state of preservation and quality. In accordance with *Standard and guidance: Archaeological field evaluation* (CIfA 2014), the evaluation has been designed to be minimally intrusive and minimally destructive to archaeological remains. The information gathered will

enable the West Sussex County Council to identify and assess the particular significance of any heritage asset, consider the impact of the proposed development upon it, and to avoid or minimise conflict between the heritage asset's conservation and any aspect of the development proposal, in line with the *National Planning Policy Framework* (DCLG 2012).

3.2 The specific objectives of the project of the project were as follows:

- Two geoarchaeological boreholes are proposed in the north of the road footprint targeted in an area which is currently covered in established tree cover. The boreholes are aimed at providing greater definition regarding the nature and date of the raised marine (beach) deposits within this part of the proposed road scheme. Subsequent to the approved WSI and in agreement with John Mills, Senior Archaeologist West Sussex County Council, as a result of restricted access, these were not undertaken.

- Two boreholes to the south of the Black Ditch to assess the nature and date of the deep palaeochannel identified at this location and ascertain whether the fills are Pleistocene or Holocene, and the palaeoenvironmental potential. Subsequent to the approved WSI and in agreement with John Mills, Senior Archaeologist West Sussex County Council, these were not undertaken.

- The two Toddington Nursery sites have identified and proven that there is clear evidence of Mesolithic, Neolithic and Bronze Age activity not far south of the Black Ditch on the coastal plain. Therefore should the trenching identify similar activity within the proposed development footprint it will be important to carefully record any such foci for these periods and if so if there is any evidence of continuity between them?

- The two nursery sites also identified Roman activity, with one recording clearly defined enclosures and associated trackways, and if similar Roman activity is encountered it will be important to compare the date of any such features and assess the possibility of whether they might form part of the same estate partially identified to the south.

- With an estate/'settlement' at Lyminster dating back to at least the time of Alfred it will be important to be vigilant for any evidence of early medieval

settlement activity. It has been noted on recent evaluations across the south of England that 'sunken-featured buildings' (SFBs) are increasingly difficult to identify due to their generally shallow construction which leaves them very vulnerable to truncation from either ploughing or the increasingly frequent practice of topsoil stripping. Very often there is only the very base 5cm remaining.

- The results of the evaluation will be considered period by period with reference to the South-East Research Framework.

4. TRIAL TRENCH EVALUATION METHODOLOGY

4.1 The trial evaluation comprised the excavation of 15no of the initially proposed 19 trenches, *c*. 30.0m long by 2.0m wide trenches, in the locations shown on the attached plan (Figure 2). None of the trenches were targeted as no archaeological features had been previously identified, and they were disturbed as evenly as possible across the four fields, taking into account ecological constraints (eg working close to a hedgerow). **Trenches 10** and **11** could not be undertaken because of lack of access whilst the evaluation was being undertaken, and this was communicated to John Mills. A further two trenches (**16** and **17**) which fell within a new housing development at the southern end of the proposed road footprint, could not be investigated due to access not being made available. Trenches were set out on OS National Grid (NGR) co-ordinates using Leica GPS and surveyed in accordance with CA Technical Manual 4: *Survey Manual*.

4.2 All trenches were excavated by mechanical excavator equipped with a toothless grading bucket. All machine excavation was undertaken under constant archaeological supervision to the top of the first significant archaeological horizon or the natural geology, whichever was encountered first. Where archaeological deposits were encountered they were excavated by hand in accordance with CA Technical Manual 1: *Fieldwork Recording Manual*.

4.3 Deposits were assessed for their palaeo-environmental potential in accordance with CA Technical Manual 2: *The Taking and Processing of Environmental and Other Samples from Archaeological Sites*; five deposits were sampled and processed. All artefacts recovered were processed in accordance with Technical Manual 3 *Treatment of Finds Immediately after Excavation*.

4.4 The archive and artefacts from the evaluation are currently held by CA at their offices in Andover. Subject to the agreement of the legal landowner the artefacts will be deposited with Littlehampton Museum along with the site archive. A summary of information from this project, set out within Appendix D, will be entered onto the OASIS online database of archaeological projects in Britain.

4.5 The geoarchaeological element of the evaluation is dealt within in detail in a separate report, which forms a technical appendix to this document. The geoarchaeological report comprises a revision of the original desk-based report and deposit model (ARCA Feb 2017), and has been revised to take into account the additional information from the field evaluation.

5. TRIAL EVALUATION RESULTS (FIGURES 2-7)

5.1 This section provides an overview of the evaluation results; detailed summaries of the recorded contexts, finds and environmental samples (palaeoenvironmental evidence) are to be found in Appendices A, B and C respectively.

5.2 A total of 15 trenches were excavated (**Trenches 1–9** and **12–17**) of which 8 (53%; **Trenches 2, 4, 6, 7, 13–15** and **17**) contained no features. The trenches with features of note, which are discussed further below, comprised **Trenches 1**, **3**, **5** (at the northern end of the Site), **8**, **9**, **12** (in the central section) and **16** (at the southern end), the results of which are detailed below. All of the features recorded cut the natural geology and were sealed by the subsoil except gully **303** (**Trench 3**) and gully **1602** (**Trench 16**) which were directly below the topsoil at depths of 0.26m and 0.19m respectively, below the current ground level. **Trench 17** at the very southern end of the Site was the only trench to have no subsoil deposit, with topsoil lying directly over the blue/grey clay natural geology.

Natural Deposits and Stratigraphic

5.3 The stratigraphic sequence of the Site was generally horizontally deposited and of relatively uniform thickness and character. The topsoil was characterised by a 0.25 – 0.40m thick deposit of mid to dark greyish-brown sandy silt with rare sub-angular flint inclusions. The subsoil was generally a 0.15 – 0.30m thick deposit of mid reddish-brown clayey sandy silt with common sub-angular flints. The natural geology

was mostly characterised by mid red/brown sandy clay with common sub-angular flints. In deep, machine-excavated sondages, through palaeochannel **803** (**Trench 8**) and possible raised beach deposit **710** (**Trench 7**), Chalk bedrock was exposed at *c*. 3.0m depth below modern ground level. In **Trenches 16** and **17** the natural geology was markedly different, consisting of blue/grey clay with shell fragments, indicating likely marine inundation.

Trench 1 (Figures 2 & 3)

5.4 The trench contained north/south aligned ditch **103**, which was 1.4m wide and 0.56m deep. The single fill **104** contained a small assemblage of 2nd century AD Roman pottery, worked and burnt flint and fired clay. A small number of worked and burnt flint artefacts were also recorded from the topsoil **100** of the trench.

Trench 3 (Figures 2 & 4)

5.5 The trench contained undated, shallow, gully **303**, sealed directly below the topsoil **300**. No finds were recorded from the single fill **304**. The gully was 1.47m wide and 0.35m deep with moderate, concave sides.

Trench 5 (Figure 2)

5.6 This trench contained a 1.83m wide and 0.31m deep, undated east/west aligned furrow, sealed below subsoil **501**.

Trench 8 (Figures 2 & 5)

5.7 This trench contained a 9.90m wide and 2.82m deep, near-east/west aligned, undated, though possible prehistoric, palaeochannel which contained no finds. Two palaeoenvironmental samples from fills **810** and **811** failed to contain any significant material except a single grain of barley.

Trench 9 (Figures 2 & 6)

5.8 This trench contained a north-east/south-west aligned, possible Roman ditch **903**, which was 1.48m wide and 0.55m deep with moderate, concave sides and a moderate, concave base. Its single fill **904** contained worked and burnt flint as well as two sherds of flint-tempered Roman pottery. A sample of the fill **904** contained

spelt wheat and other plant material possibly representative of dispersed settlement waste.

Trench 12 (Figures 2 & 7)

5.9 This trench contained undated, north-east/south-west aligned ditch **1203**, which had moderate, concave sides terminating in a moderate, concave base. The ditch was 0.75m wide and 0.25m deep with moderate concave sides and a moderate concave base. The ditch contained only three pieces of burnt flint, although a small number of worked and burnt flint artefacts were recorded from the trench topsoil **1200**.

Trench 16

5.10 The trench contained undated, east/west aligned gully **1602**, which was 0.49m wide and 0.45m deep, with steep, concave sides and a deep concave base. It was sealed by topsoil **1600**. The single fill **1603** contained no finds.

6. THE FINDS

6.1 Artefactual material recovered from the evaluation is listed in Appendix B and discussed further below. All finds have been cleaned and quantified by material type in each context. The pottery was sorted by fabric and quantified by count and weight.

Pottery

6.2 A total of 18 sherds of pottery, weighing 228g, was recorded from three deposits (appendix B). The assemblage is small and its usefulness in providing comparisons with local sites is limited. The sherds are only moderately fragmented, with a mean sherd weight of 12.5g. All sherds are dateable to the Roman period. In the absence of a local type series for Sussex, codes matching those of the National Roman Fabric Reference Collection (Tomber and Dore 1998) have been used to record the fabrics, where possible.

6.3 The majority of the group occur in coarsewares, including fine flint-tempered and black and grey sandy fabrics. The range of fabrics is similar to those recorded at the kiln site at Worthing Road, Littlehampton, around 3km from the site (Laidlaw 2000). This kiln is a possible production site for the grey sandy fabrics; the fine flint-tempered wares were probably also produced locally. A single form is present, a

probable jar with everted rim in a greyware fabric, recovered from ditch **103** (fill **104**). It is not closely datable. Also from this context is a single sherd (2g) of Central Gaulish samian, a rimsherd with bead rim of uncertain form, dateable to the 2nd century.

Other finds

6.4 A total of 51 items (443g) of prehistoric worked flint was recorded from 14 deposits. An additional 29 items (643g) of burnt flint was recovered by hand excavation and bulk soil sample of eight deposits. The assemblage is dominated by flakes characterised by pronounced ripples and scarring across the ventral face, in particular on the bulb of percussion. This is indicative of hard hammer percussion. Scrapers were redeposited within topsoil contexts **1200**, **1300** and **1500**. The assemblage cannot be closely dated.

6.5 Two fragments (6g) of fired clay were recovered from ditch **103** (fill **104**). The fragments are amorphous, consequently function and date cannot be established.

7. THE BIOLOGICAL EVIDENCE

7.1 A series of five environmental samples (42 litres of soil) were taken from a range of features within four trenches (**Trenches 7**, **8**, **9** and **12**) to evaluate the preservation of palaeoenvironmental remains across the area and with the intention of recovering environmental evidence of industrial or domestic activity on the Site (Appendix C). The samples were processed by standard flotation procedures (CA Technical Manual No. 2).

7.2 Preliminary identifications of plant macrofossils are noted in Table 3, following nomenclature of Stace (1997) for wild plants, and traditional nomenclature, as provided by Zohary *et. al.* (2012) for cereals.

7.3 The flots were generally small with low numbers of rooty material and modern seeds. The charred material comprised varying levels of preservation.

Trench 7

7.4 No remains were recorded from the possible raised beach deposit **710** (sample 3)

Trench 8

7.5 A few charred remains were recovered from fill **810** (sample 4) of possible prehistoric palaeochannel **803**. These included fragments of barley (*Hordeum vulgare*) and small charcoal fragments. This may be representative of dispersed material. Sample 5 from the lower fill **811** of palaeochannel **803** contained no charred remains.

Trench 9

7.6 A small charred plant assemblage was recorded from fill **904** (sample 1) of possible Roman ditch **903**. These included indeterminate grain fragments, of spelt wheat (*Triticum spelta*) glume base and seeds of brome grass (*Bromus* sp.). There was also a small quantity of charcoal noted. This assemblage may be representative of dispersed settlement waste. Spelt wheat is generally the predominant wheat in later prehistoric assemblages in southern Britain (Greig 1991) but it was recorded in Middle Bronze Age assemblages from the nearby former Toddington Nurseries site (Pelling 2012).

Trench 12

7.7 The single sample (2) from fill **1204** of possible prehistoric ditch **1203** contained a small amount of charred material. The few charred plant remains included free-threshing wheat (*Triticum turgidum/aestivum* type) grain fragments, a spelt wheat glume base and seeds of oat/brome grass (*Avena/Bromus* sp.). The charcoal fragments included roundwood pieces. This assemblage may again be reflective of dispersed settlement waste. Free-threshing wheat is more typical of assemblages of post-Roman date (Greig 1991) so it is possible that some of the remains in the assemblage may be intrusive. There were problems with the possibility of intrusive material in some of the assemblages recovered from the former Toddington Nursery site (Pelling 2012).

Summary

7.8 The charred remains provide some indication of domestic settlement activities taking place in the wider area but unlikely to be in the immediate vicinity of these trenches.

8. DISCUSSION

8.1 This section discusses the results of the trial trench evaluation and also the geoarchaeological evaluation presented in Appendix A. The trial trench evaluation

recorded a small number of features and a small finds assemblage of archaeological interest, most of which lie in the northern part of the Site. This relatively small dataset from the evaluation has been problematic in resolving most of the project aims and objectives. However, the evaluation evidence overall does indicate low density activity on the Site of Neolithic/Bronze Age and Roman date.

8.2 A small assemblage of relatively non-diagnostic and unstratified worked flint, comprising mostly debitage, was recorded across the Site. The technological and morphological traits present on the lithic material indicate a probable Neolithic/Bronze age date. The assemblage also included three scrapers from the topsoil of **Trenches 12**, **13** and **15**. The presence of a similarly widespread and small assemblage of burnt flint, both unstratified and residual in later features, would support the presence of ephemeral and episodic activity of Neolithic/Bronze Age date on the Site. However, it is markedly less than the Neolithic/Bronze Age activity noted at the Toddington Nursery sites to the south. The evidence would point to the transitory exploitation of the higher ground between the Brookfield Stream and the Black Ditch. The artefactual finds are considered to be of **low significance**, as derived from their limited evidential value.

8.3 Two relatively minor, Roman ditches were also recorded on the slightly higher, east/west ridge between the watercourses. The ditches contained residual worked and burnt flint as well as fired clay and Roman-British pottery. The pottery was of regional and continental manufacture and included a small assemblage of diagnostic 2nd century AD material from ditch **103** in **Trench 1**. The similar size, morphology and perpendicular alignments (to each other) of ditches **103** (**Trench 1**) and **903** (**Trench 9**) would indicate the ditches represent Romano-British field boundaries on the higher ground beyond the watercourses. In addition, the palaeoenvironmental evidence from ditch **903**, including spelt wheat, brome grass and charcoal might be representative of dispersed settlement waste, possibly from manuring of fields from Romano-British settlement in the area. The ditches are considered to be of **medium** significance, as derived from their evidential value in providing an indication of the nature of Roman activity in the area in this period and specifically to the south of the site.

8.4 The geo-archaeological borehole evaluation, comprising two geoarchaeological boreholes and a review of the results of geotechnical boreholes carried out for engineering purposes (ESG Ltd), was conducted in the southern part of the route of

the Site in May and June 2017. The work was informed by a preliminary geo-archaeological desk-based assessment, which, based on BGS and earlier geotechnical data, had highlighted the possible palaeo-environmental and archaeological significance of fine-grained deposits outcropping south of Black Ditch (an east-west tributary of the River Arun running across the southern part of the Bypass route), and a possible 'raised beach' deposit at the northern end of the Site. Consequently two geo-archaeological boreholes were drilled within an area extending 120m southwards from Black Ditch. It was not possible to examine the possible raised beach deposits in the north as it was not possible to drill boreholes at this location. The results were used to update the original assessment and this is presented in as Appendix A.

8.5 The geo-archaeological and geotechnical boreholes demonstrate that up to 21.1m of marine and intertidal clays, silts and sands overlie 0.4m of peat, which in turn overlies weathered Chalk at 18.6–21.1m below ground level (BGL). The lowest organic stratum fills the interstices of the weathered Chalk in both geo-archaeological boreholes, but two further organic strata are found interbedded within the overlying intertidal/marine deposits between 19.2 and 17.7m BGL in ARCA BH1. The mineral deposits that form the majority of the overlying marine/intertidal sequence have a tripartite division comprising (from top to bottom) blue grey silts and clays with occasional marine mollusc fragments (c. 18 to 6m BGL), blue grey medium and fine sands with frequent complete marine molluscs (6.0-2.4 m BGL), and blue grey trending upwards to yellow brown silts and clays lacking macrofossils (2.4-0.0m BGL).

8.6 The entire sequence overlying the Chalk is considered to be of Holocene (11,500-0 BP) age. Given the outcrop elevation, the organic strata are likely to date from c 10,000-8500 BP, while the overlying clays, silts and sands probably date from the Early Holocene until the recent past. The archaeological potential of the sequence is considered low (in terms of evidence of past human activity), while the palaeo-environmental potential of the mineral clays, silts and sands is moderate and that of the organic strata high. Information gathered may also provide data regarding the maximum reach of the marine inlet south of Arundel and how that varied over time. Such remains would be of **low** or **medium** significance, derived from their evidential value in providing information on the past environments in which prehistoric and later people camped/lived.

9. CA PROJECT TEAM

9.1 Fieldwork was undertaken by Joe Whelan, assisted by Georgina Johnston and Tim Street. The report was written by Chris Ellis. The finds and biological evidence reports were written by Katie Marsden and Sarah Wyles respectively. The illustrations were prepared by Charlie Patman. The archive has been compiled by Joe Whelan, and prepared for deposition by Hazel O'Neill. The project was managed for CA by Richard Greatorex. Jon Chandler provided consultancy and editorial input on behalf of WSP and as such identified the levels of significance .

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APPENDIX A: CONTEXT DESCRIPTIONS

Trench No.	Context	Type	Fill of	Context Interpretation	Context Description	Length (m)	Width (m)	Depth/ thickness (m)
1	100	Layer		Topsoil	Mid greyish-brown sandy silt, common rooting throughout, rare sub-angular flint inclusions.	30	1.9	0.34
1	101	Layer		Subsoil	Mid orange/brown sandy silt, rare sub-angular flint inclusions	30	1.9	0.14
1	102	Layer		Natural geology	Mid orange/brown sandy clay, common patches of chalk and common sub- angular flint inclusions	30	1.9	0.61+
1	103	Cut		Ditch	Linear N/S ditch with gentle slope onto flat base.	>1.9	1.4	0.56
1	104	Fill	103	Ditch Fill	Yellowish-brown clay silt sand with few flint inclusions, friable	>1.9	1.4	0.56
2	200	Layer		Topsoil	Yellowish-brown clay silt sand with rare flint inclusions	25	1.9	0.27
2	201	Layer		Subsoil	Mid yellowish-brown clay sand, rare flint inclusions	25	1.9	0.13
2	202	Layer		Natural geology	Yellowish-brown clay sand with few flint inclusions	25	1.9	0.16+
3	300	Layer		Topsoil	Mid greyish-brown sandy clay, friable, ploughed topsoil, common sub-angular flints and rooting throughout, rare burnt flint	33	1.9	0.26
3	301	Layer		Subsoil	Mid greyish, orange/brown sandy clay, friable, common sub-angular flint and rare sub rounded chert	33	1.9	0.12
3	302	Layer		Natural geology	Dark orange/brown sandy clay, friable, common sub-angular flint with rare patches of chalk	33	1.9	0.1+
3	303	Cut		Gully	Linear E/W gully with sharp, gradual sides and moderate, concave base.	>1.9	1.47	0.35
3	304	Fill	303	Secondary gully fill	Mid greyish-brown sandy clay, friable, common sub-angular flint inclusions	>1.9	1.47	0.35
4	400	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable with occasional sub-angular flint inclusions	35	1.9	0.24
4	401	Layer		Subsoil	Mid red brown clay sandy silt, friable, sub-angular flint inclusions	35	1.9	0.29
4	402	Layer		Natural geology	Mid brown red sandy clay, friable, common sub-angular flint with patches of Natural geology degraded chalk towards north of trench	35	1.9	0.05+
5	500	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, occasional sub-angular flint inclusions	34	1.9	0.39
5	501	Layer		Subsoil	Mid reddish-brown clayey sandy silt, friable, sub-angular flint inclusions	34	1.9	0.24
5	502	Layer		Natural geology	Mid reddish-brown sandy clay, friable, common sub-angular flint inclusions	34	1.9	0.1+
5	503	Cut		Furrow	Linear, near-E/W furrow with gradual slope on north and steep to the south, uneven base.	>1.9	1.83	0.31
5	504	Fill	503		Mid greyish-brown sand y silt clay, loose, common sub-angular flint inclusions and bioturbation	>1.9	1.83	0.31
6	600	Layer		Topsoil	Dark greyish-brown clayey sandy silt, common sub-angular flint inclusions	28	1.9	0.38
6	601	Layer		Subsoil	Mid reddish- brown clayey sandy silt, friable, common sub-angular flint inclusions	28	1.9	0.26
6	602	Layer		Natural geology	Mid yellowish-brown sandy clay, friable, very common sub-angular flint inclusions	28	1.9	0.1+

Trench No.	Context	Type	Fill of	Context Interpretation	Context Description	Length (m)	Width (m)	Depth/ thickness (m)
7	700	Layer		Topsoil	Dark greyish-brown clayey sandy silt, common sub-angular flint inclusions, friable	27	1.9	0.2
7	701	Layer		Subsoil	Mid red brown clayey sandy silt, friable, common sub-angular flint inclusions	27	1.9	0.27
7	702	Layer		Natural geology	Mid brown yellow sandy clay, friable, very common sub-angular flint inclusions	27	1.9	0.14+
7	710	Layer		Natural geology	Raised beach deposit. Fill of machine-dug sondage. Yellowish- brown sandy clay with flints	27	1.9	0.14+
7	711	Layer		Natural geology	Chalk and flint-rich clay. Natural geology at base of sondage	27	1.9	0.14+
8	800	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, common flint inclusions	28	1.9	0.40
8	801	Layer		Subsoil	Mid reddish-brown clayey sandy silt, friable, common sub-angular flint inclusions	28	1.9	0.38
8	802	Layer		Natural geology	Mid yellowish-brown sand, friable, common sub-angular flint inclusions	28	1.9	0.24
8	803	Cut		Palaeochannel	Wide channel crossing trench on a rough west - east orientation	>1.9	9.9	2.82
8	804	fill	803	Palaeochannel fill	Upper fill. Dark yellowish-brown clayey silt	>1.9	>1.9	1.4
8	810	fill	803	Palaeochannel fill	Middle fill. Mid yellowish-brown clayey silt	>1.9	>1.9	0.6
8	811	fill	803	Palaeochannel fill	Lowest fill. Light yellowish-brown clayey silt	>1.9	>1.9	0.55
8	812	Layer		Natural geology	Chalk and flint-rich clay at base of machine dug sondage	>1.9	>1.9	-
9	900	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, common sub-angular flint inclusions	23	1.9	
9	901	Layer		Subsoil	Mid reddish-brown clayey sandy silt, friable, common sub-angular flint inclusions	23	1.9	0.39
9	902	Layer		Natural geology	Mid brown yellow medium sand, friable, common sub-angular flint	23	1.9	0.13+
9	903	Cut		Ditch	Linear NE/SW ditch with concave sides to concave base.	>1.9	1.48	0.55
9	904	Fill	903	Ditch fill	Mid orange/brown sand y silt clay, friable, common sub-angular flint inclusions	>1.9	1.48	0.55
12	1200	Layer		Topsoil	Dark greyish-brown clayey sandy silt, common sub-angular flint inclusions	30	1.9	0.47
12	1201	Layer		Subsoil	Mid reddish- brown clayey sandy silt with common sub-angular flint inclusions	30	1.9	0.19
12	1202	Layer		Natural geology	Mixed orange/brown sandy clay, friable, very common sub-angular flint inclusions	30	1.9	0.47+
12	1203	Cut		Ditch	Linear NE/SW ditch, sharp slope on south-east side and gradual on north-west, uneven but level base.	>7.8	0.75	0.25
12	1204	Fill	1203	Secondary fill	Mid greyish-brown clayey sand, friable, common sub-angular flint inclusions	>7.8	0.75	0.25

Trench No.	Context	Type	Fill of	Context Interpretation	Context Description	Length (m)	Width (m)	Depth/ thickness (m)
13	1300	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.36
13	1301	Layer		Subsoil	Mid reddish- brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.22
13	1302	Layer		Natural geology	Mixed orange/brown sandy clay, friable, very common sub-angular flint inclusions	30	1.9	0.17+
14	1400	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.4
14	1401	Layer		Subsoil	Mid red brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.32
14	1402	Layer		Natural geology	Mid orange/brown sandy clay, friable, very common sub-angular flint and patches of degraded chalk	30	1.9	0.28+
15	1500	Layer		Topsoil	Dark greyish-brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.37
15	1501	Layer		Subsoil	Mid red brown clayey sandy silt, friable, common sub-angular flint inclusions	30	1.9	0.04
15	1502	Layer		Natural geology	Dark orange/brown sand clay, very common sub-angular flint and patches of chalk	30	1.9	0.34+
16	1600	Layer		Topsoil	Mid greyish-brown sandy clay, common rooting throughout, rare sub-rounded chalk and sub-angular flint inclusions	30	1.9	0.19
16	1601	Layer		Natural geology	Light grey/blue brown mottled in the north. Mid orange/brown silty clay, common rooting throughout	30	1.9	0.22+
16	1602	Cut		Gully	Linear E/W gully, steep sides to a concave tapered base.	>1.9	0.49	0.45
16	1603	Fill		Secondary gully fill	Mid greyish- brown silt clay, compact with no inclusions	>1.9	0.49	0.45
17	1700	Layer		Topsoil	Yellowish-brown silty clay with dark orange/brown mottling.	30	1.9	0.28
17	1701	Layer		Natural geology	Blue/grey clay with rare oyster shell inclusions and rare flint. Patches of reddish- brown clay	30	1.9	0.07+

APPENDIX B: THE FINDS

Table 1: Finds totals

Context	Class	Description	Ct.	Wt.(g)	Spot-date
100	Burnt Flint		3	66	
	Flint	Flakes	2	8	
104	Roman pottery	LOC BS (black sandy ware)	9	136	C2
	Roman pottery	Greyware	5	79	
	Roman pottery	LEZ SA2 (Central Gaulish samian)	1	2	
	Burnt Flint		1	66	
	Fired Clay		2	6	
	Flint	Flakes	6	12	
200	Flint	Flake	1	5	
300	Flint	Flakes	3	29	
304	Flint	Flakes (1 retouched)	4	9	
400	Burnt Flint		6	284	
	Flint	Flakes	2	28	
500	Flint	Flakes	2	30	
801	Flint	Flake	1	17	
904	Roman pottery	Flint-tempered	2	8	RB
	Burnt Flint		3	7	
	Flint	Flakes	3	37	
1200	Burnt Flint		1	24	
	Flint	Flakes, x1 scraper	4	76	
1204	Burnt Flint		3	67	
1300	Roman pottery	Greyware	1	3	RB
	Flint		6	69	
1304	Burnt Flint		1	30	
	Flint	Flakes	8	27	
1400	Burnt Flint		1	21	
	Flint	Flakes, some with edge damage or retouch	6	45	
1500	Flint	x2 retouched flakes, x1 scraper	3	51	

Table 2: Finds from environmental samples

Context	Sample no.	Class	Ct.	Wt.(g)
904	1	Burnt flint	3	27
1204	2	Burnt flint	7	51

APPENDIX C: THE PALAEOENVIRONMENTAL EVIDENCE

Table 3: Palaeoenvironmental remains assessment table

Feature	Context	Sample	Vol (L)	Flot size (ml)	Roots %	Grain	Chaff	Cereal Notes	Charred Other	Notes for Table	Charcoal > 4/2mm	Other
Trench 7 - Possible raised beach deposit												
	710	3	7	2	-	-	-	-	-	-	-	-
Trench 8 - ?Prehistoric palaeochannel												
803	810	4	10	10	5	*	-	Barley grain frag	-	-	*/*	-
	811	5	9	2	-	-	-	-	-	-	-	-
Trench 9 – Roman ditch												
903	904	1	7	5	10	*	*	Indet. grain frags, spelt glume base	*	*Bromus*	-/*	-
Trench 12 - ?Prehistoric ditch												
1203	1204	2	9	10	5	*	*	F-t wheat grain frags, spelt glume base	*	*Avena/Bromus*	*/**	-

Key * = 1–4 items; ** = 5–19items; *** = 20–49 items; **** = 50–99 items; ***** = >100 items

APPENDIX D: OASIS REPORT FORM

PROJECT DETAILS		
Project Name	Lyminster Bypass, Lyminster, West Sussex: Archaeological Evaluation	
Short description	The evaluation has recorded a small number of features and a small finds assemblage of archaeological interest, most of which lie in the northern part of the site. This relatively small dataset from the evaluation has been problematic in resolving most of the project aims and objectives. However, the evaluation evidence overall does indicate low density activity on the site of Neolithic/Bronze Age and Roman date. A small assemblage of relatively non-diagnostic and unstratified worked flint, comprising mostly debitage, was recorded across the site. The technological and morphological traits present on the lithic material indicate a probable Neolithic/Bronze age date. The assemblage also included three scrapers from the topsoil of Trenches 12, 13 and 15. The presence of a similarly widespread and small assemblage of burnt flint, both unstratified and residual in later features, would support the presence of ephemeral and episodic activity of Neolithic/Bronze Age date on the site. Two relatively minor, Roman ditches were also recorded on the slightly higher, east/west ridge between the watercourses. The ditches contained residual worked and burnt flint as well as fired clay and Roman-British pottery. The pottery was of regional and Continental manufacture and included a small assemblage of diagnostic 2nd century AD material from ditch 103 in Trench 1. The similar size, morphology and perpendicular alignments (to eachother) or ditches 103 (Trench 1) and 903 (Trench 9) would indicate the ditches represent Romano-British field boundaries on the higher ground between the watercourses.	
Project dates	15 – 26 May 2017	
Project type	Evaluation	
Previous work	Geoarchaeological desk-based assessment (ARCA 2017)	
Future work	Unknown	
PROJECT LOCATION		
Site Location	Lyminster, West Sussex	
Study area (M^2/ha)	3.43 ha	
Site co-ordinates	TQ 0296 0463	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project Brief originator	N/A	
Project Design (WSI) originator	Cotswold Archaeology	
Project Manager	Richard Greatorex	
Project Supervisor	Joe Whelan	
MONUMENT TYPE	None	
SIGNIFICANT FINDS	None	
PROJECT ARCHIVES	Intended final location of archive: Littlehampton Museum	Content
Physical		Pottery, worked flint, burnt flint, fired clay
Paper		Trench records, Context records, A3/A4 Drgs, Photo Registers, Sample Registers and Records
Digital		Finds database, survey data, digital photographs
BIBLIOGRAPHY		
Cotswold Archaeology (CA) 2017 *Lyminster Bypass, Lyminster, West Sussex: Archaeological Evaluation*. CA Typescript Report **17431**.		

APPENDIX E: GEOARCHAEOLOGY DESK-BASED ASSESSMENT

Geoarchaeology

ARCA

October 2017

Report Number: 1617-19 (revised)

LYMINSTER BYPASS, LYMINSTER, WEST SUSSEX: INTERIM REPORT ON GEOARCHAEOLOGICAL BOREHOLES (REVISED)

Prepared for Cotswold Archaeology

Keith Wilkinson

ARCA
Department of Archaeology
University of Winchester
Winchester
SO22 4NR
http://www.arcauk.com

Version	Date	Status*	Prepared by	Author's signature	Approved by	Approver's Signature
01	22/06/17	E	Keith Wilkinson		Keith Wilkinson	
02	08/10/17	F	Keith Wilkinson		Keith Wilkinson	
*I – Internal draft; E – External draft; F - Final						

CONTENTS

FIGURES

SUMMARY

The first part of a geoarchaeological borehole study was conducted in the southern part of the route of the planned A284 Lyminster Bypass in May and June 2017. A prior geoarchaeological desk-based assessment had highlighted the possible palaeoenvironmental and archaeological potential of fine-grained deposits outcropping south of Black Ditch (an east-west tributary of the River Arun running across the southern part of the Bypass route). Consequently two geoarchaeological boreholes were drilled within an area extending 120m southwards from Black Ditch. Strata retained in the borehole cores was photographed, described using standard geological criteria and sub-sampled for biostratigraphic assessment and ^{14}C dating (neither form part of this report). A geotechnical borehole and test pit survey was conducted by ESG Ltd of the entire road footprint at the same time as the geoarchaeological boreholes and were intended to update the subsurface drift and bedrock geoarchaeological model of the road footprint. In terms of the wider road footprint the additional geotechnical data has not added anything that changes the subsurface model as presented in the geoarchaeological DBA, other than perhaps adding further/greater definition.

In terms of the Black Ditch, the geoarchaeological and geotechnical boreholes demonstrate that up to 21.1m of marine and intertidal clays, silts and sands overlie 0.4m of peat, which in turn sits unconformably on weathered Chalk at 18.6-21.1m below ground surface (BGL). The lowest organic stratum fills the interstices of the weathered Chalk in both geoarchaeological boreholes, but two further organic strata are found interbedded within the overlying intertidal/marine deposits between 19.2 and 17.7m BGL in ARCA BH1. The mineral deposits that form the majority of the overlying marine/intertidal sequence have a tripartite division comprising (from top to bottom) blue grey silts and clays with occasional marine mollusc fragments (c. 18 to 6m BGL), blue grey medium and fine sands with frequent complete marine molluscs (6.0-2.4 m BGL), and blue grey trending upwards to yellow brown silts and clays lacking macrofossils (2.4-0.0m BGL).

The entire sequence overlying the Chalk is considered to be of Holocene (11,500-0 BP) age. Given the outcrop elevation, the organic strata are likely to date from c 10,000-8500 BP, while

the overlying clays, silts and sands probably date from the Early Holocene until the recent past. The archaeological potential of the sequence is consider low, while the palaeo-environmental potential of the mineral clays, silts and sands is moderate and that of the organic strata high.

1 INTRODUCTION

1.1 This text reports on the lithostratigraphy of two boreholes drilled for geoarchaeological purposes on the route of the planned A284 Lyminster Bypass in May and June 2017. Use is also made in the present report of the results of geotechnical studies carried out by WSP Ltd in 2014 (Endsor and Burrows 2014) and ESG Ltd in May-July 2017 (Nottage 2017). The geoarchaeological works reported here were undertaken on behalf of Cotswold Archaeology (CA) and their clients, WSP UK Ltd.

1.2 The Lyminster Bypass will comprise a 980m link between the A284 Lyminster Road and the B2187 East Street. The road will be 7.5m wide and will possess an additional 1m-wide hardstanding strip on either side. Beyond the latter will be a 3.85m-wide verge and a 2.5m-wide footpath on one side only (Endsor and Burrows 2014, 8). The total impact of the proposed road is therefore a 980 x 19.7m, north-south orientated strip (henceforth the 'study area'). In addition to construction of the road, a bridge will be built over the Black Ditch stream, which is an east bank tributary of the River Arun. The Bypass will approach the bridge via embankments built on top of the floodplain. The latter will be constructed of deposits removed from the floodplain margin during the excavation of two compensation basins (Endsor and Burrows 2014, 8). The sub-surface impact of the road and associated features will depend upon the engineering approaches that are adopted, the specification for which was not available at the time this assessment was written.

1.3 A prior geoarchaeological desk-based assessment (DBA) recommended the collection of dedicated geoarchaeological records from raised beach deposits along the northern part of the Bypass route (not considered here) and from a buried palaeochannel located immediately south of Black Ditch (the subject of this report) (Figure 1). The boreholes reported here therefore, form only part of a geoarchaeological investigation that may eventually comprise a total of four geoarchaeological boreholes together with a review of the in excess of 100 geotechnical records. The present text may therefore be considered an interim summary of the lithostratigraphy and geoarchaeological potential of an area extending 120m southwards from the south bank of Black Ditch (Figure 1). Note that the report should be read alongside the prior geoarchaeological desk-based assessment (DBA) (Watson and Wilkinson 2017).

1.4 The proposed Lyminster Bypass will pass to the east of Lyminster village and run between NGR TQ 02882 05222 and TQ 03193 03936. It will start from the A284 north of Lyminster where the ground lies at c. +2m OD, climb a slight ridge on which the village of Lyminster sits (c. +6m OD), descend to cross the Black Ditch (c. +1.5m OD) before finally climbing to its junction with East Street at the south of the study area (c. +3m OD). The terrain over which the road will run presently comprises arable and pasture, while the southernmost portion passes through Holland Nursery.

1.5 The British Geological Survey (BGS) map the bedrock of the study area as comprising undifferentiated strata of the White Chalk Group (formerly the Middle and Upper Chalk) (BGS 1996, 2017a, b). Tidal River or Creek/Raised Marine deposits are mapped as superficial strata in the floodplain of the Black Ditch on the 1/50,000 and 1/10,000 geological maps respectively (BGS 2017a, b). The implication of the BGS mapping is that the superficial deposits infilling the Black Ditch valley are of Holocene age [11,500 BP (11.5 Ka) to present] and were deposited by tidal incursions along the River Arun. However, the prior geoarchaeological DBA highlighted the possibility that the c. 21m of fine-grained deposits recorded 20m south of Black Ditch in geotechnical borehole WSP BH03 (see Figure 1), are intertidal or marine sediments of the last [Ipswichian, Marine Isotope Stage (MIS) 5e] interglacial (Watson and Wilkinson 2017).

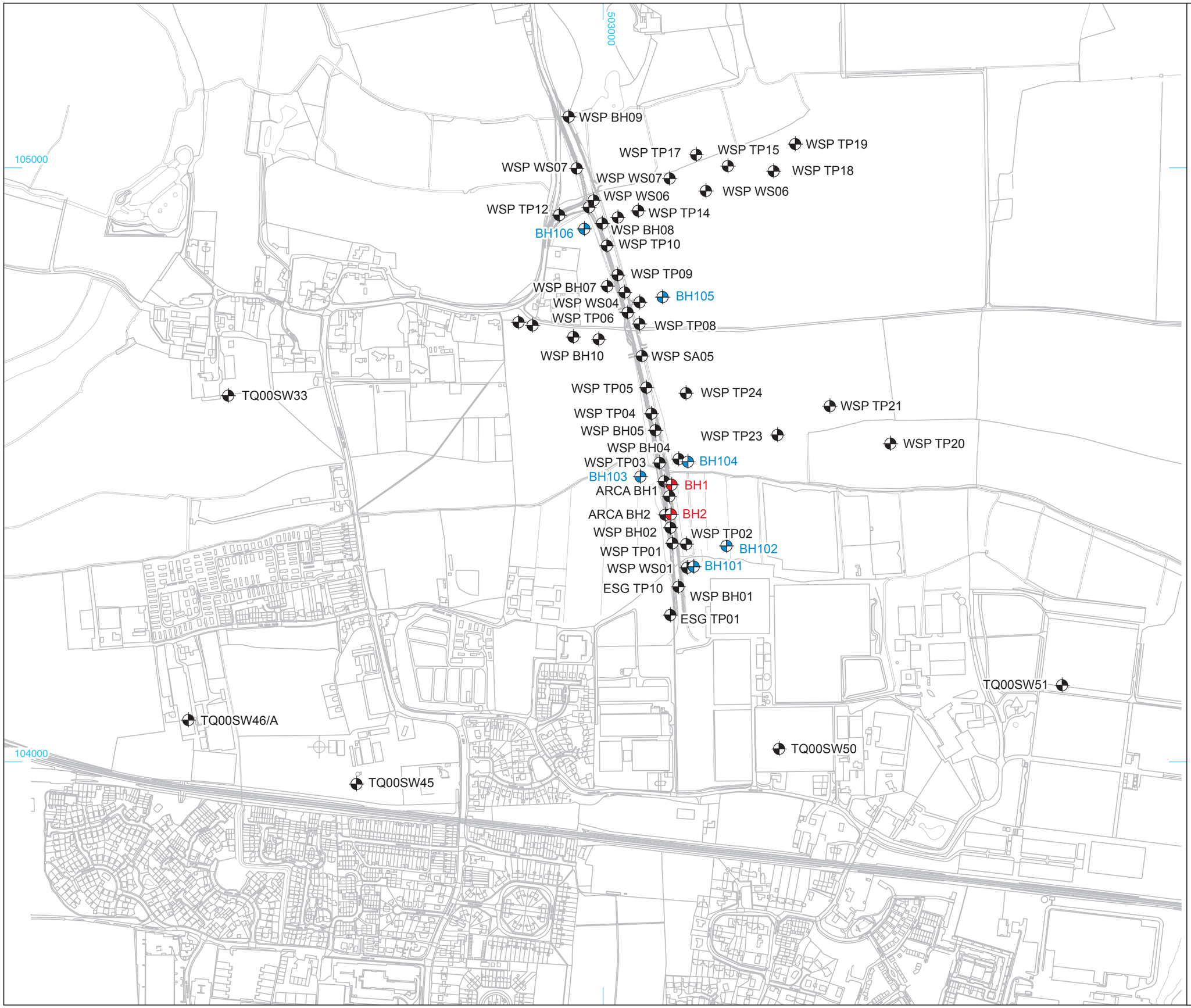
1.6 Given the uncertain interpretation of the deposits outcropping immediately south of Black Ditch, the aims of drilling the two geoarchaeological boreholes in this area was to:

1.6.1 Determine the genesis of the fine-grained strata previously encountered in WSP BH103;

1.6.2 Suggest a likely age for the deposits;

1.6.3 Provide an outline assessment of the archaeological and palaeoenvironmental potential of the deposits;

1.6.4 Make recommendations on further works to further address Aims 1.6.2-1.6.3 above.



Cotswold Archaeology
Andover01264347630
Cirencester01285771022
Exeter 01392826185
MiltonKeynes 01908564660
w www.cotswoldarchaeology.co.uk
e enquiries @cotswoldarchaeology.co.uk

PROJECT TITLE

Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Location of ARCA geoarchaeological boreholes plotted alongside geotechnical sample points and lithostratigraphic records in the BGS borehole database

DRAWN BY	**CP**	*PROJECT NO.*	**770525**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**01/12/2017**	**1**
APPROVED BY	**REG**	*SCALE@A3*	**1:6,000**	

2 METHODOLOGY

2.1 The positions of the two geoarchaeological boreholes were located by reference to the previous geotechnical study (Endsor and Burrows 2014) and using the ArcGIS GIS software. Ordnance Survey (OS) coordinates for the boreholes were then uploaded from ArcGIS to a Leica System 1200 RTK GPS, and the stake out function of that device used to mark out borehole positions in the field. The System 1200 GPS was then used to record the elevation of the boreholes with respect to Ordnance Datum (OD).

2.2 The boreholes were advanced by technicians of Geotechnical Engineering Ltd (GE) between 23 and 26 May 2017, and overseen (on 23 May) by the author. Initially a 1.2m-deep inspection pit was hand dug at each borehole location to check for services and obstructions (none were found in either borehole), while strata exposed in the walls were described using the protocols set out below (Figure 2).

Figure 1. Inspection pit for ARCA BH1

2.3 A Pioneer 2 dynamic probing rig capable of both percussive and rotary drilling was employed to collect continuous 112mm

diameter cores with the cased boreholes and from the base of the inspection pit to the bedrock (Geotechnical Engineering 2015) (Figure 3). Cores were retained in Perspex tubes of 1.5m length and placed in labelled 'core boxes' (see Figure 4 and Figure 6) for transport to GE's warehouse in Quedgeley, Gloucester.

Figure 2. Technicians from GE employing a Pioneer 2 rig to advance ARCA BH1. Casing is being inserted into the borehole to prevent collapse of the walls, while core chambers are lying on the trestles

2.4 In GE's warehouse the Perspex tubes containing the cores were cut open using a Stanley knife with a hooked blade and the uppermost 5mm of sediment was sliced off with a sharp kitchen knife. The strata so exposed were photographed with a 13MP camera (Figure 4) and then described onto an Apple iPad running Microsoft Excel and using standard geological criteria (Jones *et al.* 1999, Munsell Color 2000 Tucker 2011). Sub-sample blocks of 10mm thickness were collected opportunistically from all strata, but systematically at 40-80mm intervals from organic units for biostratigraphic assessment and ^{14}C dating (see Section 4).

2.5 Upon completion of the photography, description and sub-sampling, the borehole cores were discarded (the cores cannot

easily be removed from their boxes once opened, while there are logistal problems in placing the core boxes in cold storage).

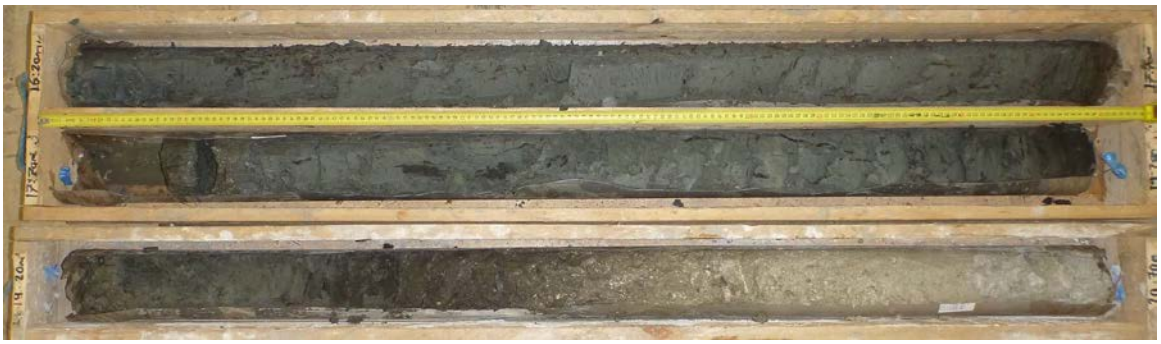


Figure 3. Borehole cores [ARCA BH1 16.20 (top left) to 20.70m BGL (bottom right)] prior to description in the GE warehouse

2.6 Lithological descriptions and positional data from the geoarchaeological boreholes were combined within the same RockWorks database used for the geoarchaeological DBA (RockWare 2013, Watson and Wilkinson 2017). The lithological unit descriptions for the geoarchaeological boreholes were then interpreted in terms of the stratigraphic taxonomy of the BGS (1996, 2017b) mapping. The RockWorks software package was further used to plot the cross section in Figure 5. Location data for the geoarchaeological records are presented in Appendix 1, while lithostratigraphic description is given in Appendix 2.

2.7 The archive resulting from the present geoarchaeological study comprises sub-samples taken from the borehole cores (presently in cold storage at the University of Winchester pending decisions on biostratigraphic assessment and chronometric dating) and digital records. The latter comprise RockWorks records (in Microsoft Access format) detailing borehole locations and lithostratigraphy, and photographs of the lithostratigraphy of the borehole cores (in TIF format). The digital data are stored on the University of Winchester server (which is backed up daily to a second server in Germany). The digital archive will be transferred to West Sussex County Council on completion of the geoarchaeological works.

3 RESULTS

3.1 In the following discussion the lithostratigraphy of the two geoarchaeological boreholes is discussed in comparison to that from geotechnical records in the vicinity of the Black Ditch. A single composite cross section has been constructed through the deposits infilling the Black Ditch valley to aid discussion (Figure 5).

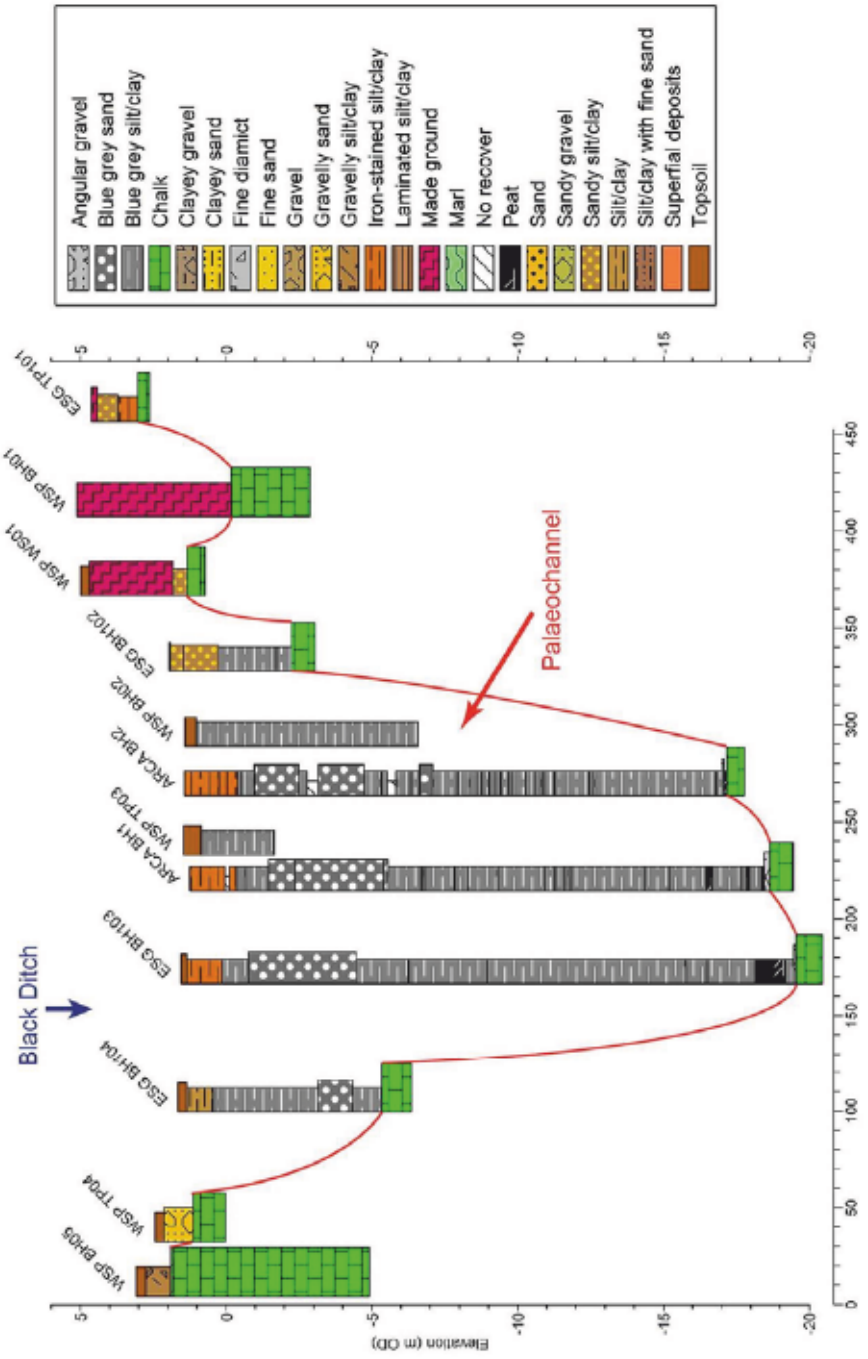


Figure 4. North (left) to south (right) composite cross section through deposits infilling the Black Ditch valley

3.2 The base of the geoarchaeological borehole stratigraphy rests on Chalk of the undifferentiated White Chalk Group at a maximum depth of 21.1m below ground level (BGL) in ESG BH103 (-19.56m OD) (Nottage 2017). In the two ARCA boreholes the depths to rockhead were 19.9 (BH1) 18.4m (BH2) BGL (-18.7 to -18.0m OD)] (Figure 5). The Chalk is present in ARCA BH1 and BH2 as sub-angular to sub-rounded pebble gravels in a sand to clay-sized chalk matrix, properties that show demonstrate weathering.

3.3 Unconformably overlying the Chalk in both geoarchaeological boreholes is a 0.10-0.11m-thick moderately humified peat and which forms the matrix between angular flint gravels (Figure 4). Plant macrofossils were not noted within the peat, which also appears to have been truncated and thus only survives as interstitial fill. It is notable that deposits at 17.2 – 20.8m BGL in WSP BH03 are described as: 'soft, blue grey, silty clay with traces of decomposed vegetation' (Endsor and Burrows 2014), while ESG BH103 contains 'pockets' of peat in otherwise clay and silt deposits between 17.3 and 20.7m BGL (Nottage 2017), suggesting that the peat outcrop is continuous across the base of the Black Ditch valley. The presence of the peat remnant indicates the presence of a terrestrial – albeit waterlogged - surface overlying the Chalk.

3.4 The peat is overlain in ARCA BH2 by a 0.07m-thick chalk diamict comprising pebble- and granular-sized sub-angular and sub-rounded chalk clasts in a dark grey silt and clay matrix. The gravels have probably accumulated as a result of relatively high energy colluvial (i.e. terrestrial) processes, while the interstitial fill is derived from the overlying marine and intertidal succession.

3.5 The remaining 18.43m of the sequence in ARCA BH2 comprises blue grey silts/clay and sands; a succession that also appears in ARCA BH1 between 19.71m BGL and the present ground surface (Figure 5). However, whereas the strata in ARCA BH2 follow the simple tripartite order of intertidal/marine sediments outlined in Section 3.6 below, those in ARCA BH1 include two further thin (i.e 0.08-0.18m) beds of peat between 17.73 and 19.20m BGL (see Figure 4). The peats are autocompacted (i.e. compressed by the weight of the overlying sediment stack), moderately humified and contain herbaceous plant remains. They are conformably interbedded with marine/intertidal sediments of Facies 1 (see Section 3.6). The presence of intercalated terrestrial strata (i.e. the peats) with marine/intertidal deposits suggests oscillating depositional environments during accretion of this part of the sequence, i.e. that the locus of ARCA BH1 sat at the margins of the

tidal frame whilst the deposits between 17.73 and 19.71m BGL accreted. The fact that there are no similar peats in ARCA BH2 might suggest that the peat/intertidal/marine sequence in ARCA BH1 predates the marine/intertidal sequence in ARCA BH2. The elevation differences between the marine/intertidal contact with the Chalk in the two geoarchaeological boreholes are further evidence supporting the same hypothesis (see Figure 5)

3.6 The marine and intertidal sequence in both geoarchaeological boreholes can be divided into two facies:
Facies 1: Mostly massive, well sorted silts and clays, with rare to occasional granular and fine pebble-sized marine mollusc fragments (see for example Figure 6). There are rare fine laminae of organic mud/peat (e.g. BH1 7.99-8.01m BGL), while the Value of the colour varies from Black (Munsell: 5 Y 2.5/1, through Very dark (5 Y 3/1) to Dark grey (5 Y 4/1), although the operation of redox processes (i.e. water table fluctuations leading to oxidation of iron minerals) within 2m of the present ground surface results in a yellow brown colour. Facies 1 forms the entire intertidal/marine sequence below 6.80m BGL in ARCA BH1 and below 8.52m BGL in ARCA BH2, while it is also found outcropping above deposits of Facies 2 at 2.72m BGL in ARCA BH1 and above 2.40m BGL in ARCA BH2. Facies 1 is likely to have formed in intertidal waters during ebb flow and either on mudflats or in channels (Reineck and Singh 1980, 315-320).

Figure 5. Borehole cores between 13.20 (top left) and 16.20m BGL (bottom right) from BH1 showing the lower part of the marine/intertidal sequence (Facies 1)

Facies 2: Well sorted, fining upwards sets of Very dark grey (Munsell: 5 Y 3/1) medium and fine sands containing moderate to frequent pebble-sized marine mollusc shell, including complete examples of cockle (*Cerastoderma edule*) and limpet (*Patella vulgata*), and fragments of oyster (*Ostrea* sp.). The shells are of near shore species and are concentrated within narrow zones within the beds. Facies 2 is mainly found as outcrops between 6.80 and 2.72m BGL in ARCA BH1 and at 8.40-2.40m BGL in ARCA BH2. The facies probably formed further down the tidal frame than

Facies 1, i.e. in sub-tidal conditions (Reineck and Singh 1980, 315-320).

3.5 Given the pattern in which Facies 1 and 2 are found in outcrop, the broad pattern of depositional environments is of mudflat/creek environments in the lower part of the sequence, followed by a phase of marine accretion, succeeded by a further period of intertidal mud flat/channel deposition. The present waters of the Black Ditch do not appear to be intertidal or indeed brackish, while the iron stained beds of Facies 2 within 2m of the surface suggest a change from intertidal to alluvial depositional environments.

4 ASSESSMENT

In this section of the report, the aims of the present geoarchaeological study as outlined in Section 1.6 are reviewed against the data that have been recovered and described in Section 3.

4.1 Genesis of the fine-grained strata

4.1.1 The fine-grained strata that infill the Black Ditch valley to a depth of 21.1m BGL comprise terrestrial peats overlain by intertidal and marine silt/clays and sands. Trends within the sequence suggest that early on in the succession there was alternation of terrestrial and intertidal deposition, after which the latter dominated. As relative sea levels (RSL) continued to rise, intertidal mud flats and creeks are likely to have been succeeded by a marine inlet. The latter then reverted to mud flat and intertidal creeks, almost certainly as a result of a slow down in RSL rise. Intertidal conditions were later transformed into the alluvial environment that is current today. Water table fluctuations in the latter have resulted in diagenesis of the upper mud flat/creek deposits, resulting in dark grey to yellow brown colour changes in the sediments.

4.2 Age of the fine-grained deposits

4.2.1 It is almost certain that terrestrial peats, intertidal/marine silt/clays and sands are of Holocene age. The course of Holocene sea level history along the West Sussex coast is known in general terms, but chronology is poorly understood. Nevertheless comparing outcrop elevations from the Black Ditch deposits with those from the lower Thames Estuary and which are associated with a ^{14}C chronology can provide a broad indication of age. These data would suggest that the peats forming the base of the Black Ditch superficial sequence date to between 10,000 and 8500 calendar years before present (cal. BP) (Devoy 1979). Consequently the upper 21m of the sequence will date from the Early to Late Holocene.

4.3 Archaeological and palaeoenvironmental potential

4.3.1 The fine-grained sequence in the Black Ditch valley is predominantly of intertidal and marine deposits. Although evidence of human activity might exist in the former, it would most likely relate to such activities as hunting, fishing and collection of plant foods rather than habitation. Human activity in the marine

environments that are envisaged for Facies 2 is very unlikely. For all these reasons, the intertidal/marine sequence is assessed as having a low archaeological potential.

4.3.2 The peats at the base of the sequence (19.71-17.73m BGL in ARCA BH1, 18.61-18.50m BGL in ARCA BH2) will have formed in a terrestrial (or at least semi-terrestrial) environment, albeit a waterlogged one. It is unclear from the morphological data whether the peats developed in salt or fresh water marsh, but both environments have been utilised by past human communities for the same types of activity noted in Section 4.3.1. The peats are assessed as having a moderate archaeological potential.

4.3.3 The inferences made in Section 3 and the first part of Section 4 with regard depositional environment are based solely on descriptions made of the core lithostratigraphy. Nevertheless they highlight changing environments, which probably occurred during periods of human activity in the surrounding area. The deposits contain well preserved flora (in the peat) and fauna (mollusc shells in the intertidal/marine deposits), while the Early Holocene is a period poorly represented in the West Sussex stratigraphic record. For these reasons, the intertidal/marine sequence is assessed as having a moderate palaeoenvironmental potential, while the basal peats are suggested as having a high palaeoenvironmental potential.

4.4 Recommendations

4.4.1 Construction of the road will have a very limited impact on the majority of the sequence reported here. The only direct truncation will be as a result of the insertion of piles to support the bridge over Black Ditch. Indirect damage of possible organic remains within the deposits is also likely to be minimal given the high water table (within 2m of the ground surface at the time the boreholes were drilled), the low elevation of Black Ditch valley (+1.2 to +1.5m OD) and the fact that the bedrock is porous (i.e. there is no risk of puncturing a perched water table). Nevertheless deposits of moderate-high palaeoenvironmental potential – but whose genesis and age is poorly understood - will be both removed and disturbed by pile driving. It is therefore recommended that the basal peats in ARCA BH1 are the subject of ^{14}C dating and pollen assessment, while foraminiferal and/or diatom assessments are made of the intertidal/marine sequence.

5 ACKNOWLEDGEMENTS

5.1 ARCA would like to thank Richard Greatorex and Joe Whelan (Cotswold Archaeology); Wayne Fitton, Liam Hergest and Terry Cox (Geotechnical Engineering) and Chris Brown (Jackson Civil Engineering) for their help during the course of the field and laboratory work reported here.

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APPENDIX 1 GEOARCHAEOLOGY BOREHOLE LOCATIONS

Record	Easting	Northing	Elevation (m OD)
BH1	503116.299	104455.745	+1.249
BH2	503112.913	104407.339	+1.431

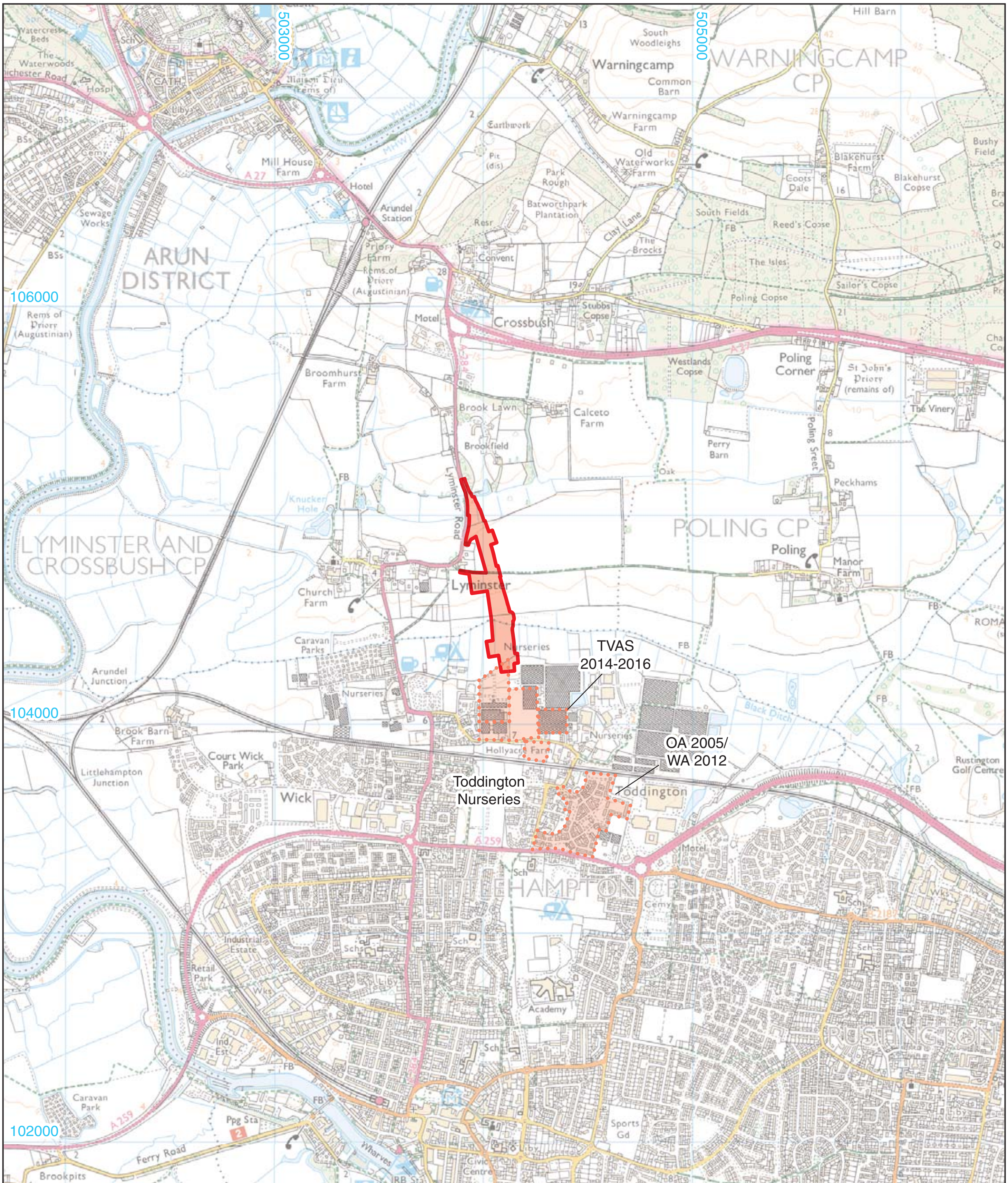
APPENDIX 2 BOREHOLE STRATIGRAPHY

Bore	Top (m)	Base (m)	Lithology	Description
ARCA BH1	0.00	1.20	Iron-stained silt/clay	Light yellow brown silt/clay with frequent vertical iron stains declining downwards. Well sorted. Diffuse boundary to:
	1.20	1.36	No recover	Void
	1.36	1.60	Iron-stained silt/clay	Light yellow brown silt/clay with frequent vertical iron stains declining downwards. Well sorted. Diffuse boundary to:
	1.60	1.92	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with moderate vertically-orientated pebble-sized iron stains. Rare granular mollusc shell. Well sorted. Diffuse boundary to:
	1.92	2.72	Grey blue silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with rare granular-sized patches of 2.5 2.5/1 organics. Diffuse boundary to:
	2.72	3.62	Blue grey sand	5 Y 3/1 Very dark grey fine-medium sand, fining upwards to fine sand (minor silt content). Becoming less compact up sequence. Rare granular marine mollusc fragments. Diffuse boundary to:
	3.62	6.64	Blue grey sand	5 Y 3/1 Very dark grey well-sorted medium sand, fining upwards to medium-fine sand. Rare granular-size marine mollusc fragments.
	6.64	6.80	Blue grey sand	5 Y 3/1 Very dark grey medium sand with moderate fine and coarse wavy, discontinuous non-parallel laminae of light blue grey silt/clay. Laminae thicken downwards. Well-sorted within structures. Rare pebble-granular size marine mollusc shell. Sharp boundary to:
	6.80	7.92	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay. Possible lamina structure at top. Diffuse boundary to:
	7.92	7.99	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay. Diffuse boundary to:
	7.99	8.06	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with single fine lamina of compressed organics at surface. Diffuse boundary to:
	8.06	9.10	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with moderate granular and pebble-sized marine mollusc shell. Diffuse boundary to:
	9.10	9.54	Blue grey silt/clay	Mid blue grey well-sorted silt/clay with moderate granular and pebble-size marine mollusc fragments. Diffuse boundary to:
	9.54	10.57	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with few granular and pebble-size marine mollusc shell fragments.

Bore	Top (m)	Base (m)	Lithology	Description
ARCA BH1	10.57	12.19	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with few pebble and granular-sized marine mollusc fragments, increasing to moderate below 12.00m. Diffuse boundary to:
	12.19	12.53	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with moderate pebble and granular-size marine mollusc fragments. Diffuse boundary to:
	12.53	12.83	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with occasional granular and pebble-size marine mollusc shell fragments. Diffuse boundary to:
	12.83	12.94	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay. Diffuse boundary to:
	12.94	13.07	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with occasional pebble and granular-size marine mollusc shell. Diffuse boundary to:
	13.07	15.6	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with occasional granular and pebble-size marine mollusc shell. Diffuse boundary to:
	15.6	16.44	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with occasional granular marine mollusc shell fragments.
	16.44	17.73	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with moderate becoming frequent vertical fine roots (concentrated at 16.44m). Sharp boundary to:
	17.73	17.91	Peat	Mid red brown highly compact herbaceous peat formed of well-preserved plant macrofossils. Compressed during drilling to 25% volume. Sharp boundary to:
	17.91	18.93	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with single pebble diameter root cast from 18.20 to 18.36m filled with red brown highly humified peat, and occasional fine pebble-granular diameter root casts of <50mm length filled with the same below. Occasional granular size marine mollusc fragment. Diffuse boundary to:
	18.93	19.12	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay thinly laminated (wavy, parallel continuous and discontinuous) with red brown moderately humified peat. Sharp boundary to:
	19.12	19.20	Peat	Red brown compact peat of herbaceous plant macro remains. End of core.
	19.20	19.61	Blue grey silt/clay	5 Y 4/1 Dark grey well-sorted silt/clay with moderate fine-coarse wavy non-parallel, discontinuous organic/peat laminae at 19.38-19.44m and same, but parallel laminae at 19.57-19.61m. Sharp boundary to:

Bore	Top (m)	Base (m)	Lithology	Description
ARCA BH1	19.61	19.71	Peat	2.5 Y 2.5/1 Black highly humified peat with moderate sub-angular flint pebbles, increasing downwards. Poorly sorted (peat forming on/within flint gravel). Diffuse boundary to:
	19.71	19.9	Angular gravel	Angular gravel of sub-angular and angular flint pebbles and cobbles in an organic mud/highly humified peat matrix. Poorly sorted. Sharp boundary to:
	19.9	20.70	Chalk	Gravel of sub-rounded and sub-angular Chalk granules to pebbles in a granular to silt Chalk matrix. Poorly sorted. Weathered surface of Chalk.
ARCA BH2	0.00	1.20	Iron-stained silt/clay	Light yellow brown silt/clay with frequent vertical iron stains declining downwards. Well sorted. Diffuse boundary to:
	1.20	1.83	Iron-stained silt/clay	Light grey brown well-sorted silt/clay with frequent pebble-sized iron stains, particular between 1.45 and 1.62m. Rare pebble-sized diameter roots. Diffuse boundary to:
	1.83	1.93	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay with two coarse pebble-sized diameter roots and occasional iron stains to granular size. Diffuse boundary to:
	1.93	2.4	Blue grey silt/clay	5 Y 4/1 Dark grey well sorted fining upwards silt/clay with rare granular-sized marine mollusc fragments. Occasional granular-size iron stains. Diffuse boundary to:
	2.4	3.92	Blue grey sand	5 Y 4/1 Dark grey fining upwards, well-sorted fine to medium sand with rare granular-size fragments of marine mollusc shell. Diffuse boundary to:
	3.92	4.2	Blue grey silt/clay	5 Y 3/1 Very dark grey well-sorted silt/clay coarse, coarsening upwards to silt/fine sand.
	4.2	4.6	No Recover	Void
	4.6	6.15	Blue grey sand	5 Y 4/1 Dark grey fining upwards medium/fine sand and silt. Single fine bed of 2.5 Y 3/1 Very dark grey organic mud/fine sand at 5.09-5.10m. Well sorted. Sharp boundary to:
	6.15	6.76	Grey blue silt/clay	5 Y 3/1 Very dark grey silt/clay. Well sorted. Diffuse boundary to:
	6.76	6.95	Blue grey silt/clay	5 Y 2.5/1 Black silt/clay (possibly organic). Well sorted. Unknown boundary.
	6.95	7.25	No recover	Void

Bore	Top (m)	Base (m)	Lithology	Description
ARCA BH2	7.25	7.78	Blue grey silt/clay	5 Y 2.5/1 Black silt/clay (possibly organic). Well sorted. Sharp boundary to:
	7.78	8.06	Blue grey sil/clay	5 Y 4/1 Dark grey silt/clay with occasional granular and fine pebble-sized marine mollusc shell fragments. Well sorted. Diffuse boundary to:
	8.06	8.52	Blue grey sand	5 Y 4/1 Dark grey fining upwards medium/fine sand and silt. Occasional fine pebble-sized marine mollusc shell fragments, except frequent pebble to granular marine mollusc shell fragments in medium/fine sands at 8.40-8.52m. Well sorted. Sharp boundary to:
	8.52	9.37	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with occasional granular and fine pebble-sized marine mollusc shell fragments. Well sorted. Diffuse boundary
	9.37	9.80	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay with occasional complete pebble-sized marine mollusc shells. Well sorted. Diffuse boundary to:
	9.80	10.05	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with occasional granular and fine pebble-sized marine mollusc shell fragments. Well sorted. Sharp boundary to:
	10.05	10.2	Blue grey silt/clay	5 Y 2.5/1 Black silt/clay (possibly organic). Well sorted. End of core.
	10.2	10.46	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay. Well sorted. Diffuse boundary to:
	10.46	10.69	Organic mud	5 Y 2.5/1 Black silt/clay (possibly organic). Well sorted. Diffuse boundary to:
	10.69	10.84	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay. Well sorted. Diffuse boundary to:
	10.84	11.12	Blue grey silt/clay	5 Y 2.5/1 Black silt/clay (possibly organic). Well sorted. Diffuse boundary to:
	11.12	11.28	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with frequent pebble to cobble-sized marine mollusc shell (including *Ostrea*) fragments. Well sorted. Sharp boundary to:
	11.28	11.70	Blue grey silt/clay	5 Y 3/1 Very dark grey mottled 5 Y 4/1 Dark grey silt/clay with moderate granular to fine pebble-sized marine mollusc shell fragments. End of core.
	11.70	12.00	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay. Well sorted. Diffuse boundary to:
	12.00	12.21	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with moderate fine pebble-sized marine mollusc shell fragments. Well sorted. Diffuse boundary to:
	12.21	12.33	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay. Well sorted. Diffuse boundary to:
	12.33	12.70	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay with moderate pebble-sized marine mollusc shell (frequent between 12.40 and 12.50m) fragments. Well sorted. Diffuse boundary to:



N

previous archaeological works

0 1km

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Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

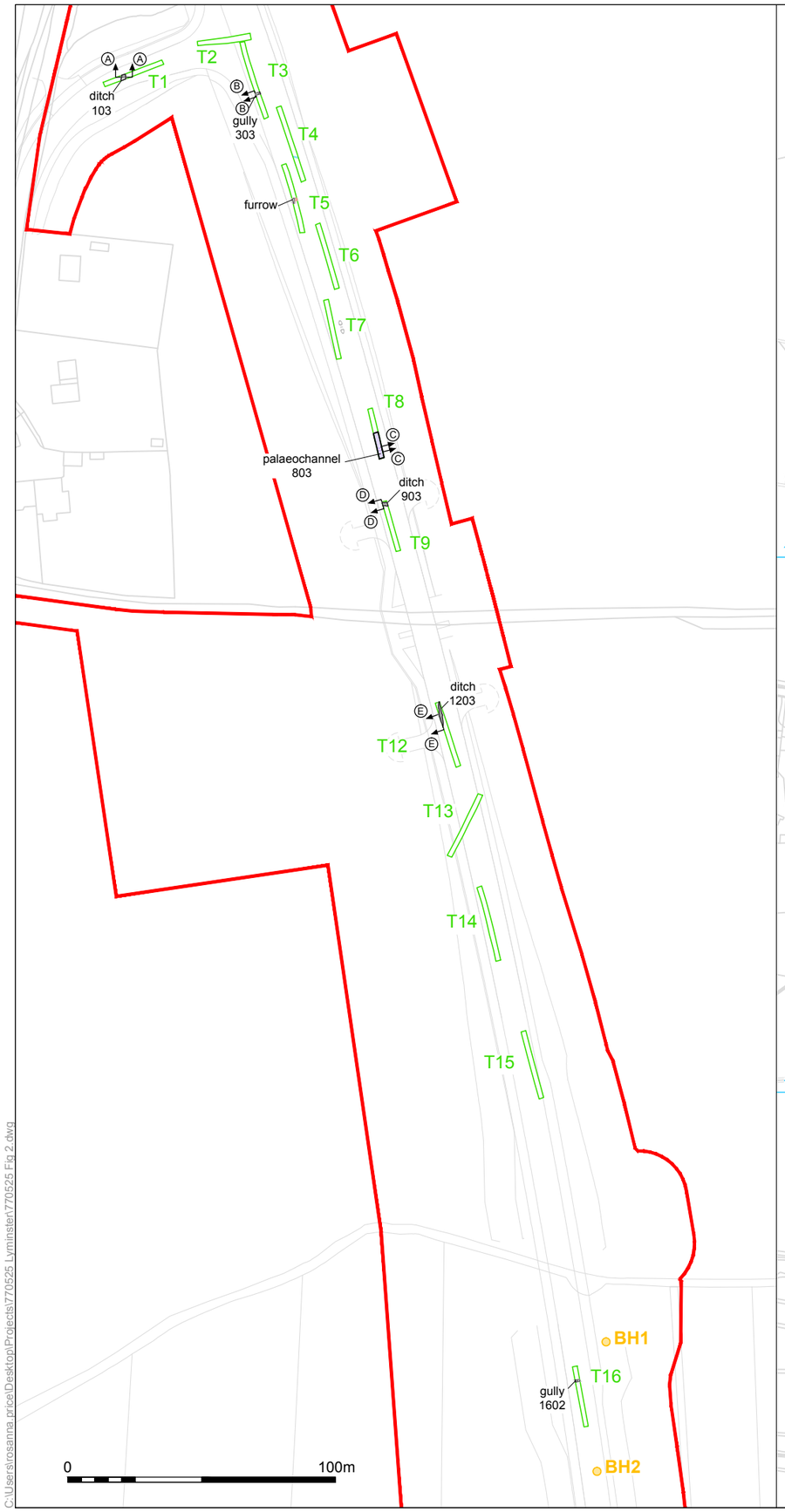
PROJECT TITLE

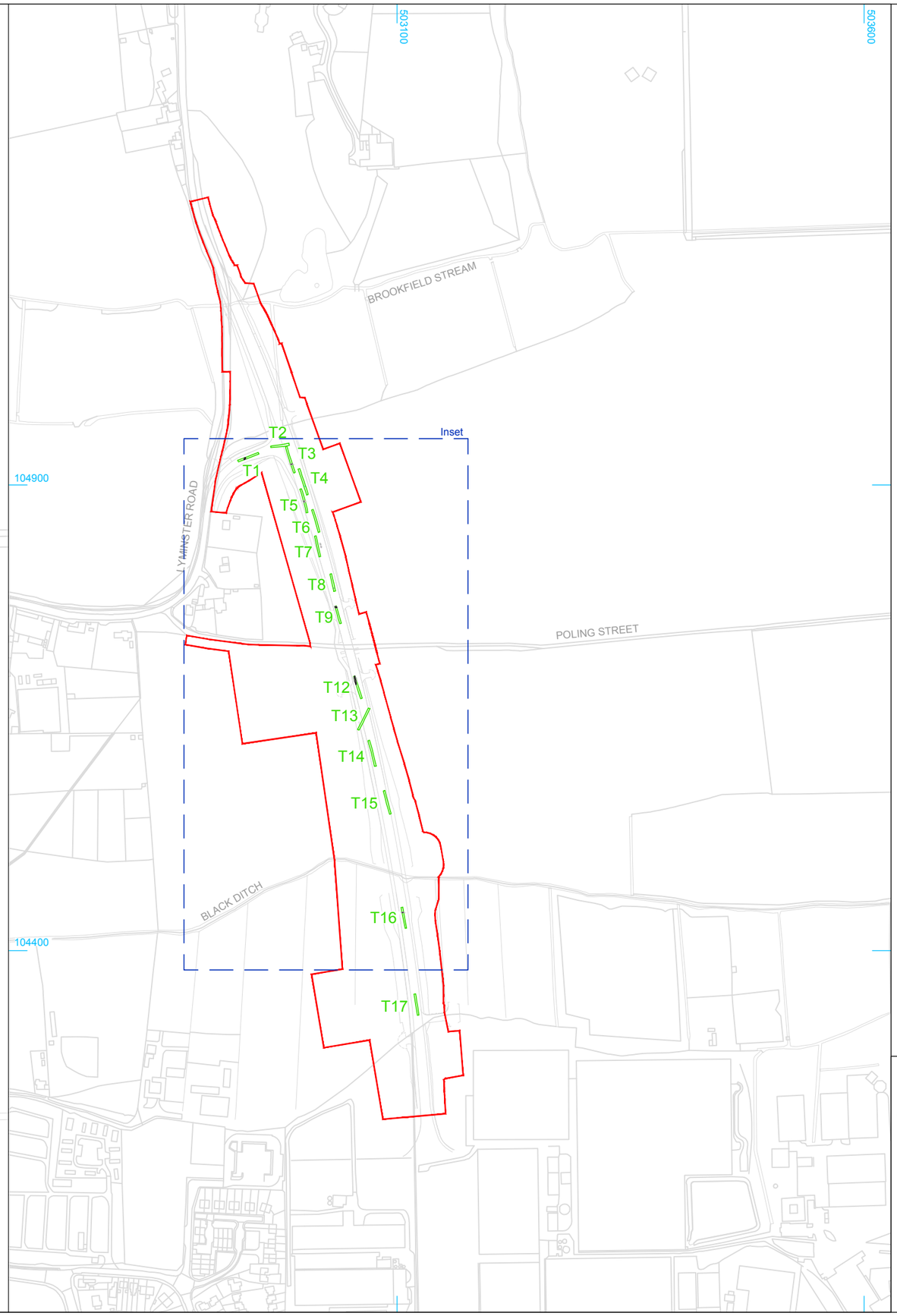
Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Site location plan

DRAWN BY	**CP**	*PROJECT NO.*	**770525**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**26/06/2017**	**1**
APPROVED BY	**RG**	*SCALE@A4*	**1:25,000**	





N

- site boundary
- evaluation trench
- archaeological feature
- geology
- furrow
- field drain
- treethrow
- BH geoarchaeological borehole
- section location

0 200m

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Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

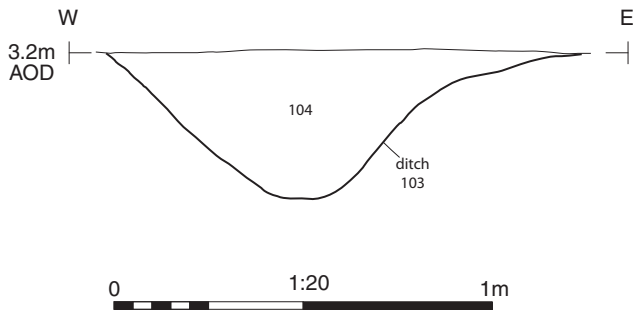
PROJECT TITLE
Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE
Trench location plan showing archeaological features and location of geoarchaeological boreholes

DRAWN BY	CP	PROJECT NO.	770525	FIGURE NO.
CHECKED BY	DJB	DATE	17/10/2017	2
APPROVED BY	RG	SCALE@A3	1:5,000 & 1:2,000	

C:\Users\rosanna.price\Desktop\Projects\770525 Lyminster\770525 Fig 2.dwg

Section AA



Trench 1, ditch 103, looking north (scale 1m)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

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FIGURE TITLE

Trench 1: section and photograph

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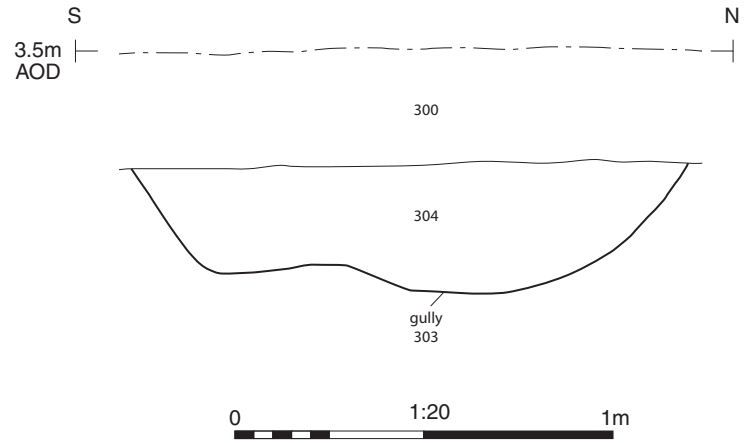
CHECKED BY	**DJB**	*DATE*	**26/06/2017**	**3**
APPROVED BY	**RG**	*SCALE@A4*	**1:20**	

Section BB



Trench 3, gully 303, looking west (scale 1m)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

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Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Trench 3: section and photograph

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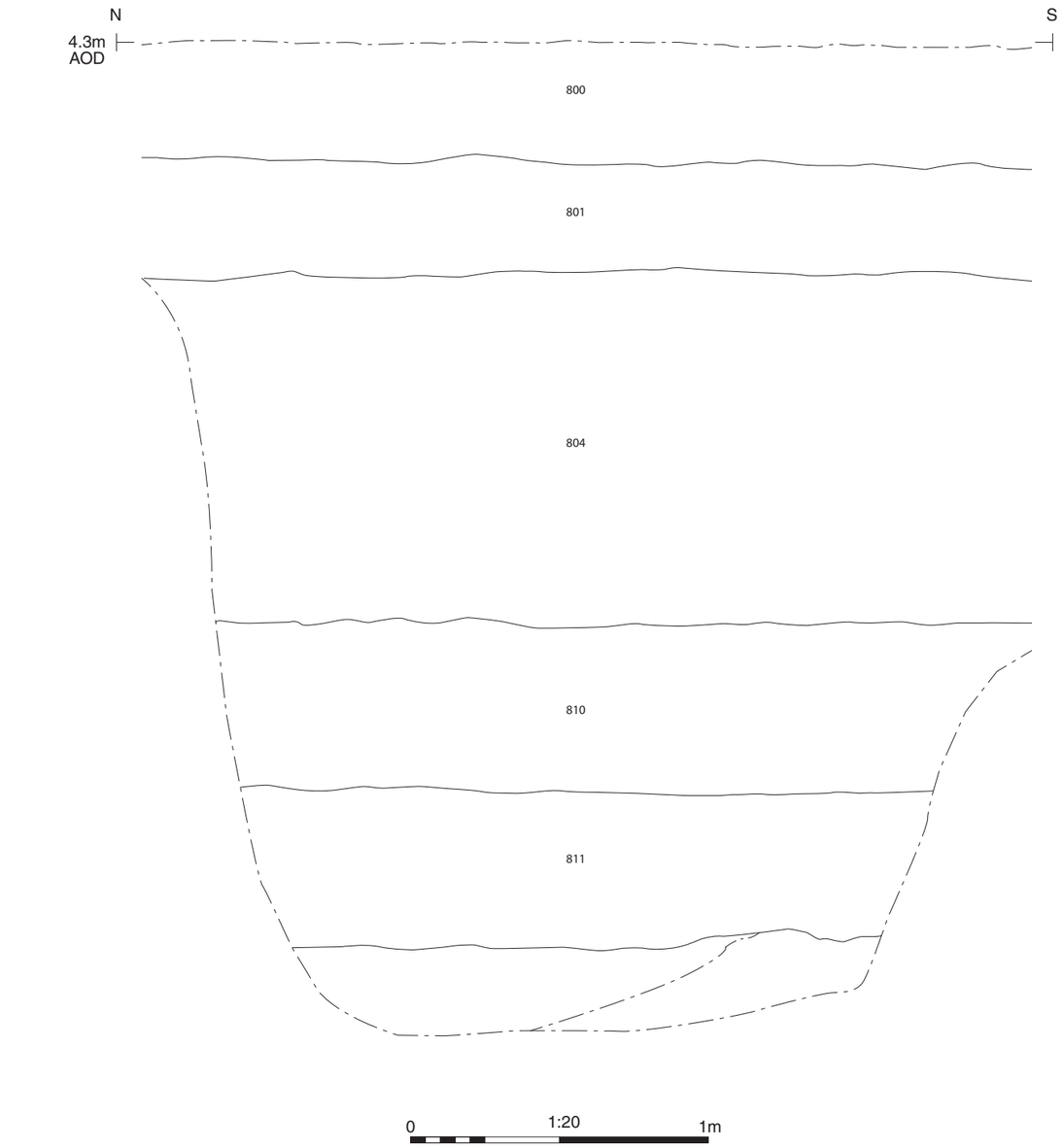
CHECKED BY	**DJB**	*DATE*	**26/06/2017**	**4**
APPROVED BY	**RG**	*SCALE@A4*	**1:20**	

Section CC



Trench 8, Palaeochannel 803, looking east (scale 1m)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

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Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Trench 8: section and photograph

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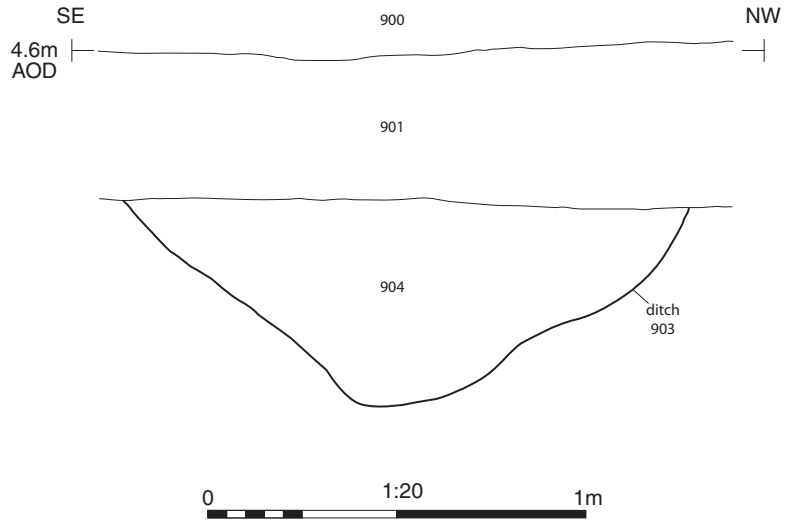
CHECKED BY	**DJB**	*DATE*	**26/06/2017**	**5**
APPROVED BY	**RG**	*SCALE@A3*	**1:20**	

Section DD



Trench 9, ditch 903, looking south-west (scale 1m)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

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Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Trench 9: section and photograph

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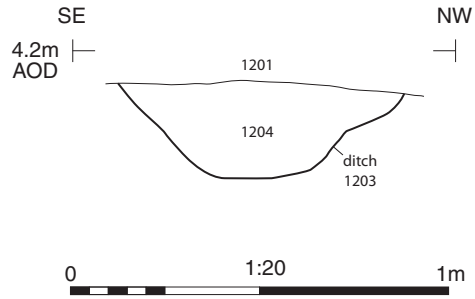
APPROVED BY	**RG**	*SCALE@A4*	**1:20**	

Section EE



Trench 12, ditch 1203, looking south-west (scale 0.2m)

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Lyminster Bypass, Lyminster, West Sussex

FIGURE TITLE

Trench 12: section and photograph

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CHECKED BY	**DJB**	*DATE*	**26/06/2017**	**7**
APPROVED BY	**RG**	*SCALE@A4*	**1:20**	

Bore	Top (m)	Base (m)	Lithology	Description
ARCA BH2	12.70	13.88	Blue grey sit/lay	5 Y 3/1 Very dark grey silt/clay. Occasional fine pebble-sized marine mollusc fragments. Well sorted. Diffuse boundary to:
	13.88	14.05	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay. Well sorted. Diffuse boundary to:
	14.05	18.25	Blue grey silt/clay	5 Y 3/1 Very dark grey silt/clay. Rare fine pebble-sized marine mollusc fragments. Well sorted. Diffuse boundary to:
	18.25	18.43	Blue grey silt/clay	5 Y 4/1 Dark grey silt/clay. Well sorted. Diffuse boundary to:
	18.43	18.5	Fine diamict	5 Y 3/1 Very dark grey silt/clay (interstitial fill) with frequent pebble and granular-size chalk fragments. Poorly sorted. Sharp boundary to:
	18.5	18.61	Peat	2.5 Y 2.5/1 Black moderately humified peat with frequent granular and fine pebble-sized sub-angular and sub-rounded chalk clasts. Poorly sorted. Sharp boundary to:
	18.61	19.20	Chalk	2.5 Y 6/2 Light brownish grey gravel of sub-angular and sub-rounded chalk pebbles and granules in a medium sand to silt Chalk matrix. Poorly sorted (weathered Chalk)

Cotswold Archaeology

Andover Office

Stanley House
Walworth Road
Andover
Hampshire
SP10 5LH

t: 01264 347630

Cirencester Office

Building 11
Kemble Enterprise Park
Cirencester
Gloucestershire
GL7 6BQ

t: 01285 771022

Exeter Office

Unit 53
Basepoint Business Centre
Yeoford Way
Marsh Barton Trading Estate
Exeter
EX2 8LB

t: 01392 826185

Milton Keynes Office

41 Burners Lane South
Kiln Farm
Milton Keynes
Buckinghamshire
MK11 3HA

t: 01908 564660

e: enquiries@cotswoldarchaeology.co.uk