

**ARCHAEOLOGICAL EVALUATION REPORT:
TRIAL TRENCHING AND AUGER SURVEY ON LAND OFF SUTTON ROAD, LEVERINGTON,
CAMBRIDGESHIRE**

Planning Reference: F/YR17/0304/F
NGR: TL 4540 1117
AAL Site Code: LESR 17
CHER Event Number: ECB5190
OASIS Reference Number: allenarc1-298142



Report prepared for Peter Humphrey Associates

By
Allen Archaeology Limited and
The Environmental Archaeology Consultancy
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Cover image: View of site during trench set out, looking northeast

Executive Summary

- Allen Archaeology Limited was commissioned by Peter Humphrey Associates to undertake an archaeological evaluation by trial trenching and a Stage 1 palaeoenvironmental assessment as a condition of planning consent for a residential development on land off Sutton Road, Leverington, Cambridgeshire.
- The site is archaeologically sensitive, lying in an area of archaeological interest and potential, being situated immediately to the west of the River Nene and to the east of a large earthwork known as Roman Bank, believed to be an early medieval sea defence.
- Three trenches, each measuring 50m long by 1.6m wide, and 12 boreholes were excavated across the site. They revealed a broadly consistent stratigraphic sequence for the site, comprising a modern topsoil and subsoil, overlying a series of flood and waterborne deposits, indicating that the whole of the site previously lay within the tidal zone of the River Nene. A former palaeochannel of the River Nene was recorded running through evaluation Trench 1 and Boreholes 8 and 9, infilled by marine sediments of a probable Saxon and medieval date, predating the post-medieval canalised course of the river to the east. It is recommended that these deposits are radiocarbon dated to confirm the date of the channel. Another possible natural channel was recorded in Trench 2 towards the south end of the site.
- Based on the results of the trenching and palaeoenvironmental assessment, the site has a negligible potential for archaeological remains. Any remains of potential archaeological interest would lie at a significant depth, potentially in excess of 24m depth.

1.0 Introduction

- 1.1 Allen Archaeology Limited was commissioned by Peter Humphrey Associates to undertake an archaeological evaluation by trial trenching and a Stage 1 palaeoenvironmental assessment as a condition of planning consent for a residential development on land off Sutton Road, Leverington, Cambridgeshire.
- 1.2 The fieldwork, recording and reporting conformed to current national guidelines, as set out in the Chartered Institute for Archaeologists '*Standard and guidance for archaeological field evaluations*' (CIfA 2014), and the Historic England documents '*Management of Research Projects in the Historic Environment*' (Historic England 2015a), '*Geoarchaeology. Using earth sciences to understand the archaeological record*' (Historic England 2015b) and '*Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation*' (English Heritage 2011), as well as the questions set out in, '*Research and Archaeology Revisited: a revised framework for the East of England*' (Medlycott 2011). The works followed a brief provided by Cambridgeshire HET (Stewart 2017), and a specification prepared by this company (AAL 2017).

2.0 Site Location and Description

- 2.1 The site is located towards the southeast of the historic core of Leverington, with the River Nene immediately to the east and Sutton Road to the west. The site is currently an area of flat pasture, centred on NGR TL 4540 1117 (Figure 1).
- 2.2 The local geology comprises Mudstones of the Ampthill Clay group, with superficial deposits of tidal flats, clay and silt (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>).

3.0 Planning Background

- 3.1 A planning application has been submitted for '*Erection of 227 dwellings, consisting of 10 x 3-storey 4-bed, 40 x 2-storey 4-bed, 106 x 2-storey 3-bed, 62 x 2-storey 2-bed, 8 x 2-storey 1-bed, and a 2-bed flat with associated garages, parking and landscaping involving the demolition of existing dwelling, industrial buildings and glass houses*' (Reference 2016/0208/F). Determination of the planning application has been deferred until sufficient information has been provided concerning the archaeological potential of the site, to allow the planning authority to make a reasoned decision as to the determination of the application and to establish any mitigation that may be necessary.
- 3.2 The approach adopted is consistent with the recommendations of the National Planning Policy Framework (NPPF), with the particular chapter of relevance being 'Chapter 12: Conserving and enhancing the historic environment' (Department for Communities and Local Government 2012).

4.0 Archaeological and Historical Background

- 4.1 There are two possible prehistoric barrows located to the southwest of the site, at Rabbit Hill (Cambridgeshire Historic Environment Record (CHER) Reference 04104) and Cherry Tree Hill (CHER Reference 04003). Rabbit Hill is a very large mound, measured at c.30m diameter and 6m high in the 19th century, and as such its date and interpretation is uncertain. There is also some debate about the origins of Cherry Tree Hill mound, which has been postulated as a

Roman barrow, a medieval mill mound or a Bronze Age barrow. Another mound nearby has been interpreted as a Civil War artillery bastion (CHER Reference MCB17291).

- 4.2 To the west of the site is a large earthwork known as Roman Bank, believed to be a sea defence and probably of early medieval date. A section c.600m long and located immediately to the west of the site is a Scheduled Monument (Scheduled Monument Number 1006887, CHER Reference 04448). The monument runs for some distance, enclosing the estuary of the River Nene in both Cambridgeshire and Norfolk.
- 4.3 Evidence for probable early medieval salt making has been recorded c.650m to the northwest of the site, where scatters of pottery and areas of burning were identified beneath the sea bank (CHER Reference 03960).
- 4.4 The parish church in Leverington is dedicated to St. Leonard. It is mainly of 13th century date, but with some 12th century fabric and alterations in the 14th, 15th and 19th centuries (CHER Reference CB14886). Trial trenching to the north of the church in advance of the extension of the burial ground recorded a number of pits and ditches of 12th to 14th century date, likely to represent settlement activity around the church (CHER Reference ECB3600). Several other archaeological interventions around the village have also identified medieval to post-medieval activity. For example, medieval settlement activity has been identified c.600m to the southwest of the site, where archaeological works recorded pits and ditches of medieval date, as well as a possible hearth or kiln, all sealed by a layer of subsoil with post-medieval features cutting this (CHER Reference MCB23225).
- 4.5 A hospital dedicated to St. John the Baptist was founded in Leverington in 1487, c.500m to the southwest of the site (CHER Reference 04001). Medieval finds in the area include an abbey token found somewhere to the south of the site (CHER Reference 03959).
- 4.6 One of the principal houses in the parish is Leverington Hall, located adjacent to the parish church (CHER Reference MCB18549). It is probably of Elizabethan origin, extensively rebuilt in 1641 by Robert Swaine, with later additions. It also has extensive walled gardens to the rear of the property (CHER Reference MCB18550).
- 4.7 Post-medieval activity in the area is represented by a number of pits and ditches recorded during archaeological work to the west of the site (CHER Reference CB14605), thought to be associated with the construction of the Chapter House, a 17th century property with brick boundary wall (CHER Reference MCB18553). The area also saw military activity during the Civil War, and another mound near to Rabbit Hill and Cherry Tree Hill mounds has been interpreted as a Civil War artillery bastion, as mentioned above (CHER Reference MCB17291). A further bastion is documented at Horseshoe Sluice on the River Nene just to the southeast of the site (CHER Reference MCB17292) to defend the sluice. The sluice was built by Cornelius Vermuyden in 1631.
- 4.8 The River Nene flows north immediately to the east of the site, its current route representing centuries of ongoing land reclamation and drainage. Several canalisation acts were passed during the 18th century to cut sections of drain between Northampton, Peterborough and The Wash, with the former course passing to the south of Wisbech to connect with the Great Ouse (CHER Reference MCB 20859).
- 4.9 Numerous post-medieval wind pumps are recorded in the area and illustrated on 18th century parish maps, generally these were located to the southeast of the site (CHER Reference 03952,

03953, 03954, 03955, 03956), and reflect the ongoing drainage of the fenland landscape in the post-medieval period.

5.0 Methodology

Evaluation trenching

- 5.1 The trial trenching methodology entailed the excavation of three trenches, each measuring 50m long by 1.6m wide (Figure 2). The fieldwork was undertaken by a team of experienced field archaeologists over a period of four working days between the 21st and 24th of August 2017.
- 5.2 The evaluation trenches were accurately located using a Leica GS08 RTK NetRover GPS unit receiving RTK corrections. A JCB 3CX wheeled excavator fitted with a smooth ditching bucket was used to remove topsoil, subsoil and underlying non-archaeological deposits in spits no greater than 10cm in depth. The process was repeated until the first archaeologically significant or natural horizon was exposed. Machine excavation was monitored at all times by an experienced field archaeologist.
- 5.3 Research objectives were identified with reference to the regional research framework (Medlycott 2011). This framework identified the site as having the potential to assist in meeting research objectives for the prehistoric to medieval periods, especially with the production of salt.
- 5.4 A full written record of the archaeological deposits was made on standard AAL context recording sheets. Archaeological deposits were drawn in plan and section at an appropriate scale (1:20 and 1:50), with OD heights being displayed on each class of drawing. Colour photography formed an integral part of the recording strategy with all photographs incorporating scales, an identification board and directional arrow, as appropriate.
- 5.5 Finds of all classes were collected, other than obviously modern material from modern overburden contexts, and were bagged and labelled with the appropriate deposit context number. All finds were processed (cleaned, marked and labelled as appropriate) at the offices of AAL, prior to assessment by approved specialists.
- 5.6 Each deposit or layer was allocated a unique identifier (context number), and accorded a written description, a summary of these are included in Appendix 1. Three-digit numbers within square brackets reflect cut features, e.g. [105].

Auger Survey

- 5.7 A strategy was agreed for the auger survey, comprising a transect of ten boreholes towards the north end of the site and two further boreholes to the south (Figure 2). The fieldwork was supervised by palaeoenvironmental specialist James Rackham, who labelled and produce a field record of the cores before removing them from site.
- 5.8 At the time of augering much of the site was covered with a crop of elephant grass (see cover image). It was not possible to refine the locations of the boreholes and so they were placed approximately where originally laid out on plan. Each auger point was located using a Leica GS08 GPS unit receiving RTK corrections. The area around this location was then cleared of vegetation

and flattened by JCB to create a level platform to allow the safe operation of the rig. The rig was set up at a convenient location on the platform and the coring was undertaken.

- 5.9 The drilling was undertaken using a Dando Terrier rig, using percussion coring, with sample tubes of 100mm internal diameter and 1m long. The boreholes were cased for the top three metres to avoid collapse and contamination of the cores by material falling down the borehole. The subsequent core (300–400cm) was taken using a sample tube of the same size, but below 390–400cm the deposits were hand augured as far as practical or a reduced size sampler (76mm) was used.
- 5.10 Coring was continued until the drilling crew indicated that there could be problems with the wet sands seizing up the sampler and casing (the wet sands blow up between the sampler and casing and cannot be extracted). Where the base of the borehole was investigated using the hand auger, coring was stopped when the auger could no longer penetrate further into the wet sands which repeatedly filled the augured hole.
- 5.11 The cores were split, cleaned, photographed and logged (

- 5.12 Appendix 2 and Appendix 3). A total of 54 cores were logged and the base of five boreholes was logged on site using the hand auger. All cores were discarded except those from BH8 and part of BH9. These have been wrapped in cling film and stored in a cool environment against the need for any further study.
- 5.13 The logged data was used to reconstruct diagrammatic sections of the deposits along each Transect (Figure 5), which are used as the basis of the deposit model for the site.

6.0 Results

Evaluation Trenching (Figure 3 and Figure 4)

- 6.1 The stratigraphic sequence of the site was broadly consistent, comprising a 0.08–0.28m thick friable very dark brown sandy silt topsoil layer, overlying a 0.18–0.26m thick dark brown silty sand subsoil. This in turn overlay a yellowish brown laminated fine sand that has been interpreted as the most natural alluvial deposit. A layer of modern rubble, 103, was also identified at the east end of Trench 1.
- 6.2 Archaeological remains were encountered in two of the three excavated trenches, with the remains of the old channel of the River Nene, [105], encountered in Trench 1 and another natural channel, [205], encountered in Trench 2. No dating material was recovered from either of these features.
- 6.3 The pre-canalised channel of the River Nene was identified in Trench 1, [105]. It was extremely diffuse, indicated primarily by a series of laminated silts, 104, sloping down gently to the east, describing the western edge of the channel. The channel was hand augured to just below 1m OD (c.2.7m below the existing ground surface), revealing further tidal laminations overlying a deposit of soft grey sand, 106, which has been interpreted as a silting deposit with the lower fills of the channel.
- 6.4 The feature identified in Trench 2, [205], likely represents the remains of a small natural watercourse and contained a mottled brownish grey sandy silt deposit, 204.



Plate 1: West-facing section of former channel [205], scales 1m and 0.5m

Auger Survey (Figure 5)

- 6.5 The sequence was fairly uniform in all the boreholes except BH8 and BH9, which lay in the old channel of the River Nene.
- 6.6 The site was covered by a sandy silt loam topsoil, overlying a fine sandy loam ploughsoil which contained small amounts of charcoal and brick. In BH11 a layer of brick and ash suggests a path, possibly associated with this part of the site's use as a nursery. Underlying these deposits were laminated fine sands with occasional silt laminae indicating an intertidal sand flat zone along the sides of the tidal river.
- 6.7 With increasing depth the laminae petered out, becoming wet banded fine sands, with occasional darker bands rich in comminute coal. These wet sands occurred to 5m depth and an elevation of just below -1m OD.
- 6.8 In none of the boreholes was a buried land surface recorded and for the whole of the depositional sequence cored across (i.e. the top 5m of sediment) the site lay within the intertidal zone until it was reclaimed in the post-medieval period.
- 6.9 Only boreholes BH8 and BH9 showed a different pattern. These two boreholes lay within and immediately next to the line of the former course of the River Nene, prior to its canalisation in the 18th century. These two boreholes were characterised by a series of banded and laminated sands and silts, laminated silts and silts, either dark grey or very dark grey unoxidised sediments with occasional surviving wood fragments. These deposits lay between 0m and 2.0m OD and were covered by similar laminated fine sands as the rest of the boreholes, although not necessarily of the same age. The laminated sands were covered by a soil which lay in the hollow of the former channel and which was covered by later sediments infilling the hollow, which now survives only as a slight depression in the ground surface.

7.0 Discussion

- 7.1 It is clear from the boreholes and evaluation trenching that the whole of the site previously lay within the tidal zone of the River Nene and that no buried land surface lies above -1.0m OD.



Plate 2: Laminated deposits at the eastern edge of former channel [105], looking north-northeast.
Scale 1m

- 7.2 This contrasts with the work conducted on the bypass to the west and south of Wisbech for the Fenland Survey (Waller 1994), which consistently recorded peats between 0.2m and 0.75m OD indicating a marshy landscape rather than a marine one. The radiocarbon dates associated with that work suggest a marine regression in the early to middle Iron Age and the onset of peat growth and a return to marine conditions in the late Iron Age (*ibid.*). It is possible that similar deposits could have been eroded from the site by the tidal river if this moved from elsewhere in the valley, but if this course of the river has any antiquity (i.e. flowed broadly along this line in the 1st millenniums BC and AD then there has not been a terrestrial episode at the site in the last two to three thousand years.
- 7.3 The fine silts recorded in the former river channel (BH8 and BH9 and Trench 1) lie at similar and higher levels to the peats recorded along the Wisbech bypass, clearly relating to a period of higher sea level post-dating these peats. This suggests that these deposits relate to the Saxon and medieval tidal river channel course visible on the LIDAR images and marked by parish, municipal and early (pre-canalisation) district boundaries. The boreholes were not deep enough to record whether the earlier channels followed a similar course. Confirmation of the date of the channel could be obtained by radiocarbon dating organic material from the channel silts.
- 7.4 The sea bank to the west, 'Roman Bank', marks the location of the late Saxon and medieval sea defences but the site lies seaward of these defences and clearly continued to be inundated by marine tides with the continued build-up of marine sediments between the tidal river channel and the sea bank.
- 7.5 The banded fine wet sands in the base of the cored sequence corresponds to Shennan's (1994) Zone 11 (intertidal sand flats) while the laminated fine sands and occasional silt laminae characteristic of the upper part of the sequence can be related to deposition in a relatively higher altitudinal position.
- 7.6 Only the modern ploughsoil contains a significant silt element and this could derive from overbank flooding of the river since canalisation. The site lies towards the southern margins of the distribution of the sand facies plotted by Brew *et al.* (2000), which is consistent with the

borehole results, and in the reconstruction of the palaeocoastlines these authors have the site on the marine side from 7000 years cal BP right up to 2000 years cal BP (late Iron Age). Radiocarbon dates associated with a transgressive phase indicate inland movement of the coastline through the Roman and Saxon periods, which suggests that the site had, until its reclamation in the post-medieval period, been in the intertidal zone for several thousand years. Any palaeo-landsurfaces are likely to be buried at much greater depth than five metres, at the bottom of the marine sediments, perhaps as much as 26m below the modern ground level (see Brew *et al.* 2000).

- 7.7 A borehole 24.38m deep on the opposite side of the river, to the east, failed to bottom the probable marine sediments (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html?>).

8.0 Conclusions

- 8.1 There are no buried land surfaces in the top 5m of deposits across the site; the models for the palaeocoastlines in this area suggest the site has lain in the marine zone for some 7000 years until post-medieval reclamation, despite the Saxon and medieval sea bank lying some 400m to the west and two potential Bronze Age barrows within another one or two hundred metres further west (although there is some doubt about the date and interpretation of these features). The proposed development will not therefore impact on any archaeology at the site, other than post-medieval sediments.
- 8.2 The sediments from the tidal river channel have some potential for palaeo-environmental analysis but, since they were deposited in a tidal channel that lay within a landscape of tidal sand flats, the archaeological value of their story is to some extent limited. The identifiable materials in the sediments, such as pollen, diatoms and any macrofossils can be expected to include many reworked items and pollen transported some distance from upstream, and only a very broad regional picture could be reconstructed rather than detailed information on the adjacent agricultural landscape beyond the sea bank. It would however be useful to obtain radiocarbon dates for the silt sequence and establish the date and duration of this channel and its relationship to the coastline and sea level data.

9.0 Effectiveness of Methodology

- 9.1 The trial trenching and auger survey methodology employed was suited to the scale and nature of the project in determining the nature of the archaeology present and the potential impacts of the proposed development. It has indicated a negligible archaeological potential for the site, exposing only layers associated with the tidal activity of the nearby River Nene.

10.0 Acknowledgements

- 10.1 Allen Archaeology Limited would like to thank Peter Humphrey Associates for this commission. The coring was undertaken by Site Investigation Services of Willoughton, Gainsborough. The cores were split, cleaned and photographed by Trude Maynard of the Environmental Archaeology Consultancy.

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Appendix 1: Trench Context Summary List

Trench 1

| Context | Type | Description | Width (m) | Thickness/depth (m) | Interpretation |
|---------|-------|---|-----------|---------------------|---|
| 100 | Layer | Friable very dark brown sandy silt with occasional very small stones and charcoal flecks | | 0.28 | Topsoil |
| 101 | Layer | Firm very dark greyish brown sandy silt with moderately frequent small stones and charcoal flecks | | 0.2 | Subsoil |
| 102 | Layer | Firm medium bluish grey very fine sand with occasional charcoal and CBM flecks | | 0.38 | Natural flood deposit |
| 103 | Layer | Friable dark orangey brown silty sand with very frequent stones, glass and modern CBM and plastic | | 0.26 | Rubble layer to the east end of trench |
| 104 | Layer | Compact light brownie yellow very fine silt and sand, made up of many layers of laminations | | >2 | Natural flood deposit |
| 105 | Cut | Number assigned to old river course possibly sealed by laminated flood deposit 104 and containing | | | Former channel |
| 106 | Fill | Soft grey very fine sand | | - | Silting within former river channel [105] |

Trench 2

| Context | Type | Description | Width (m) | Thickness/depth (m) | Interpretation |
|---------|-------|---|-----------|---------------------|--------------------------------------|
| 200 | Layer | Friable dark brown sandy silt with occasional small stones charcoal specks | | 0.18 | Topsoil |
| 201 | Layer | Firm dark greyish brown sandy silt with moderately frequent small stones, charcoal flecks and yellow sand patches | | 0.26 | Subsoil |
| 202 | Layer | Soft yellowish brown very fine sand with frequent iron panning | 2.09 | 0.23 | Subsoil |
| 203 | Layer | Moderately compacted m yellowish brown very fine sand laminated with iron panning. | | - | Natural flood deposit |
| 204 | Fill | Compact mid brownish grey silty sand very bio-turbated with occasional charcoal flecks | | 0.26 | Natural silting within channel [205] |
| 205 | Cut | Northwest-southeast orientated linear with moderately steep straight sides and uneven base | 2.42 | 0.26 | Natural water channel |

Trench 3

| Context | Type | Description | Width (m) | Thickness/depth (m) | Interpretation |
|---------|-------|--|-----------|---------------------|------------------------|
| 300 | Layer | Friable dark brown sandy silt | | 0.08 | Topsoil |
| 301 | Layer | Loose dark greyish brown silty sand | | 0.18 | Subsoil |
| 302 | Layer | Soft mid yellowish brown sand with frequent iron panning | | - | Natural flood deposits |

Appendix 2: Borehole Logs

Borehole 1

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0–100cm | 0–10 | Empty |
| | 10–14 | Turf |
| | 14–7.5 | dark brown fibrous organic layer (turf root mat) |
| | 17.5–27 | very dark greyish brown (10YR 3/2) sandy silt loam |
| | 27–45 | dark greyish brown (10YR 4/2) very fine sandy loam |
| | 45–82 | laminated yellowish brown (10YR 5/4) very fine sands |
| | 82–100 | laminated yellowish brown (10YR 5/4) very fine sands with fine silt laminae |
| 100–200cm | 100–110 | empty |
| | 110–147 | laminated fine and fine-medium sands with occasional silt laminae near top |
| | 147–200 | wet laminated brown (10YR 5/3) fine sands |
| 200–300cm | 200–300 | brown (10YR 5/3) fine sands, wet, with occasional visible laminations |
| 300–394cm | 300–305 | empty |
| | 305–394 | banded greyish brown to brown (10YR 5/2 to 5/3) wet fine sands, with occasional fine coal rich bands |
| | 394–487 | Hand Augured - wet brown fine sands |

Borehole 2

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0–100cm | 0–03 | Empty |
| | 03–12 | very dark grey (10YR 3/1) very fine sandy silt loam |
| | 12–30 | disturbed pale sands and grey silt 'lumps' – plough disturbance |
| | 30–55 | brown (7.5YR 5/4) very fine sand with slightly silty disturbances, an oblique boundary at base – deep ploughing? |
| | 55–100 | laminated light yellowish brown (10YR 6/4) fine sands with occasional silt laminae |
| 100–200cm | 100–114 | empty |
| | 114–140 | yellowish brown (10YR 5/4) visibly laminated fine sands |
| | 140–180 | yellowish brown (10YR 5/4) banded fine sands with occasional fine coal rich bands |
| | 180–200 | yellowish brown (10YR 5/4) wet banded fine sands, with occasional coal rich bands |
| 200–300cm | 200–300 | yellowish brown (10YR 5/4) banded wet fine sands |
| 300–394cm | 300–306 | empty |
| | 306–394 | banded fine sands, wet and with occasional visible fine shell fragments |
| | 394–487 | Hand Augured - wet brown fine sands |

Borehole 3

| Core | Depth (cm) | Description |
|---------|------------|--|
| 0–100cm | 0–12 | empty |
| | 12–16 | turf |
| | 16–24 | dark greyish brown (10YR 4/2) fine sandy loam – topsoil |
| | 24–58 | brown (10YR 4/3) very fine sand loam, charcoal and ploughed up sand – ploughsoil |

| Core | Depth (cm) | Description |
|-----------|------------|--|
| | 58–100 | yellowish brown to light yellowish brown (10YR 5/4 – 6/4) laminated fine sands, sharp boundary above |
| 100–200cm | 100–110 | empty |
| | 110–158 | brown to yellowish brown (10YR 5/3 – 5/4) laminated fine sands with occasional silty laminae |
| | 158–200 | brown to yellowish brown (10YR 5/3 – 5/4) banded fine sands with occasional coal rich bands |
| 200–300cm | 200–300 | yellowish brown (10YR 5/4) banded fine sand – wet, with occasional coal rich bands |
| 300–390cm | 300–315 | empty |
| | 315–390 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands-wet |
| | 390–455 | Hand Augured - wet brown fine sands |

Borehole 4

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0–100cm | 0–9 | empty |
| | 9–12 | turf |
| | 12–18 | very dark greyish brown (10YR 3/2) silty fine sand loam – topsoil |
| | 18–48 | dark greyish brown (10YR 4/2) fine sandy loam – ploughsoil |
| | 48–100 | light yellowish brown (10YR 6/4) laminated fine sands onto brown to yellowish brown (10YR 5/3 – 5/4) – wet |
| 100–200cm | 100–110 | empty |
| | 110–166 | light yellowish brown (10YR 6/4) laminated sands with occasional brown (10YR 5/3) silt laminae |
| | 166–200 | yellowish brown (10YR 5/4) banded wet fine sands |
| 200–300cm | 200–300 | yellowish brown (10YR 5/4) banded wet fine sands with rare silt laminae |
| 300–400cm | 300–400 | banded fine sands – degraded wood at 38cm, with occasional blacker bands |
| | 400–450 | Hand Augured - wet brown fine sands |

Borehole 5

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0–100cm | 0v11 | empty |
| | 11–14 | turf |
| | 14–39 | dark greyish brown (10YR 4/2) sand loam – ploughsoil |
| | 39–100 | brown (120YR 5/3) laminated fine sands |
| 100–200cm | 100–113 | empty |
| | 113–200 | brown (7.5YR 5/3) laminated fine sands and silts |
| 200–300cm | 200–210 | empty |

| Core | Depth (cm) | Description |
|-----------|------------|---|
| | 210–300 | yellowish brown (10YR 5/4) banded fine sands with occasional blacker coal rich bands |
| 300-400cm | 300–400 | yellowish brown (10YR 5/4) banded fine sands with occasional blacker, coal rich, bands and group of black bands at 357-366cm. Greyish brown (10YR 5/2) below 360cm |
| 400-500cm | 400–438 | empty |
| | 438–500 | banded fine sands with occasional coal rich bands and fine shell fragments |

Borehole 6

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–5 | empty |
| | 5–19 | strong brown to yellowish brown (7.5YR 5/6 – 10YR 5/6) fine sand – ploughed up |
| | 19–31 | brown (10YR 4/3) fine sand loam – ploughsoil |
| | 31–100 | yellowish brown to light yellowish brown (10YR 5/4 – 6/4) laminated fine sands with occasional thin silt laminae |
| 100-200cm | 100–200 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands |
| 200-300cm | 200–210 | empty |
| | 210–300 | yellowish brown (10YR 5/4) banded fine sands with frequent coal rich bands |
| 300-400cm | 300–400 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands |
| 400-500cm | 400–410 | empty |
| | 410–496 | brown (10YR 5/3) banded fine sands with occasional coal rich bands |
| | 496–500 | brown (10YR 5/3) slightly coarser fine sands with comminute coal |

Borehole 7

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–16 | empty |
| | 16–34 | brown (10YR 4/3) very fine sand loam – topsoil |
| | 34–54 | dark yellowish brown (10YR 4/4) very fine sand loam with occasional charcoal – ploughsoil |
| | 54–100 | yellowish brown to brownish yellow (10YR 5/4 – 6/6) fine laminated sands |
| 100-200cm | 100–200 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands |
| 200-300cm | 200–208 | empty |
| | 208–300 | yellowish brown (10YR 5/4) banded fine sands with frequent coal rich bands – wet |
| 300-400cm | 300–400 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands and comminute shell |
| 400-500cm | 400–420 | empty |

| Core | Depth (cm) | Description |
|------|------------|---|
| | 420–465 | brown to yellowish brown (10YR 5/3 – 5/4) laminated fine sands with occasional silt lenses –wet |
| | 465–483 | brown to yellowish brown (10YR 5/3 – 5/4) laminated fine sands with occasional silt lenses –wet |
| | 483–500 | banded slightly coarser fine sand with coal rich bands – wet |

Borehole 8

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–6 | empty |
| | 6–48 | dark greyish brown 910YR 4/2) fine sand loam with occasional grits and charcoal, and nylon mesh (potting mesh?) – ploughsoil |
| | 48–59 | yellowish brown (10YR 5/4) fine sand – plough up |
| | 59–75 | dark grey (10YR 4/1) very fine sand loam – old soil |
| | 75–100 | brown to dark greyish brown (7.5YR 4/2 – 10YR 4/2) fine sand loam – ploughsoil |
| 100-200cm | 100–109 | empty |
| | 109–140 | brown (7.5YR 4/2) very fine sand loam with penetrating roots |
| | 140–158 | brown (7.5YR 5/2) very fine sand, with roots and some barely visible laminations |
| | 158–200 | grey to greyish brown (10YR 5/1 – 5/2) laminated fine sands |
| 200-300cm | 200–252 | grey (10YR 5/1) very wet fine sands |
| | 252–256 | grey (2.5Y 5/1) silt – oblique lower boundary |
| | 256–260 | grey (10YR 5/1) very gritty layer with coarse sands and silt |
| | 260–263 | grey (2.5Y 5/1) silt |
| | 263–287 | grey (7.5YR 5/1) laminated silts with a little fine sand |
| | 287–289 | shell rich gritty coarse sandy silt |
| 300-400cm | 289–300 | very dark grey (2.5Y 3/1) laminated silts and fine sands, tending to a bit bluer |
| | 300–310 | empty |
| | 310–373 | black (Gley 1 2.5/N) banded fine sand and silts- oxidising on exposure |
| | 373–386 | black (Gley 1 2.5/N) fine sands and silts with organics and occasional wood |
| 400-500cm | 386–400 | black (Gley 1 2.5/N) fine sands, stopped by stone at 400! |
| | 400–425 | empty |
| | 425–500 | very dark grey (10YR 3/1) banded fine sands with zone of fine silty laminations at 92-100 |

Borehole 9

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–16 | Empty |
| | 16–34 | brown (10YR 4/3) very fine sand loam, with occasional small stone |
| | 34–92 | brown (10YR 4/3) very fine sand loam, includes ploughsoil |
| | 92–100 | as above but a bit paler |
| 100-200cm | 100–118 | empty |
| | 118–190 | yellowish brown (10YR 5/4) poorly laminated fine sands – wet, greying slightly to base |
| | 190–200 | brown (10YR 5/3) fine sands with very dark grey lenses/laminae – degraded organic lenses?, oxidising on exposure – wet |

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 200-300cm | 200–280 | grey (10YR 5/1) with dark grey (10YR 4/1) very wet banded and laminated fine sands with degraded organics, oxidising on exposure |
| | 280–300 | grey (10YR 5/1) laminated coarse silts and fine sands – wet, with dark grey (10YR 4/1) patch – oxidising on exposure |
| 300-400cm | 300–332 | very dark grey and dark grey (10YR 3/1 and 4/1) banded and laminated silts and fine sands, brown sand band at 8-9cm, oxidising on exposure |
| | 332–341 | greyish brown (10YR 5/2) fine sand |
| | 341–349 | dark grey and very dark grey (10YR 4/1 and 3/1) banded fine sands – wet |
| | 349–383 | greyish brown (10YR 5/2) banded fine sands- wet |
| | 383–390 | dark grey and very dark grey (10YR 4/1 and 3/1) laminated silts |
| | 390–396 | dark grey (10YR 4/1) silts |
| 400-500cm | 396–400 | greyish brown (10YR 5/2) fine sand |
| | 400–423 | empty |
| | 423–500 | greyish brown (10YR 5/2) fine sand – very wet |

Borehole 10

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–32 | empty |
| | 32–38 | brown (7.5YR 4/2) very fine sand – topsoil and turf |
| | 38–100 | brown (7.5YR 4/3) very fine sand and coarse silt – ploughsoil |
| 100-200cm | 100–110 | empty |
| | 110–165 | brown (7.5YR 4/3) very fine sand and coarse silt |
| | 165–200 | brown (7.5YR 5/3) laminated very fine sands and coarse silts |
| 200-300cm | 200–216 | empty |
| | 216–300 | greyish brown (10YR 5/2) banded fine sands – wet – smelly! |
| 300-400cm | 300–305 | empty |
| | 305–400 | greyish brown (10YR 5/2) banded fine sands with occasional silt bands at 390-400 – wet |
| 400-490cm | 400–420 | empty |
| | 420–490 | greyish brown (10YR 5/2) banded fine sands, with occasional coal rich bands – wet |

Borehole 11

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–22 | empty |
| | 22–40 | very dark greyish brown (10YR 3/2) sandy loam – topsoil |
| | 40–53 | brick and ash – possible path/track |
| | 53–76 | dark greyish brown (10YR 4/2) very fine sand loam with occasional grits, charcoal, coal – ploughsoil |
| | 76–100 | brown (10YR 4/3) very fine sand, coarse silt with occasional grits and small stones |
| 100-200cm | 100–125 | laminated fine sands – becoming damp |
| | 125–195 | banded fine sands with occasional shell fragments (terrestrial) |
| | 195–200 | slightly silty fine sands |





| Core | Depth (cm) | Description |
|-----------|------------|--|
| 200-300cm | 200–212 | empty |
| | 212–300 | yellowish brown (10YR 5/4) banded fine sands with frequent coal rich bands – wet |
| 300-395cm | 300–325 | empty |
| | 325–395 | yellowish brown (10YR 5/4) banded fine sands with frequent coal rich bands |
| | 395–430 | Hand augured fine brown laminated sand – very wet |
| | 430–458 | Hand augured grey sands, becoming slightly darker with depth |

Borehole 12

| Core | Depth (cm) | Description |
|-----------|------------|--|
| 0-100cm | 0–12 | empty |
| | 12–22 | dark greyish brown (10YR 4/2) fibrous turf layer- fine sand loam |
| | 22–45 | brown (10YR 4/3) fine sand loam with occasional charcoal flecks |
| | 45–76 | brownish yellow (10YR 6/6) laminated fine sands –disturbed –partly ploughsoil |
| | 76–100 | light yellowish brown (10YR 6/4) laminated fine sands with root holes |
| 100-200cm | 100–103 | empty |
| | 103–166 | light yellowish brown (10YR 6/4) laminated and banded fine sands |
| | 166–200 | yellowish brown (10YR 5/4) banded fine sands with occasional coal rich bands – wet |
| 200-300cm | 200–215 | empty |
| | 215–300 | yellowish brown (10YR 5/4) banded fine sands with rare silt laminae and occasional coal rich bands – wet |
| 300-393cm | 300–315 | empty |
| | 315–393 | brown (10YR 5/3) banded fine sands with occasional coal rich bands – wet |
| | 393–447 | Hand augured brown fine sands – wet |
| | 447–450 | Hand augured grey coarser sand with occasional organics |
| | 450–468 | Hand augured lost- wet sands |

Appendix 3: Core Photographs

Borehole 1 – BH1

| 0-100cm | 100-200cm | 200-300cm | 300-394cm |
|--|--|--|--|
|  |  |  |  |

Hand augured to 487cm

Borehole 2 – BH2

| 0-100cm | 100-200cm | 200-300cm | 300-394cm |
|--|--|--|--|
|  |  |  |  |




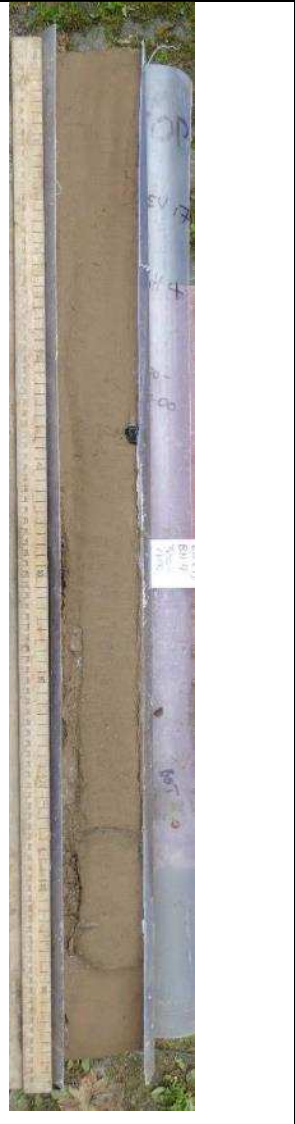
394-487cm Described on site. Core not retained

Borehole 3 – BH3

| 0-100cm | 100-200cm | 200-300cm | 300-400cm |
|---------|-----------|-----------|-----------|
| | | | |



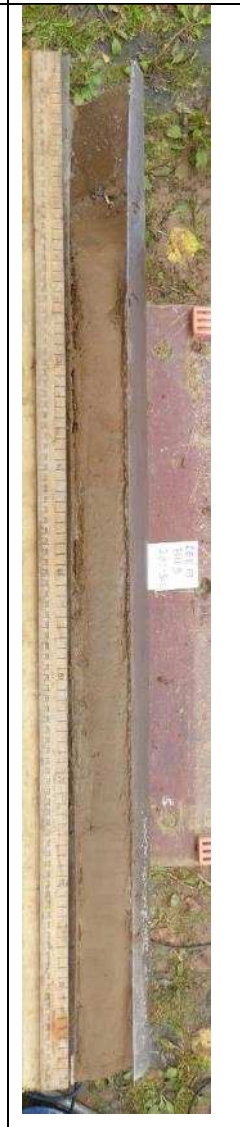


Hand augered to 455cm

Borehole 4 – BH4

| 0-100cm | 100-200cm | 200-300cm | 300-400cm |
|--|--|---|--|
|  |  |  |  |

Hand augered to 450cm

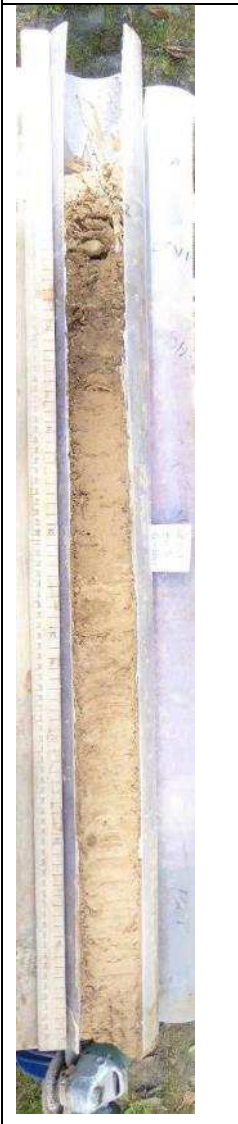
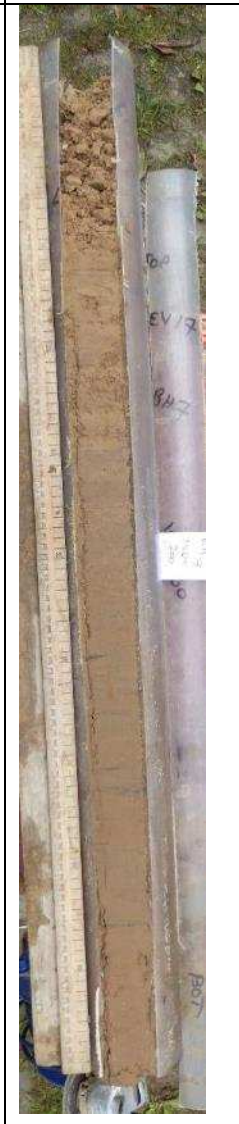


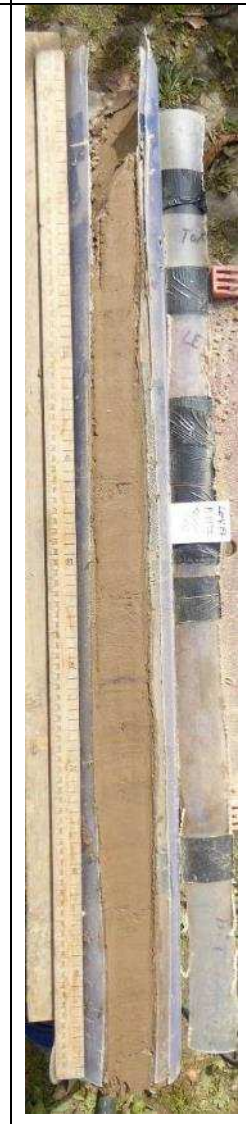
Borehole 5 – BH5

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-500cm |
|--|--|--|---|--|
|  |  |  |  |  |

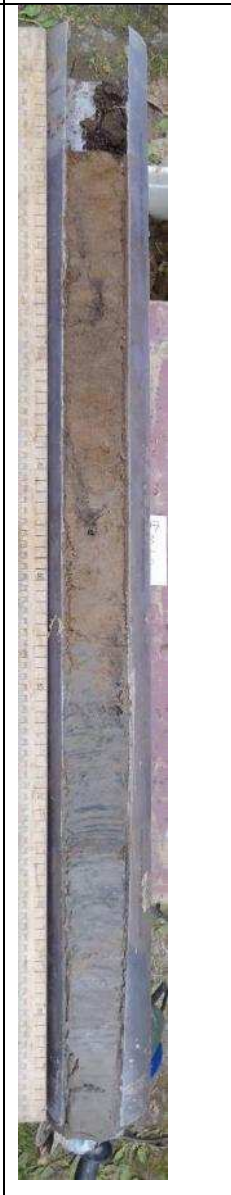


Borehole 6 – BH6

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-500cm |
|--|--|--|---|--|
|  |  |  |  |  |


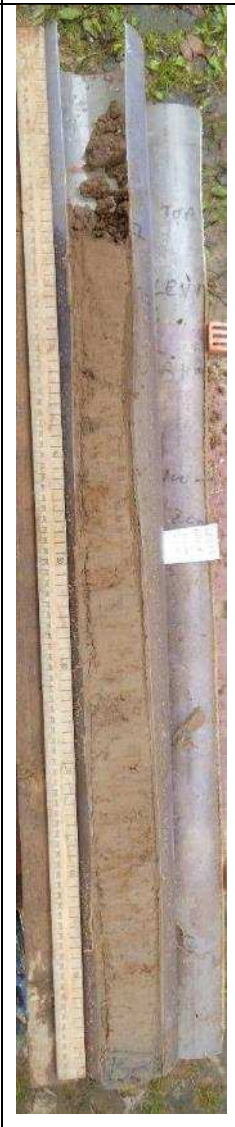


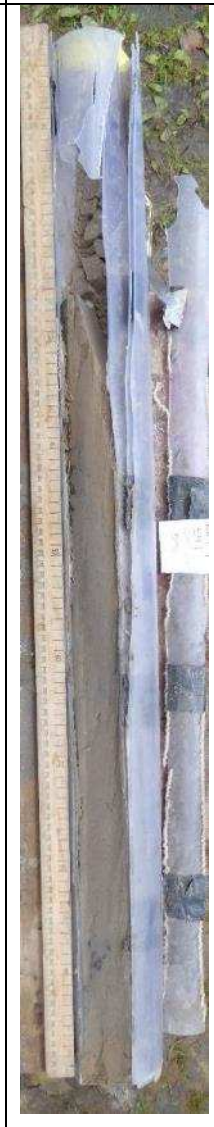
Borehole 7 – BH7

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-500cm |
|--|--|--|---|--|
|  |  |  |  |  |

Borehole 8 – BH8

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-492cm |
|--|--|--|---|--|
|  |  |  |  |  |

Borehole 9– BH9

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-500cm |
|--|--|--|---|--|
|  |  |  |  |  |

Borehole 10– BH10

| 0-100cm | 100-200cm | 200-300cm | 300-400cm | 400-490cm |
|--|--|--|---|--|
|  |  |  |  |  |

Borehole 11 – BH11

| 0-100cm | 100-200cm | 200-300cm | 300-400cm |
|--|--|--|--|
|  |  | <p>Recorded on site – not retained</p> |  |

Hand augered to 458cm

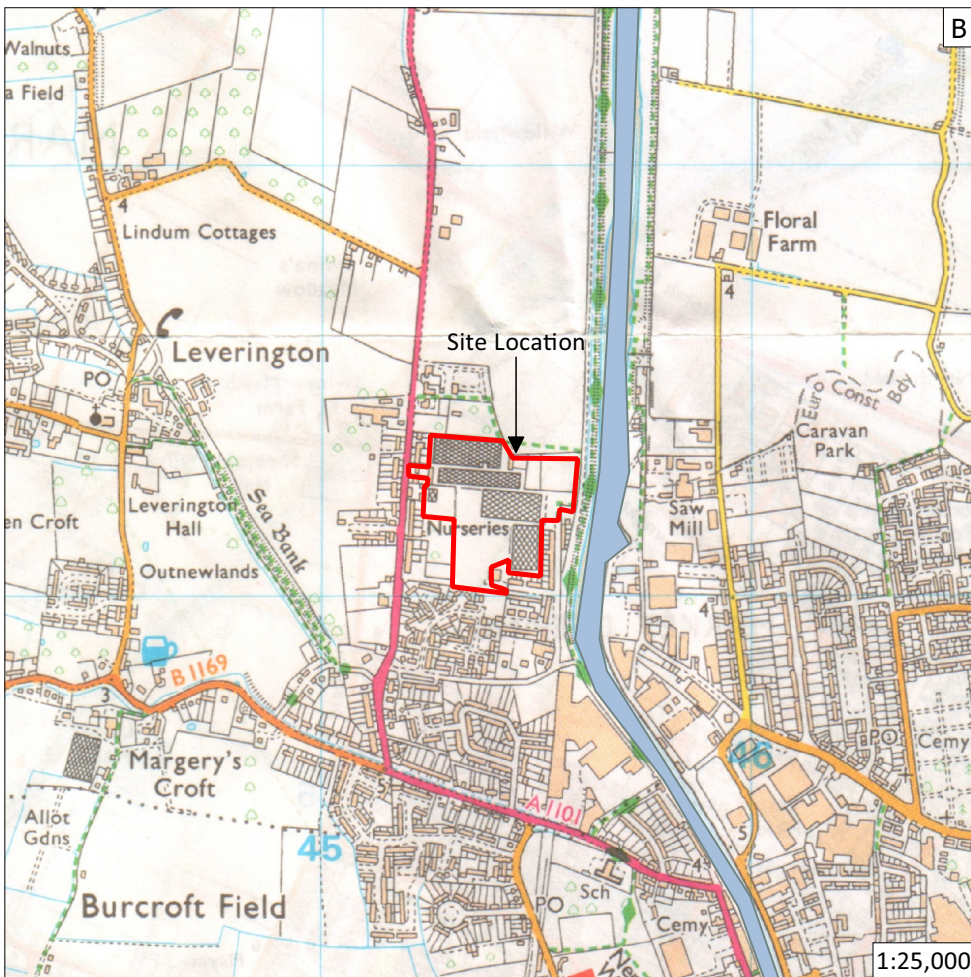
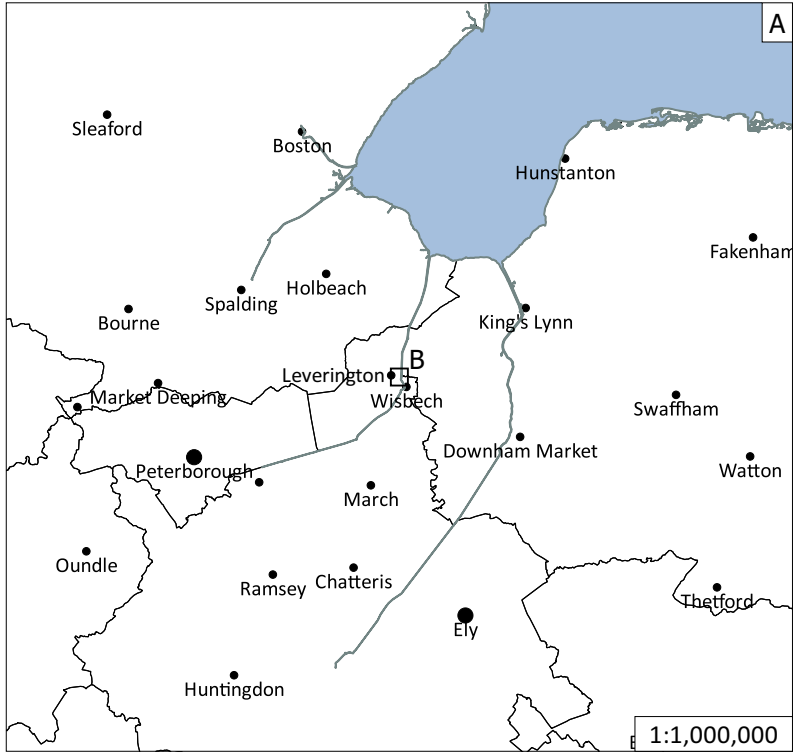
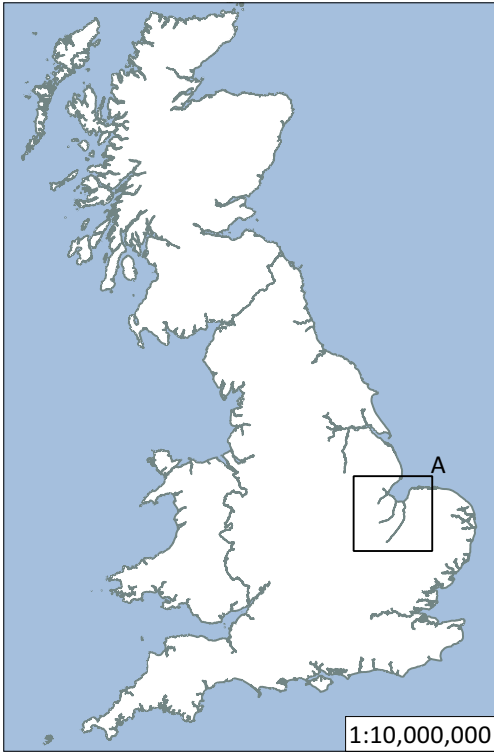


Figure 1: Site location outlined in red

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| | |
|-----------|--|
| Site Code | LESR 17 |
| Scale | 1:10,000,000 1:1,000,000 1:25,000 @ A4 |
| Drawn by | F Johnson |
| Date | 09/10/2017 |

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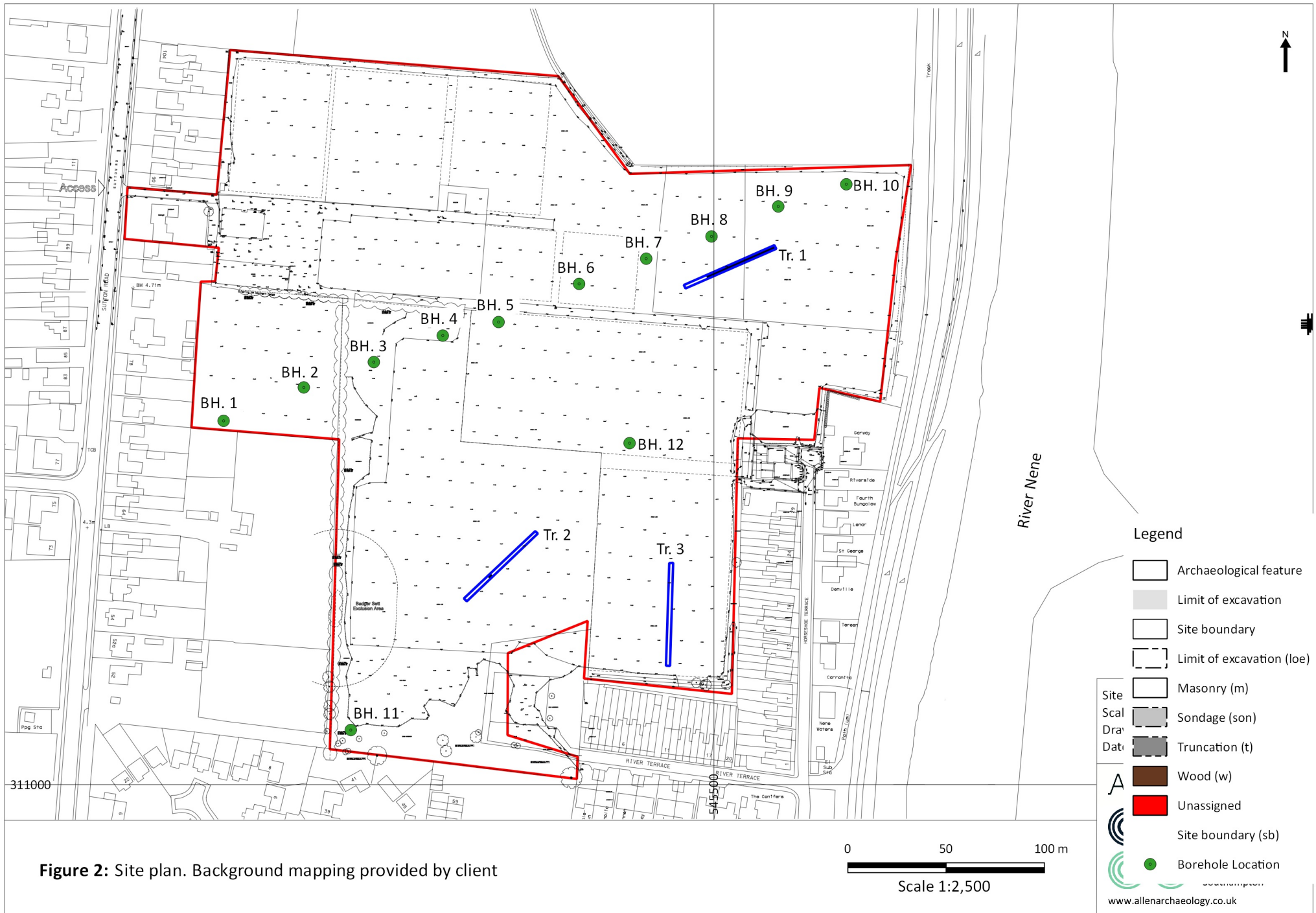
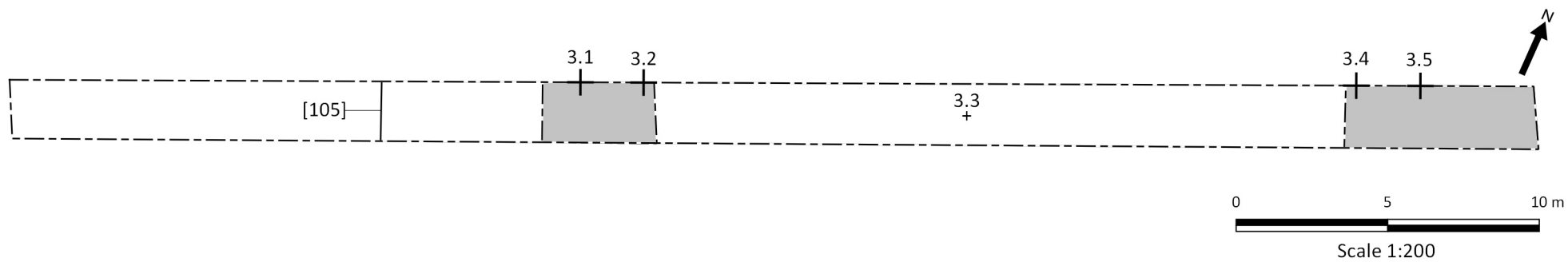
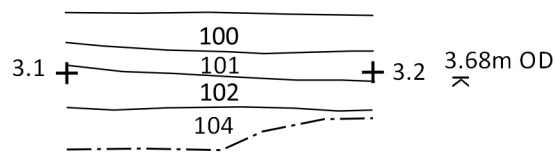


Figure 2: Site plan. Background mapping provided by client

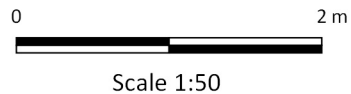
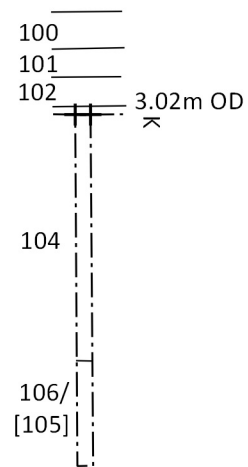
Scale 1:2,500



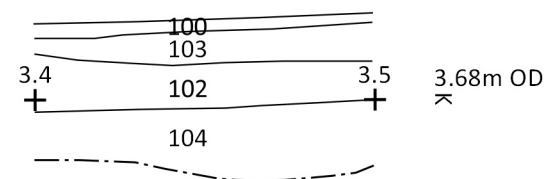
South southwest-facing section



Auger 3.3



South southwest-facing section



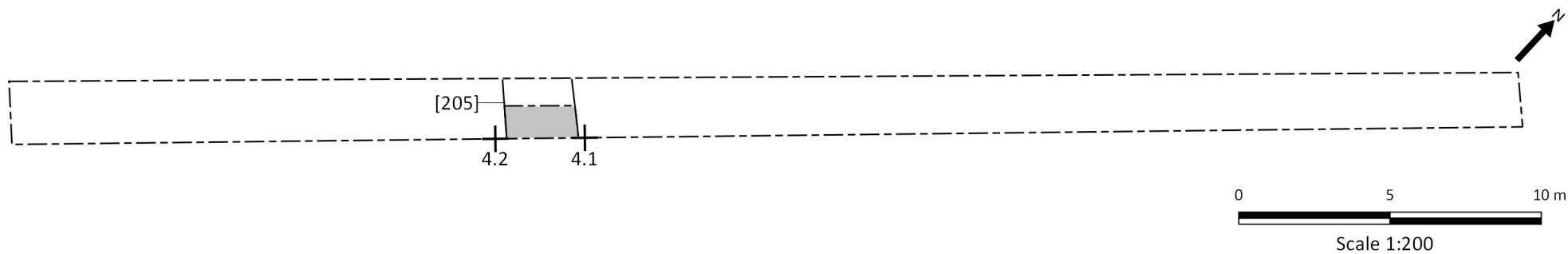
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| Site Code | LESR 17 |
| Scale | 1:200 and 1:50 @ A4 |
| Drawn By | F Johnson |
| Date | 09/10/2017 |

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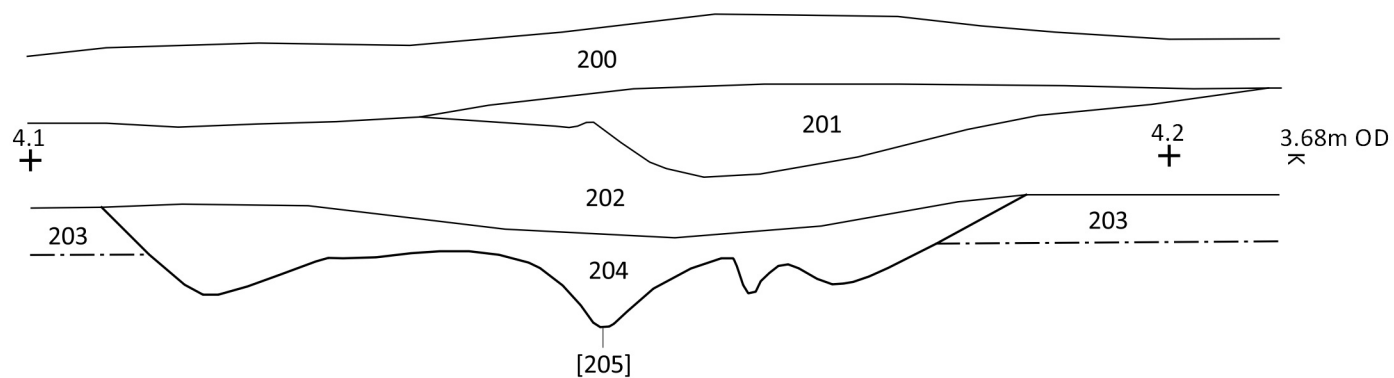


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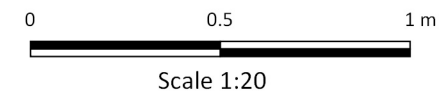
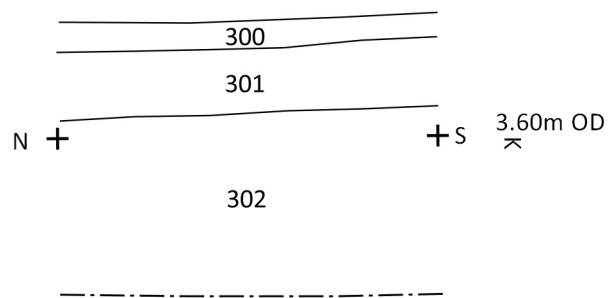
Figure 3: Plan and sections of Trench 1



Northwest-facing section



West-facing representative section of Trench 3

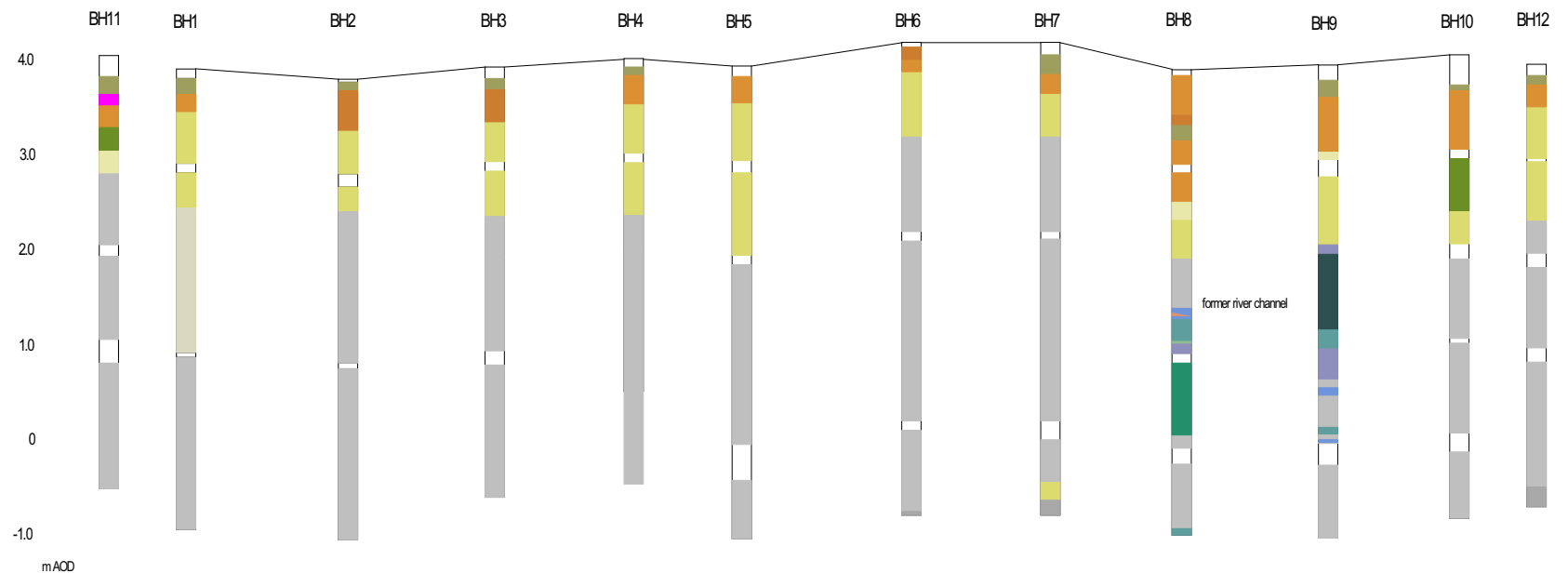


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| Scale | 1:200 and 1:20 @ A4 |
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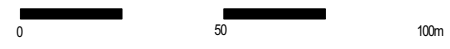
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Figure 4: Plan and section of Trench 2 and representative section of Trench 3



- KEY
- brick and ash -possible path
 - gritty coarse sand and silt
 - sandy loam topsoil
 - sandy silt
 - sandy loam ploughsoil
 - banded sands and silts
 - disturbed ploughsoil
 - banded and laminated sands with organics
 - very fine sand and coarse silt
 - laminated sands and silts with organics
 - very fine sands
 - laminated silts
 - laminated fine sands
 - dark and very dark grey silts
 - fine sands with occasional laminations
 - banded wet sands
 - coarser fine sands



| | |
|-----------|--------------|
| Site Code | LESR 17 |
| Scale | 1:1,750 @ A4 |
| Drawn by | J Rackham |
| Date | 09/10-2017 |

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Figure 5: Reconstructed section based on the data from the boreholes



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