Archaeology South-East

ASE

Geoarchaeological Interpretation of Geotechnical Site Investigations at Conningbrook Manor Pit, Kennington, Kent.

Planning Reference: 12/01245/AS

NGR: 603080, 143398
TR 03080 43398

ASE Project no. 170472

Site code: CBQ 17
OASIS ID: 289970

ASE Report No: 2017316

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Abstract

This report presents the results of a geoarchaeological watching brief carried out by Archaeology South-East at Conningbrook Manor Pit in June 2017. The fieldwork was commissioned by the client, Chartway Group, ahead of development of the former aggregate extraction site for housing and landscaping. The watching brief monitored up to 70 interventions carried out by Causeway Geotech Ltd as part of a geotechnical ground investigation.

Conningbrook Manor Pit has been previously recognised as an important archaeological and palaeontological site of regional importance for understanding the sequence of environmental change and human activity during the last interglacial in south east England. Collections of Pleistocene fauna including mammoth and woolly rhinoceros alongside a significant assemblage of Middle Palaeolithic (Neanderthal) stone tools , including an example of poorly understood blade points, were recovered from the site by a team from the Harrison Institute in the 1990s. However, no formal investigation of the archaeology, or comprehensive scientific investigation of associated sedimentation has yet been undertaken.

The geotechnical site investigation comprised 57 boreholes, window samples and test pits. The results from these, integrated with those of an earlier geotechnical investigation, carried out by Ecologia in 2012, allow the depth and extent of previous impacts through aggregate extraction and landfill to be more precisely determined and modelled. Modelling of the surface of intact Quaternary sediments at depth showed these to be preserved at relatively shallow depths across an area of the site to the north of the southern lake. This is broadly in line (although there are some discrepancies) with zoning proposed by Ecologia which indicated intact Quaternary sedimentation in this area. We found strong supporting evidence for Ecologia's proposed zones of intact Quaternary sedimentation through the centre of the site and to the south west, however there was less supporting evidence to confirm intact deposits at the north east and north west limits of the site.

It is proposed that the archive of the Harrison Institute is consulted to identify the extent and location of sediments preserving artefacts and ecofacts identified in the 1990s. Targeted purposive geoarchaeological assessment could further establish potential and allow for the development of a programme of mitigation once the full impact of the development on locally surviving Quaternary deposits is determined.

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

1.1 Project Background

1.1.1 Archaeology South-East was commissioned by Chartway Group to undertake the monitoring of geotechnical site investigations carried out by Causeway Geotech Limited in June of 2017 (Figures 1 and 2, NGR 603080,143398). These investigations, the latest in a series ahead of proposed development of a former quarry site, provided an opportunity to further determine the areas of likely surviving Holocene and Pleistocene deposition at the site.

1.1.2 In this report these results are combined with observations from previous geotechnical studies to determine where, within the site, Quaternary deposits with archaeological or palaeoenvironmental potential are likely to survive to a significant degree. In addition, recommendations are made for how the proposed development impact on these deposits might be mitigated.

1.2 Topography and Geology

1.2.1 The site is situated in the Stour valley, 1.5km to the immediate north of the town of Ashford, Kent, in the parish of Kennington (Figure 1). The site, comprising 59ha, is a former aggregate extraction site which has been partially restored through landscaping and landfill to create level ground next to artificial lakes representing former deep extraction areas (Figure 3). The site operated was by Bretts Ltd from the 1980's with the extraction occurring up until 2012 (Figure 3, 4and 5).

1.2.2 Much of the 59ha site lies firmly within the relatively flat floodplain of the river Stour at around 32m OD, but its western flanks overly slightly higher topography grading up from the floodplain edge up to 38m OD. It can be seen from the topographic model generated from Environment Agency LIDAR data (Figures 6 and 7), that the site occupies a spur in the landscape defined by a meander in the course of the river Stour. To the north of the site the Stour cuts a relatively straight-sided valley through the chalk hills of the North Downs which overlook the site. To the south the Hythe Beds sandstone escarpment rises, separating the site from the rest of the low-lying Wealden landscape to the south.

1.2.3 The British Geological Survey (BGS) maps the solid geology of the site as the Cretaceous bedrock of Folkestone Formation, part of the Lower Greensand Group (Figure 8). Isolated deposits of the overlying Gault Clay outcrop to the north east of the site (Gallois 1965) while the underlying Sandgate Beds outcrop to the south west.

1.2.4 Superficial deposits mapped by the BGS show extensive surface coverage of the floodplain of the River Stour by Holocene Alluvium, with localised deposits of peat forming part of this sequence. Underlying the Holocene Alluvium and preserved on the flanks and margins of the floodplain are Pleistocene Head Deposits. These comprise clays and silts containing soliflucted flint gravels derived from weathering of the chalk and reworking of local river terrace deposits. These may locally also grade up into Holocene colluvium.

1.2.5 Under the extensive covering of Pleistocene Head and Holocene Alluvium the BGS map Pleistocene fluvial deposits comprising sands and gravels of the River Stour. These gravel and sands outcrop on a spur on the western edge of the site and are part of Terrace 3 of the Stour sequence. Although unmapped these should be expected to give way to younger deposits of Terraces 2 and 3. The river terrace deposits, which may contain localised fine grained loess lenses and palaeosols are in turn overlain by Head Deposits made up of both fine-grained Brickearths and gelliflucted Head Deposits from both the local Folkestone and Sandgate Beds ridge and also possibly from the North Downs chalk escarpment to the north of the Site.

1.3 Planning Background

1.3.1 The geotechnical SI works were undertaken ahead of the new Conningbrook Lakes residential development, as shown in the Chartway Plan and approved by Ashford Borough Council under Planning Reference: 12/01245/AS. Following consultation with KCC's Heritage Conservation Group Archaeological Advisor (Wendy Rogers), Ashford Borough Council set the following condition on the works:

"33 No development hereby permitted in within each phase identified in the phased programme of works approved by the Local Planning Authority pursuant to Condition 2 shall commence unless and until the applicant their agents or their successors in title to the applicant for that phase have secured the implementation of a programme of archaeological works for the relevant phase in accordance with a written scheme of investigation which has been submitted and approved by the Local Planning Authority in writing unless otherwise agreed in writing by the Local Planning Authority"

1.3.2 The development covered by these works is that relating to the residential areas, residential access roads and the county park access road. All other development on the site will be dealt with under a separate programme of archaeological mitigation, as required by the LPA and their advisors KCC's Heritage Conservation Group.

1.4 Scope of Report

1.4.1 This report provides an account of observations made during the watching brief of geotechnical works carried out by Causeway Geotech Limited in June 2017. Furthermore it provides an interpretation of those results alongside previous geotechnical studies and the identification of areas at the site still preserving intact, or usefully intact, Pleistocene and Holocene sediments.

2.0 GEOARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The site has been subjected to extensive aggregate extraction, beginning in the early 20th century on a small scale and intensifying during the 1980s, 1990's and 2000s. A series of artefact retrieval operations took place at the site during gravel extraction in the 1990's (see below) which highlighted the potential for faunal remains and Palaeolithic artefacts to be preserved. Large areas of the site are now open, flooded gravel pits. The flooded pits flank the eastern limits of the site extending, almost continuously, from north to south. In addition, large areas of the site, to the north of the Julie Rose stadium, are infilled gravel pits, with the current level topography the result of an extensive landfill operation which ceased in 2012. The flooded pits and landfill indicate that the site's potential for both Palaeolithic archaeology and important palaeoenvironmental potential has been impacted upon through previous development.

2.2 Pleistocene

2.2.1 During the 1980s and 1990s gravel extraction at the Conningbrook site allowed for the collection of artefactual and faunal material. While none of this work appeared to have been directed by professional archaeologists it does seem that, during some periods, relatively systematic collection was undertaken straight from the quarry conveyor belt. David Harrison, a respected and qualified palaeontologist, and a small team from the Harrison Institute were alerted to the presence of fauna at the site by a quarry operative who was making collections from the gravel heaps and from the gravel conveyor.

2.2.2 Over a period of 15 years the Harrison Institute visited the site allowing for the recovery of both Pleistocene fauna and artefacts from the site during this period. Collections of large fauna and artefacts continued to be made from the conveyor however excavations were also undertaken of fine grained deposits allowing for the recovery of an exceptional assemblage of small mammal remains of important palaeoenvironmental significance (Harrison *pers. com.*). In one such excavation a bison horn core was found in-situ in a complete sequence which preserved the boundary between the Holocene and Pleistocene sedimentation. A record of this sequence exists at the Harrison institute. In addition to systematic collection from the conveyor and these excavations, an unknown number of amateur collectors were visiting the site and it is known that material exists in private hands including the blade point, currently this material is untraceable.

2.2.3 Much of the conveyor belt material is now curated by the Harrison Institute, this collection comprises up to 20 flint artefacts, in excess of 12 pieces of large fauna and large collection of small mammals fauna (Harrison 1996). The flint artefacts comprise a great diversity of Middle and upper Palaeolithic technology. This includes handaxes (Lower Palaeolithic), discoidal and Levallois cores (Middle Palaeolithic; Jacobi et al 2006) and a blade point (Early Upper Palaeolithic; Jacobi 2007). The context of the lithic material, in terms of stratigraphic position within the fluvial sequence or position within the pits, was not recorded and is not easily possible to reconstruct due to the

nature of the collection strategy. If this material was originally stratified it indicates that the sediments at the site may span the period of the last glaciation which saw the replacement of Middle Palaeolithic technologies with those of Early Upper Palaeolithic character. Blade Point industries are currently recognised as the earliest technology of Upper Palaeolithic character in northern Europe. The significance of such industries is high as they are considered by different researchers to either be the product of the last Neanderthal populations in Northern Europe, transitional industries of unknown authorship or the technology associated with earliest modern humans in the region (Aldhouse-Green and Pettitt 1998; Flas 2002, 2008; Jacobi 2007).

2.2.4 In the absence of clear association with human anatomical remains, determining between these possibilities relies on having clear dating frameworks and contextualising palaeoenvironmental evidence as part of intact stratigraphic sequences. To date only one open air site in Britain, Beedings in West Sussex, preserves a clear stratigraphic relationship between Middle Palaeolithic and Early upper Palaeolithic technology. The Conningbrook Manor Pit locale may represent another such locality.

2.2.5 The site produced a rich vertebrate fauna including both small and large mammals; most of this material is currently curated at the Harrison institute, Sevenoaks where it is catalogued as: “An extensive collection of small and large mammal material. Of particular interest in the large mammals are spotted hyena, lion, bear, mammoth, woolly rhinoceros, bison, giant Irish elk. The collection also features numerous specimens of small mammals with the arctic lemming (*Dicrostonyx torquatus*) being especially abundant. Kennard’s Shrew (*Sorex kennardi*) was recorded, although it has subsequently been reclassified as *Sorex runtonensis*. Flint Acheulean tools were also collected from the site.” Currant and Jacobi list the fauna as belonging to the Pinhole Mammal Assemblage Zone (MAZ) which is consistent with a Marine Isotope Stage 3 (Middle Devensian) age as indicated by radiocarbon dates below (Currant and Jacobi 2001).

2.2.6 Radiocarbon dates have been obtained for the site and are listed by the Oxford Radiocarbon laboratory as:

OxA-1069	Bone, mammoth	33200±1300
OxA-1610	Bone, mammoth	d13C=-21.0 35200±1600
OxA-1611	Bone, mammoth	d13C=-26.0 38600±2400
OxA-1612	HZM58.14184, bone, w.rhino	d13C=-21.0 34000±1400
OxA-1613	HZM58.14184, bone, w. rhino	d13C=-26.0 35000±1500
OxA-1644	Bone, mammoth	d13C=-26.0 37300±1900
OxA-1645	HZM58.14184, bone, w. rhino	d13C=-26.0 33600±1200

2.2.6 While the Stour Valley has a rich record of Palaeolithic artefacts and Middle to Late Pleistocene sedimentation which includes the sites of Sturry, Fordwich, Chartham and Reculver (Wymer 1999) other Palaeolithic finds within the immediate vicinity of the site, beyond those made by Harrison et al, are recorded as follows:

1. HER Record. NGR 601950 144678. 4km WSW of the Site. A “large brown-patinated Acheulean hand-axe was found in fields to the north of Ashford

found in a field by Mr D Hone of Kennington". This area in now thought to be the site of a housing development. The hand-axe was 14cm in length and 10cm wide. It is uncertain where this find is now located.

2. HER Record. NGR 600500 142500. 3.1km WSW of the Site. Handaxe.
3. PAS Record. NGR 601950 144800. 2km NW of the site. Handaxe from 'Brickearth'. PAS Number: Kent 5277.

2.3 Holocene

2.3.1 The site was originally covered by up to 3m of Holocene alluvium which locally contained organic horizons. These deposits span an unknown part of the Holocene record and may, on the margins of western part of the site, contain colluvial deposits predating inundation with freshwater deposits. These sediments are likely to be have been heavily impacted upon during extraction activities at the site due to their relatively shallow depth.

2.4 Results of Previous Geotechnical Investigations

2.4.1 At least three different phases of geotechnical assessment and one further desk study had been undertaken at the site prior to the current investigation by Causeway Geotech Limited:

1993: South Eastern Soils. Report on Ground Investigation at Conningbrook Manor for Ashford Borough Council.
2007: Capita Symonds Phase 1a Environmental Risk Assessment and Ground Investigation, Conningbrook Quarry, Ashford.
2011: WSP. Geo-Environmental Desk Study, Conningbrook Quarry.
2012: Ecologia: Geo-Environmental and Geotechnical Site Assessment Conningbrook Quarry, Willesborough Road, Ashford Kent.

2.4.2 In the absence of any systematic geoarchaeological investigation prior to the current phase of works, and no integration of records made by Harrison et al during collecting and sampling from the quarry, these records provided the only indication of the nature of sedimentation at the site during and after extraction. It is anticipated that other geotechnical survey data might be in existence relating to the initial phases of aggregate extraction at the site but these have not been located.

2.4.3 Working with geotechnical data presents challenges in terms of interpretation as different teams have used different sediment classifications and nomenclature. The investigations occurred at different periods in the quarry's active life and the quarry contains deep, vertical-sided extraction areas, the edges of which are not always possible to define, and significant areas of landscaped made ground. Consequently detailed and meaningful sediment modelling from this archive of data is not considered appropriate to understand the current distribution of intact Quaternary sedimentation.

2.4.4 Instead a zoning approach is considered more useful, understanding the site in terms of areas where Quaternary sedimentation has been removed to varying degrees and where the site retains intact. It is possible from these combined records to establish areas where extraction has been extensive (to depth greater than 5m), where extraction proceeded to less significant depths and where no record of extraction has been established and geotechnical information suggests intact Quaternary sediments with only minimal disturbance at the surface. This zoning was undertaken Ecologia in their report of January 2012 (reproduced in Figure 9). This zoning scheme, which shows areas of current deep made ground (Zones 1 and 2) and probable natural ground (Zone 1), which contains extensive and minimally disturbed areas of intact Quaternary sedimentation, was reviewed ahead of this phase of geoarchaeological works and found to be based on a sensible and useful interpretation of the existing archive of ground investigation data.

2.4.5 Consequently the results of the watching brief reported on here provide a further check on these results and potential refinement of this zoning scheme.

2.5 Research Questions, Project Aims and Project Objectives

2.5.1 The scope of the watching brief was developed to address the following research questions. Answers to the questions are necessary in order that the impact of the development can be properly determined and an appropriate programme of mitigation put in place.

1. Where do Quaternary sediments survive on the site?
2. What is the nature of these deposits in terms of depositional environment and likely age?
3. At what depths do these deposits survive and how does this vary across the site?

2.5.2 In order to answer these questions the project was designed to achieve the following aims:

- To make observations on the nature of sediments arising from Geotechnical investigations undertaken by Cause Geotech Limited in June 2017.
- To take sediment samples where useful and appropriate.
- To test the result of previous Geotechnical investigations zoning undertaken by Ecologia (2012) (Figure 9) and determine/refine where Pleistocene sediments survive to the greatest extent within the area of the proposed developed.
- To assess options for mitigation ahead of development at the site.

2.5.3 The following objectives were undertaken to meet the aims:

- To make a lithological record of deposits using test pitting/boreholes.
- To refine previous mapping suggesting intact areas of Pleistocene sediment.
- To provide recommendations for further work to mitigate impact on the site to the degree that impact is currently known.

2.5.4 These project aims and objective have been drafted to provide not only necessary information to address the key Research Questions aimed at understanding Quaternary sediments surviving at the site and to develop an appropriate mitigation strategy but also in line with the National Research Framework for Palaeolithic Archaeology in England and draft Research frameworks for the Palaeolithic in South East England. These include:

From English Heritage 2008: Research and Conservation Framework for the British Palaeolithic

1. Principal Theme 1: Hominin Environments and Climate Driver. (English Heritage 2008)
2. Principal Theme 2: Sharing Human Origins: Developing New Audiences. (English Heritage 2008)
3. Strategic Theme 1: Areas.
4. Strategic Theme 2: Dating Frameworks
5. Strategic Theme 4: Curation and Conservation.

From KCC 2009: South East Region Research Framework: Lower and Middle Palaeolithic.

RA20. Identification, and more precise dating, of late Lower/Middle Palaeolithic and British Mousterian occupation

RA23. Correlation and integration into a chrono-stratigraphic framework of Sussex raised beach deposits and major fluvial terrace systems within the region (such as the lower Solent Basin, the Lower Thames, the Medway, the Stour)

RA27. Investigations on how the date and taphonomic history of artefacts is reflected in aspects of their condition, such as: staining, patination, edge abrasion and surface scratches.

RA5. How disturbed/transported are Palaeolithic remains in fluvial contexts?

RA6. Are there levels or geographic/topographic zones within deposits that are more likely to be richer in Palaeolithic artefactual remains?

3.0 GEOARCHAEOLOGICAL METHODOLOGY

3.1 Fieldwork Methodology

3.1.1 Causeway Geotech Limited undertook a comprehensive geotechnical assessment of the site in June 2017. This comprised 11 boreholes, 8 window sample investigations and 38 test pits. This comprised in total 57 interventions which provided potentially useful data (See Appendix 1).

3.1.2 Geoarchaeological specialists from Archaeology South East provided a watching brief during the course of these works to make an independent record of the Quaternary stratigraphy to allow more detailed interpretation of previous geotechnical studies undertaken at the site. While a watching brief, the ground investigation team from Causeway allowed good access to each intervention and sediments, including opportunity to sift deposits for artefacts and ecofacts and to take samples. This allowed a comprehensive record of the sediment sequence to be compiled.

3.1.3 A record was made of the depositional sequence in order to record each major lithological unit in term of matrix, coarse components, colour and consistency. A digital photographic record was made of test pits and sections were drawn where appropriate.

3.1.4 Where deposits with potential for palaeoenvironmental material were encountered and the circumstances of extraction mitigated contamination, bulk samples were taken. Pleistocene sediments were sifted for artefacts and ecofacts.

3.2 Fieldwork constraints

3.2.1 Due to weekend and late working hours brought in during the course of the project working not all interventions undertaken by Causeway Geotech Limited could be monitored in their entirety. Over 50% of the interventions were however recorded in their entirety allowing Geotech records made by the Causeway Geotech team to be usefully integrated when available. Those interventions not directly monitored were however interpreted from the Causeway Geotech Logs and included in the resulting sediment model.

3.2.2 Much of the upper part of each intervention encountered made ground which comprised redeposited Holocene alluvium and Pleistocene fluvial sediments. Much of this made ground was free of modern contamination, presented bedding from tip lines and was heavily compacted. These factors made determining the boundary between made ground and undisturbed Quaternary sedimentation difficult in some cases. Consequently, the observations recorded here are necessarily interpretive and, in the context of a watching brief where we were not able to enter test pits, should be considered as providing a first order interpretation of the site.

3.3 Archive

3.3.1 The contents of the archive are tabulated below (Table 1).

Borehole/test pit sheets	35
Section sheets	2
Plans sheets	1
Colour photographs	0
B&W photos	0
Digital photos	70
Sample register	1
Drawing register	1
Watching brief forms	0
Trench Record forms	0

Table 1: Quantification of site paper archive

Bulk finds (quantity e.g. 1 bag, 1 box, 0.5 box 0.5 of a box)	0
Registered finds (number of)	0
Flots and environmental remains from bulk samples	0
Palaeoenvironmental specialists sample samples (e.g. columns, prepared slides)	20
Waterlogged wood	0
Wet sieved environmental remains from bulk samples	0

Table 2: Quantification of artefact and environmental samples

4.0 RESULTS

4.1 Lithology

4.1.1 During the course of the watching brief five main sedimentary units were encountered beneath the topsoil [1]. These comprised:

Made Ground [2]: Highly variable and largely comprising redeposited sand clays and gravels of both Holocene alluvial and Pleistocene sands and gravels.

Head [3]: Clays and silts with variable quantities of sub-angular frost-shattered flint gravel and redeposited fluvial gravel, Pleistocene origin relating to slope processes under periglacial conditions.

Alluvium [4]: Fine-grained sediments (clays, silts and sands) with occasional seams of organic material. Holocene floodplain sediments.

Fluvial Sands [5]: Stone-free medium to coarse sands comprising the upper part of the Pleistocene fluvial sequence.

Sands and Gravel [6]: Sub-angular to sub-rounded gravels within coarse to medium sands. Gravel are largely comprised of rolled flint but also contains quantities of Wealden geologies and redeposited rounded Tertiary flints. Lower part of Pleistocene fluvial gravels.

Folkestone Beds [6]: Grey, compact sands and silts of the Cretaceous Lower Greensand geology. Solid geology underlying the entire site.

4.1.2 As mentioned previously, distinguishing between the made ground and disturbed alluvium and head deposits was not always easy, especially within recorded borehole and window sample sequences. This is likely to have also been the case in earlier geotechnical investigations. However, the 35 interventions (out of 57) recorded in their entirety during the watching brief provided very useful data which was integrated with existing data into a model of Quaternary sediment distribution across the site. For this exercise, only borehole and test pit data from the most recent previous geotechnical survey, that undertaken by Ecologia in 2012, was used (Appendix 1). The earlier studies are not considered reliable as conditions on the site may have changed locally since they were undertaken.

4.2 Sediment Distribution and Modelling

4.2.1 In Figure 2 the locations of all boreholes, test pits and window sample holes from the Ecologia 2012 and Causeway Geotech 2017 surveys are shown. While the coverage is not entirely even across the site, there is suitable coverage to give an indicative picture of sub-surface sedimentation.

4.2.2 In Figure 10 contours are superimposed on the LIDAR DEM of the site to show the upper surface of Quaternary sedimentation across the site. This shows areas where interventions suggest Holocene alluvium or Pleistocene sands and gravels are relatively close to the surface and locations where Made Ground [1] extends to greater depths. Where these sediments appear to be

locally preserved at depths of less than 2m the contours are shown in Red to yellow colours, depths of 2m to 3.5m are shown in green shade and depths of greater than 3.5m to 6m are shown in shades of blue and purple.

4.2.3 In Figure 11 interventions are shown in blue where fine-grained sediments thought to be Holocene alluvium [4] survived overlying intact Pleistocene sediments. Interventions shown in red are locations where no sign of surviving Holocene alluvium was present and the first Quaternary sediment encountered was Pleistocene fluvial sands [4] or sands and gravels [6].

4.3 Interpretation

4.3.1 Taken together, the contour map in Figure 10 and distribution map of surviving alluvium in Figure 11 indicate that the Quaternary sediments were only moderately impacted upon by aggregate extraction across an area of the site to the north of the main southern lake and on the western margin of the southern lake. Both maps are consistent in showing that impact depth in this area is generally much less than 2m in depth and, as a consequence, both Pleistocene fluvial sands [5] and sands and gravels [6] and remnants of overlying Holocene alluvium [4] both survive at relatively shallow depths.

4.3.2 Preservation on the north west margin of the site north appears more uneven It should also be noted that distinguishing between redeposited Quaternary sediments and disturbed intact Quaternary sediments was particularly problematic of the western margin of the main southern lake.

5.0 THE FINDS

5.1 **Summary by** Karine Le Hegerat

5.1.1 A single flake weighing 17g was recovered from TPA1. It displayed a dark honey coloured stained ventral surface, but recent edge damage indicates the original colour of the flint was dark grey. The cortex, covering the dorsal face was stained and abraded. The flake was relatively thin and displayed a hinged termination and a small platform. It was chronologically undiagnostic.

6.0 THE PALAEOENVIRONMENTAL SAMPLES

6.1 A total of 18 small bulk palaeoenvironmental samples were taken as a contingency should they need to be assessed in the future. As palaeoenvironmental analysis falls outside of the scope of these work no further action is to be taken at present.

7.0 DISCUSSION AND CONCLUSIONS

7.1 Overview of the Watching Brief

7.1.1 The watching brief has allowed the first formal geoarchaeological assessment of the site and a first order model of sediment distribution to be developed. While not purposive, this exercise has been valuable in allowing the results of observations made during the watching brief to be used to interpret with more clarity the results of previous geotechnical studies. This said the test pit interventions were relatively small compared to purposive geoarchaeological test pits, which did not allow access into the holes for close inspection and interpretations have been made on observation alone, and not supported by palaeoenvironmental analysis or scientific dating.

7.1.2 The watching brief has demonstrated that around the edges of the former extraction areas both Pleistocene and Holocene sediment sequences are preserved. Although their precise nature and age are unable to be more definitively categorised without further palaeoenvironmental assessment.

7.2 Answering the Original Research Questions: Deposit survival and existing impacts

RQ1: Where do Quaternary sediments survive on the Site?

7.2.1 The site has been extensively affected by aggregate extraction, landfill and other activities associated with its life as a sand and gravel quarry. Areas of obvious and complete extraction are indicated by the existing flooded parts of the site (lakes), but much larger areas were subjected to more shallow extraction or infilled to form extensive areas of landscaped made ground. Landscaping activities at the margins of the deep extraction areas, which would have originally been vertically sided, have formed slopes on the edge of the lakes formed by both shallow and deeper deposits of made ground [2].

7.2.2 The sediment modelling presented in Section 4 broadly confirms the results of Ecologia's zoning (Figure 9) indicating some areas of relatively intact Quaternary sediment across the northern and south western parts of the site. The modelling does not however immediately support the precise zoning presented in the Ecologia map. For example, Ecologia suggest bodies of intact Quaternary sediment lie along the north west limits of the site. Our model, suggests a deeper cover of made ground in this areas. Differences may stem from direct interpretation of the geotechnical logs or, in the case of the model, from sparse data point coverage along the north west limits of the site. Therefore, in the absence of purposeful, targeted geoarchaeological investigation, it would be unwise to entirely refute Ecologia's interpretation of geotechnical records in this area. Crucially, both interpretations are in agreement that intact quaternary sediment exists at shallow depths across parts of the site and there is overlap in identifying where these areas lie.

RQ2: At what depths do these deposits survive and how does this vary across the Site?

7.2.3 In parts of the site, most extensively to the north and south west of the main southern lake, Quaternary sediments have been minimally impacted upon and

are present across areas at less than 2m below ground level and locally occur much closer to the surface. An indication of depth is given in Figure 10.

RQ3: What is the nature of these deposits in terms of depositional environment and likely age?

7.2.4 Surviving Quaternary sedimentation at the site includes high and low energy Pleistocene sands and gravels extending to in excess of 7m in depth and overlying these are lower energy deposits of clay and silts with locally surviving organics thought to be Holocene in age. The bulk of the Pleistocene sediments, on the basis of elevation and topographic position, appear to relate to the last cold stage (MIS 5d-2), but the possibility exists for deeply buried sediments relating to the last interglacial MIS5e and the terrace deposits of older cold stages (MIS6?) outcrop on the west of the site.

7.3 Potential impact on deposits

7.3.1 ASE have been provided with **indicative** information regarding the potential impact of the proposed development. Indicative development plans are given in Appendix 2 . Figure 12 shows the deepest impact (foul drain run) overlain on the surface contour model of surviving Quaternary deposits.

- Generally across the site, the finished ground level will be raised by up to 3m to allow the construction to be set above the flood zones
- The houses are intended to be all piled, the only intrusion into the defined strata will be the piles (7-12 per house)
- The highways are still subject to soil investigation but initial indication is that they are likely to be around 0.8m deep to formation level, deeper in places
- Surface water is being dealt with by swales and all run to the existing lakes. Swales within the site are 250mm with pea-shingle & land drain below – maximum depth to be around 1.0m from finished ground level.
- Foul drainage will start shallow at furthest point at the north of the site and kept shallow wherever possible – indicatively around 0.75m below finished floor levels of houses with shallow gravity falls away. The main spine road known as “the Broadway” will take the main sewer which becomes deeper as it gets to the foul pumping station. The location of the pumping station is expected to be behind the Julie Rose Stadium. At this point an indicative depth of 5.5m-6m is likely below the road level.

Summary of deep impacts (Figure 12*)*

- Piles and foul drain trenches are likely to impact intact deposits of both Holocene and Pleistocene age. There are some areas of road which may also intrude around Willesborough Road.

7.4 Updated Research Questions

7.4.1 The site shows good local preservation of Quaternary sedimentation comprising fine-grained clays and silts, with local organic preservation, interpreted as Holocene alluvium [4] and deeper sands and gravels consistent with Pleistocene fluvial sedimentation [5], [6]. No significant depths of overlying Head Deposits with fine-grained facies [3] were encountered. The site shows good preservation of the entire sequence allowing the research agenda for the locale to be updated. The following updated research questions are proposed by this investigation:

1. To what do degree does Quaternary sedimentation at the site preserve palaeoenvironmental indicators of past vegetation, depositional regime and palaeoecology?
2. What precise date range, to be achieved through scientific dating, is represented by the Quaternary sedimentary sequence?
3. Do fine-grained Head or Colluvial facies from Late Glacial or Early Holocene exists at the interface between the Pleistocene fluvial and Holocene alluvial sequences?
4. Can finds and records from the period of active artefact and faunal collection from the site by Harrison et al be tied into the surviving sedimentary sequence at the site?

7.6 Conclusions and Recommendations

7.6.1 The combined results of the watching brief and integration of earlier results into a provisional sediment model has confirmed the survival of Quaternary deposits at the site. The surviving Pleistocene sediments are consistent with those which have previously demonstrated to preserve a regionally important collection of stone artefacts and fauna at the site.

7.6.2 The site has been subjected to extensive quarrying and landfill and consequently the identified areas of surviving Quaternary sedimentation represent part of an originally much larger sediment body lost to extraction and landfill without formal archaeological ort scientific investigation.

7.6.3 It is recommended that purposive geoarchaeological assessment is undertaken to determine the full extent and nature of surviving deposits and ultimately to mitigate impact of the proposed development once the scope of this is fully understood.

7.6.4 This geoarchaeological assessment is likely to require the following:

1. A review and integration of the archive from the work of Harrison et al in order to integrate records, assess the nature of the artefactual material recovered from the site and identify locations and particular sediments with high potential from the original quarry site.

2. A purposive geoarchaeological test pit assessment of the site in order to test the model, recover dating and palaeoenvironmental samples and further determine the survival of artefactual and faunal material. Depending on the agreed outcomes, this could comprise **6-10 2-3m deep**,

4m square stepped, geoarchaeological test pits and should be targeted on areas of direct impact by, for example, drainage and roads, or key sections of high archaeological or scientific importance which would increase understanding of the whole site.

3. A phase of palaeoenvironmental assessment and programme of scientific dating (using samples recovered from the test pit programme) in order to better characterise the significance of these deposits.

4. Using the data gathered from the above stages 1-3 phases of work, the development, if appropriate, of a mitigation strategy. In effect this is likely to be the full scientific analysis of the samples recovered and publication/public interpretation, if appropriate, of the results. Further geoarchaeological fieldwork is considered unlikely at this stage unless very significant results are forthcoming from stage 2.

7.6.5 This report only addresses **geoarchaeologica**l evaluation/mitigation.

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HER Summary

HER enquiry no.						
Site code	170472					
Project code	CBQ 17					
Planning reference	12/01245/AS					
Site address	Conningbrook Manor Pit, Kennington, Kent.					
District/Borough	Ashford					
NGR (12 figures)	603080, 143398					
Geology	Pleistocene fluvial sands and gravels and Holocene alluvium: Folkestone Formation					
Fieldwork type	Eval	Excav	**WB**	HBR	Survey	Other
Date of fieldwork	June 2017					
Sponsor/client	Chartway Group					
Project manager	Jon Sygrave					
Project supervisor	Matt Pope					
Period summary	**Palaeolithic**	Mesolithic	Neolithic	Bronze Age	Iron Age	
	Roman	Anglo-Saxon	Medieval	Post-Medieval	Other	
Project summary **(100 word max)**	*A geoarchaeological watching brief carried out by Archaeology South-East at Conningbrook Manor Pit in June 2017. The fieldwork was commissioned by the client, Chartway Group, ahead of development of the former aggregate extraction site for housing and landscaping. The watching brief monitored up to 70 interventions carried out by Causeway Geotech Ltd as part of a geotechnical ground investigation. This comprised 73 interventions comprising boreholes, window samples and test pits. The results from these, integrated with those of an earlier geotechnical investigation, carried out by Ecologia in 2012, allow the depth and extent of previous impacts through aggregate extraction and landfill to be more precisely determined and modelled. Modelling of the surface of intact Quaternary sediments at depth showed these to be preserved at relatively shallow depths across an area of the site to the north and north west of the southern lake.*					
Museum/Accession No.						

Oasis form

OASIS ID: archaeol6-289970

Project details

Project name	Geoarchaeological Interpretation of Geotechnical Site Investigations at Conningbrook Manor Pit, Kennington, Kent.
Short description of the project	A geoarchaeological watching brief during geotechnical SI works at Conningbrook Manor Pit, Kennington, Kent. The data from this and previous boreholes survey was used to construct a preliminary deposit model in order to understand the impacts of a proposed development.
Project dates	Start: 06-06-2017 End: 10-06-2017
Type of project	Recording project
Current Land use	Industry and Commerce 5 - Mineral extraction
Investigation type	"Watching Brief"
Prompt	Planning condition

Project location

Country	England
Site location	KENT ASHFORD KENARDINGTON Connongbrook Manor pit
Study area	59 Hectares
Site coordinates	TR 03080 43398 51.153139692979 0.904249940265 51 09 11 N 000 54 15 E Point

Project creators

Name of Organisation	Archaeology South East
Project brief originator	Kent County Council
Project design originator	ASE
Project director/manager	JON SYGRAVE
Project supervisor	Matt Pope
Type of sponsor/funding body	Commercial Developer
Name of sponsor/funding body	Chartway Group

Project archives

Physical Archive recipient	Ashford Museum
Physical Contents	"Worked stone/lithics"
Digital Archive recipient	Kent HER
Digital Media available	"Images raster / digital photography","Spreadsheets","Text"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Geoarchaeological Interpretation of Geotechnical Site Investigations at Conningbrook Manor Pit, Kennington, Kent.
Author(s)/Editor(s)	M. Pope
Other bibliographic details	2017316
Date	2017
Issuer or publisher	ASE
Place of issue or publication	ASE

Entered by	KRISTINA KRAWIEC (k.krawiec@ucl.ac.uk)
Entered on	11 July 2017

Appendix 1

Site logs

Survey	LOC ID	Easting	Northing	Elv.	Topsoil mbgl	Made Ground mbgl	Alluvium (Holocene) mbgl	Head mbgl	Sands m	Gravel and Sand m	Folkestone Beds m	Base m	Depth to Pleistocene m
Causeway	BHA9	603202	143839	34.24	0				0.5	3	7.6	13.5	0.5
Causeway	BHA1	603109	143552	33.13	0		0.5			3	6.5	7.5	0.5
Causeway	BHA1A	603106	143553	33.18									
Causeway	BHA2	603099	143631	32.43	0	0.7	2			3.5	6.5	7.5	3.5
Causeway	BHA3	603305	143728	33.27	0	0.5	0.2				6.5	7.5	
Causeway	BHA4	603203	143752	32.98	0	0.8	3.2				11.8	13	
Causeway	BHA5	603084	143730	33.66	0	0.5	3.5				9.8	11	
Causeway	BHA6	603153	143791	34.15	0	0.5	2			5	9	10	5
Causeway	BHA7	603073	143847	34.73	0				1		8	9	1
Causeway	TPA1	603089	143563	33.32	0	0.8				1.7		3	1.7
Causeway	TPA13	603089	143764	33.86	0	0.3	2.8		3.9			3	3.9
Causeway	TPA14	603065	143767	33.97	0	0.4			4.5			3	4.5
Causeway	TPA15	603039	143761	34.22	0	0.3		0.7	2.3			3	0.7
Causeway	TPA18	603114	143780	33.43	0	0.7	1.5		2			3	1.5
Causeway	TPA19	603092	143781	33.37	0	0.6	1		2			3	1
Causeway	TPA2	603125	143549	32.60	0	0.7	2.2		3.5			3	3.5
Causeway	TPA20	603043	143786	33.89	0	0.3				2		3	2
Causeway	TPA25	603077	143840	34.30	0	0.4	1.4					3.5	1.4
Causeway	TPA26	603052	143825	34.25	0	0.2	1.8			3.4		4	1.8
Causeway	TPA28	603113	143844	33.98	0					1		3	1
Causeway	TPA29	603063	143839	34.79		0			1.6			4.7	1.6
Causeway	TPA3	603089	143541	33.85	0			0.5	0.8			4	0.8
Causeway	TPA33	603087	143593	33.44	0	0.6						3.6	
Causeway	TPA34	603086	143663	33.01	0	0.5			1			3.5	1
Causeway	TPA4	603084	143615	33.43	0	0.3						4	
Causeway	TPA5	603088	143639	32.95	0	0.5						3.5	
Causeway	TPA6	603292	143743	33.39	0	0.1	1.1				1.4	2.5	

Survey	LOC ID	Easting	Northing	Elv.	Topsoil mbgl	Made Ground mbgl	Alluvium (Holocene) mbgl	Head mbgl	Sands m	Gravel and Sand m	Folkestone Beds m	Base m	Depth to Pleistocene m
Causeway	TPA7	603232	143753	33.28	0	0.3			3.6			3.5	3.6
Causeway	TPA9	603114	143738	33.88	0	0.8	1.8		4			4.5	1.8
Causeway	WSA1	603088	143590	33.38	0	0.5	4					4.5	4
Causeway	WSA2	603270	143744	33.20	0	0.4	2.5					3	2.5
Causeway	WSA3	603138	143765	33.72	0	0.2	3					3.5	3
Causeway	WSA4	603060	143786	33.77	0	0.15			2.3			3	2.3
Causeway	WSA5	603188	143762	33.27	0	0.5			2.5	3.6		4	2.5
Causeway	WSA6	603143	143831	34.42	0	0.1	2.65		2.8				2.65
Causeway	WSA7	603213	143865	34.20	0		3.1			4		4.5	4
Causeway	TPA32	603135	143870	33.92	0				0.25	1.8		2.5	0.25

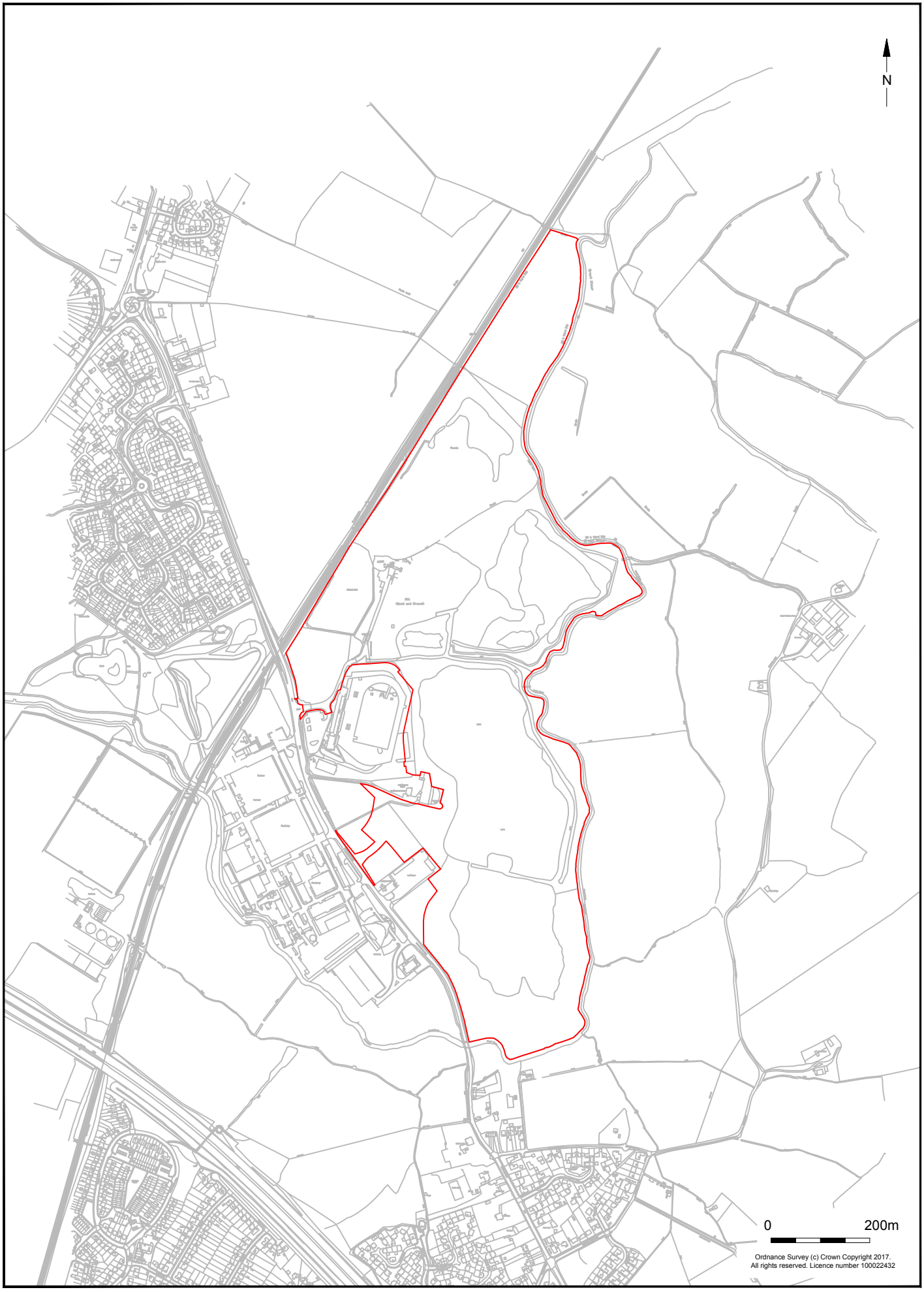
Ecologia logs

Survey	LOC ID	Easting	Northing	Elv.	Topsoil mbgl	Made Ground mbgl	Alluvium (Holocene) mbgl	Head mgl	Sands mbl	Gravel and Sand mbgl	Folkestone Beds mbgl	Base mbgl	Depth to Pleistocene mbgl
Ecologia	ETP1	603291	143744		0				0.3			2.5	0.3
Ecologia	ETP2	603231	143757		0	0.3	0.6			1.8		2.1	0.6
Ecologia	ETP3	603092	143606		0				0.3	1.5		2.5	0.3
Ecologia	ETP4	603088	143443		0				0.25	1.3		2.5	0.25
Ecologia	ETP5	603146	143176		0				0.4	1.2		2.5	0.4
Ecologia	ETP6	603135	143303		0	0.2	1.2					2.5	1.2
Ecologia	ETP7	603103	143785		0	0.2				1.8		2.5	1.8
Ecologia	ETP8	603087	144004		0	0.3						2.8	
Ecologia	ETP9	603126	144010		0	0.7				0.7		3.4	0.7
Ecologia	ETP10	603123	143894		0	0.2	1.35			2		2.4	2
Ecologia	ETP11	603099	143882		0	0.1				0.7		2.8	0.7
Ecologia	ETP12	603063	143815		0	0.1				0.7		2.8	0.7
Ecologia	ETP13	603045	144048		0	0.4			1.2			3.5	1.2
Ecologia	ETP14	603076	144055		0	0.4				2.8		3	2.8
Ecologia	ETP15	603115	144092		0	0.4						4.5	
Ecologia	ETP16	603149	144084		0	0.4						3.1	
Ecologia	ETP17	603181	144117		0	0.4						3	
Ecologia	ETP18	603226	144132		0	0.4						2.2	
Ecologia	ETP19	603098	144144		0	0.3						3.5	
Ecologia	ETP20	603161	144174		0	0.2			1			2.7	
Ecologia	ETP21	603303	144191		0	0.2			0.4	1.8		2.5	0.4
Ecologia	ETP22	603314	144128		0				0.2			2	0.2
Ecologia	ETP23	603279	144105		0	0.25					2.5	3.5	
Ecologia	ETP24	603126	144178		0				0.2			2.6	0.2
Ecologia	ETP25	603183	143866		0	0.1			1.2			2.75	1.2
Ecologia	ETP26	603149	143958		0	0.1						2	
Ecologia	ETP27	603187	143974		0	0.1						2.7	
Ecologia	ETP28	603292	144082		0					0.2		2.7	0.2
Ecologia	ETP29	603249	144001		0					0.6		3	0.6

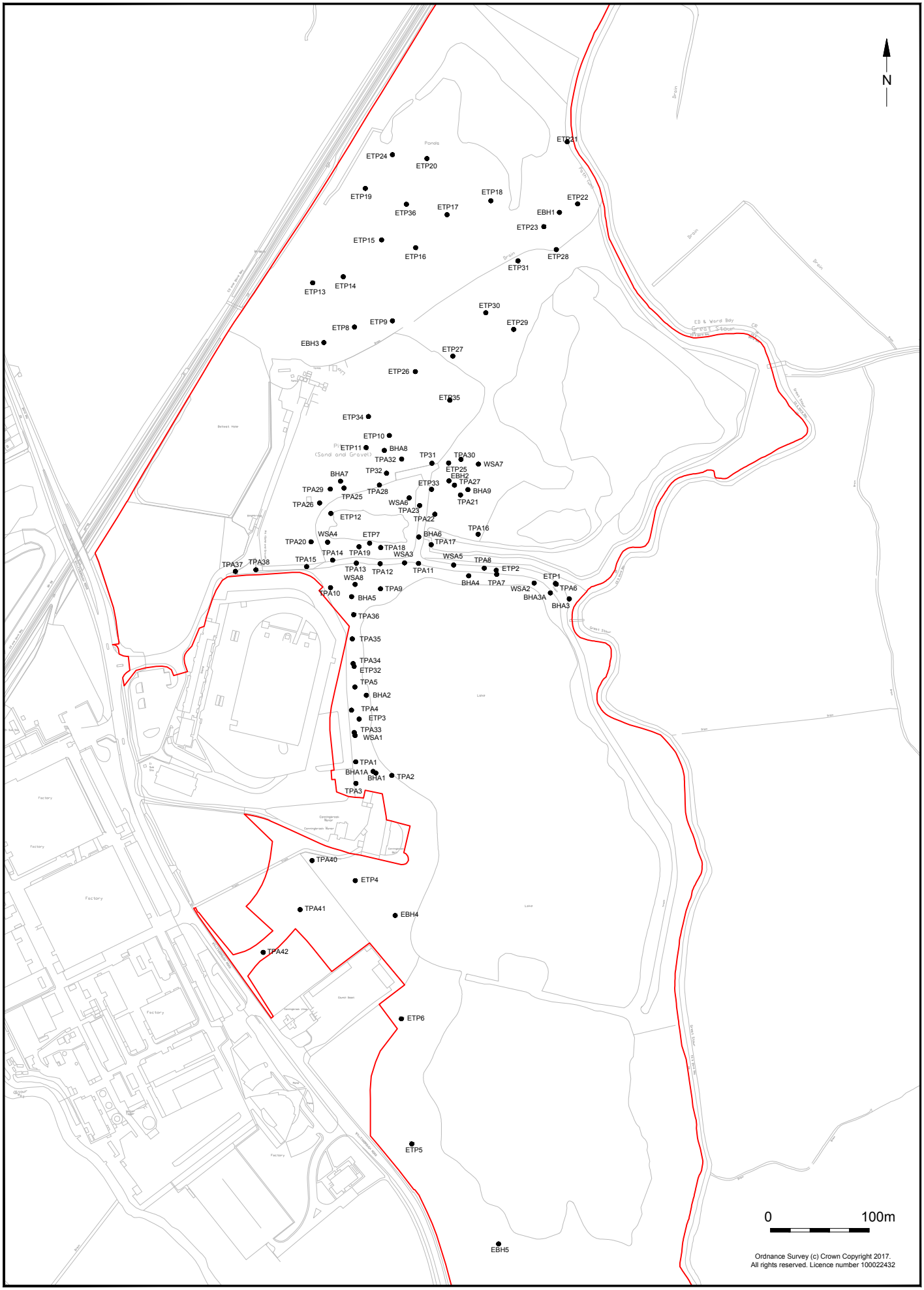
Survey	LOC ID	Easting	Northing	Elv.	Topsoil mbgl	Made Ground mbgl	Alluvium (Holocene) mbgl	Head mgl	Sands mbl	Gravel and Sand mbgl	Folkestone Beds mbgl	Base mbgl	Depth to Pleistocene mbgl
Ecologia	ETP30	603220	144018		0	0.5						2.5	
Ecologia	ETP31	603253	144071		0	0.25						1.2	
Ecologia	ETP32	603087	143660		0				0.15			2.7	0.15
Ecologia	ETP33	603166	143839		0	0.2						1.8	
Ecologia	ETP34	603102	143913		0	0.2	1.3			2.5		3.5	2.5
Ecologia	ETP35	603184	143929		0	0.2						2.6	
Ecologia	ETP36	603140	144128		0	0.2						2.6	
Ecologia	EBH1	603295	144120		0		0.3			1.3	6.3	7.3	1.3
Ecologia	EBH2	603183	143848		0	0.1	2.4		3.1	3.8	7		3.1
Ecologia	EBH3	603056	143988		0	0.1						5.5	
Ecologia	EBH4	603129	143407		0				0.1	3.3	7	8	0.1
Ecologia	EBH5	603233	143074		0	0.3	1.3		3.8		7	8	1.3

APPENDIX 2: PROPOSED DEVELOPMENT PLANS

© Archaeology South-East		Conningbrook Quarry	Fig. 1
Project Ref: 170472	July 2017	Site location	
Report Ref:	Drawn by: JLR		



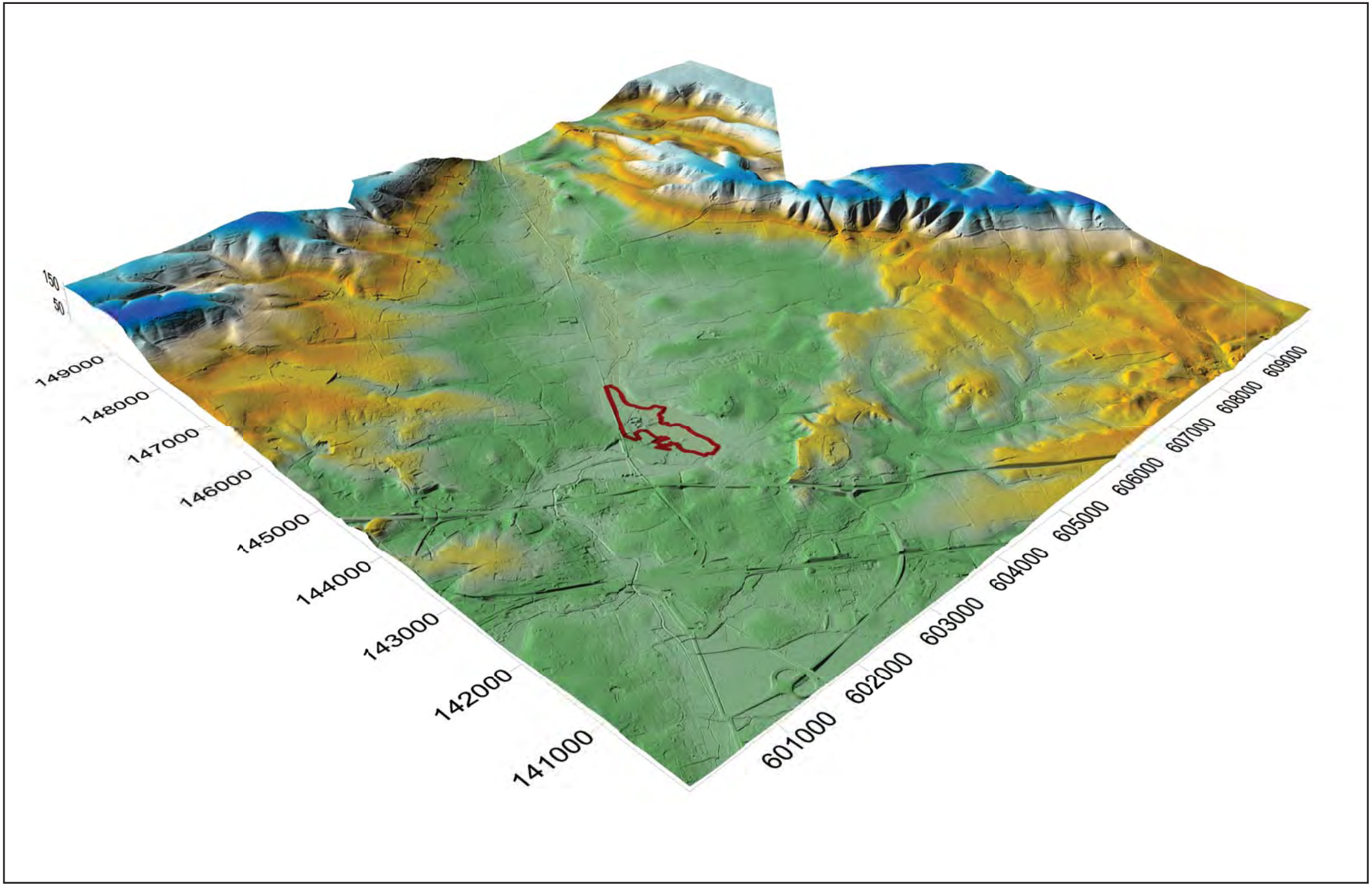
© Archaeology South-East		Conningbrook Quarry	Fig. 2
Project Ref: 170472	July 2017	Site plan	
Report Ref:	Drawn by: JLR		



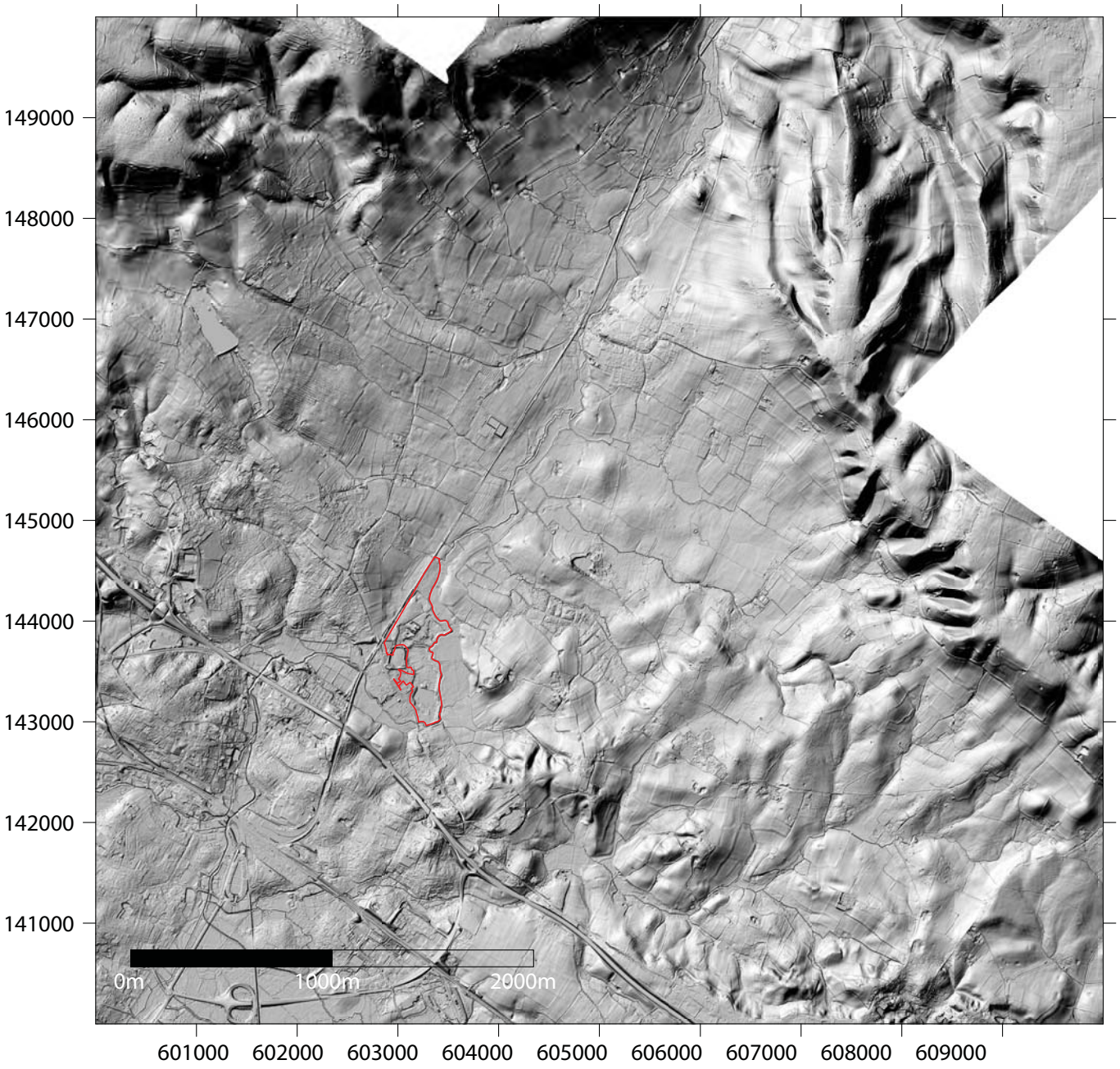
© **Archaeology South-East**		Conningbrook Quarry	Fig. 3
Project Ref: 170472	July 2017	The location of all interventions undertaken as part of the 2017 Causeway Geotechnical site investigation and those of the earlier 2012 Ecologia site investigation	
Report Ref:	Drawn by: JLR		

© Archaeology South-East		Conningbrook Quarry	Fig. 4
Project Ref: 170472	July 2017	1990 aerial photograph	
Report Ref:	Drawn by: JLR		

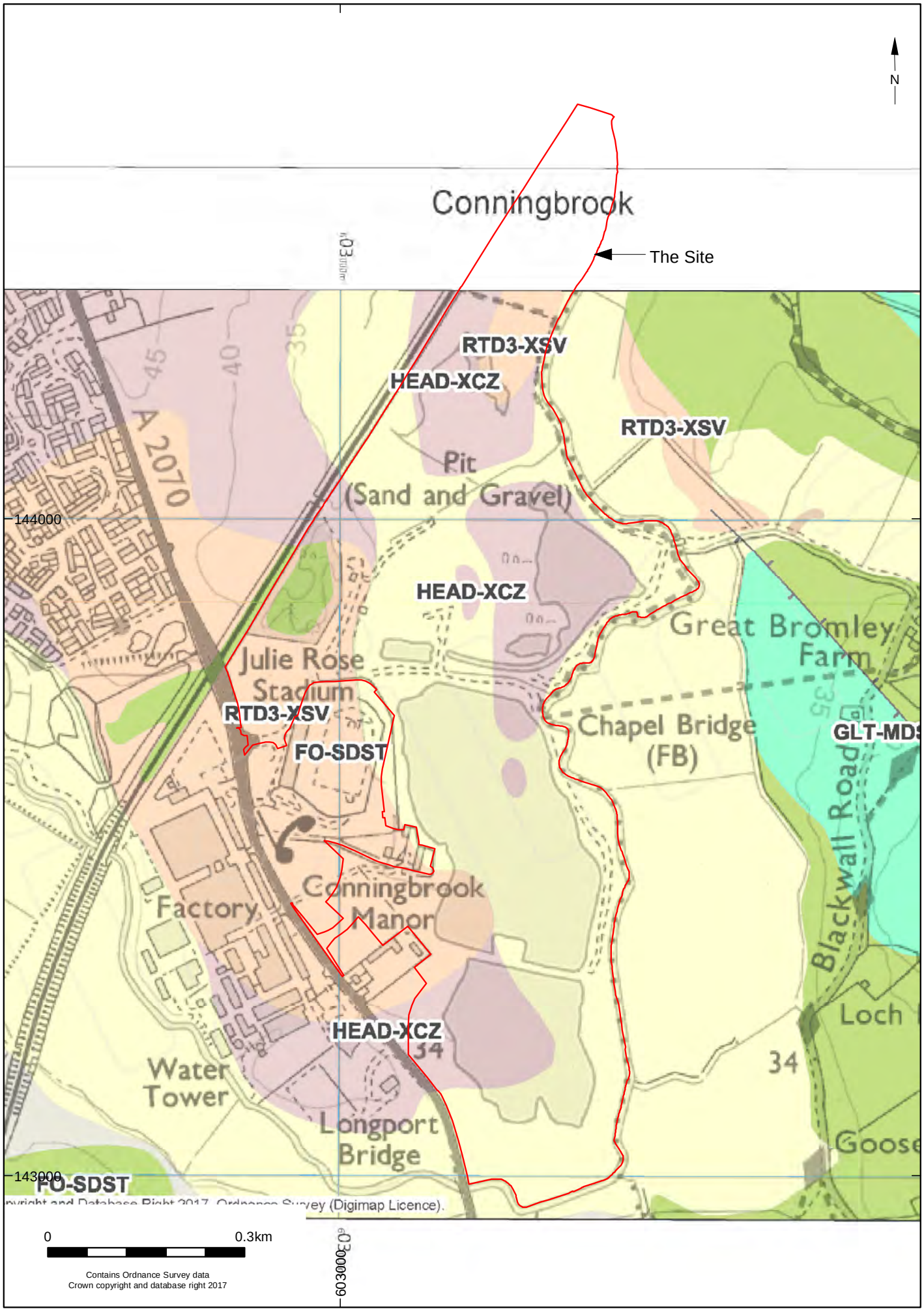
© Archaeology South-East		Conningbrook Quarry	Fig. 5
Project Ref: 170472	July 2017	2008 aerial photograph	
Report Ref:	Drawn by: JLR		



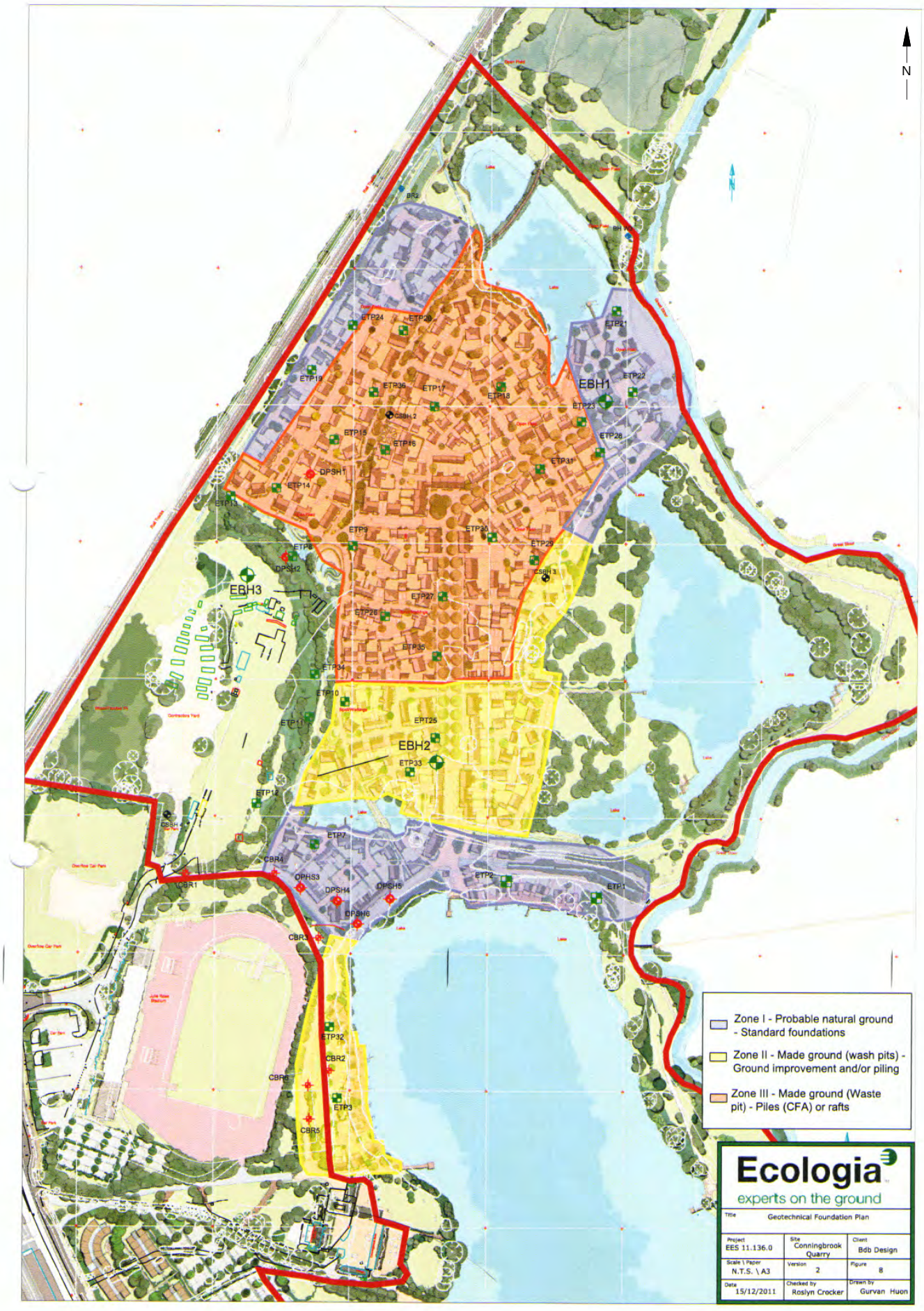
© **Archaeology South-East**		Conningbrook Quarry	Fig. 6
Project Ref: 170472	July 2017	3D surface model of the wider landscape setting of the site. (2m LIDAR DEM, Environment Agency)	
Report Ref:	Drawn by: JLR		



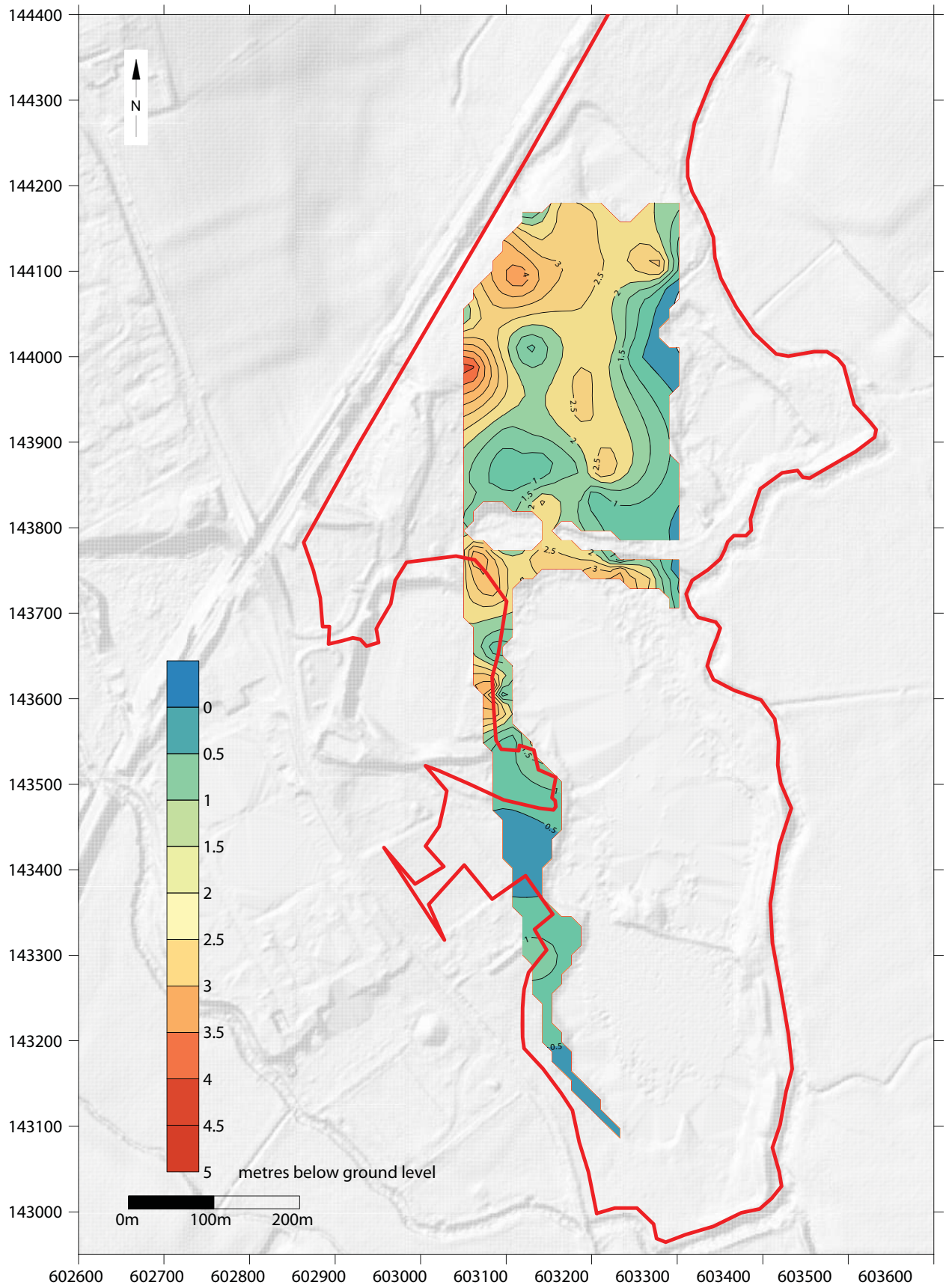
© Archaeology South-East		Conningbrook Quarry	Fig. 7
Project Ref: 170472	July 2017	Shaded Relief Map of the wider landscape setting of the site. (2m LIDAR DEM, Environment Agency)	
Report Ref:	Drawn by: JLR		



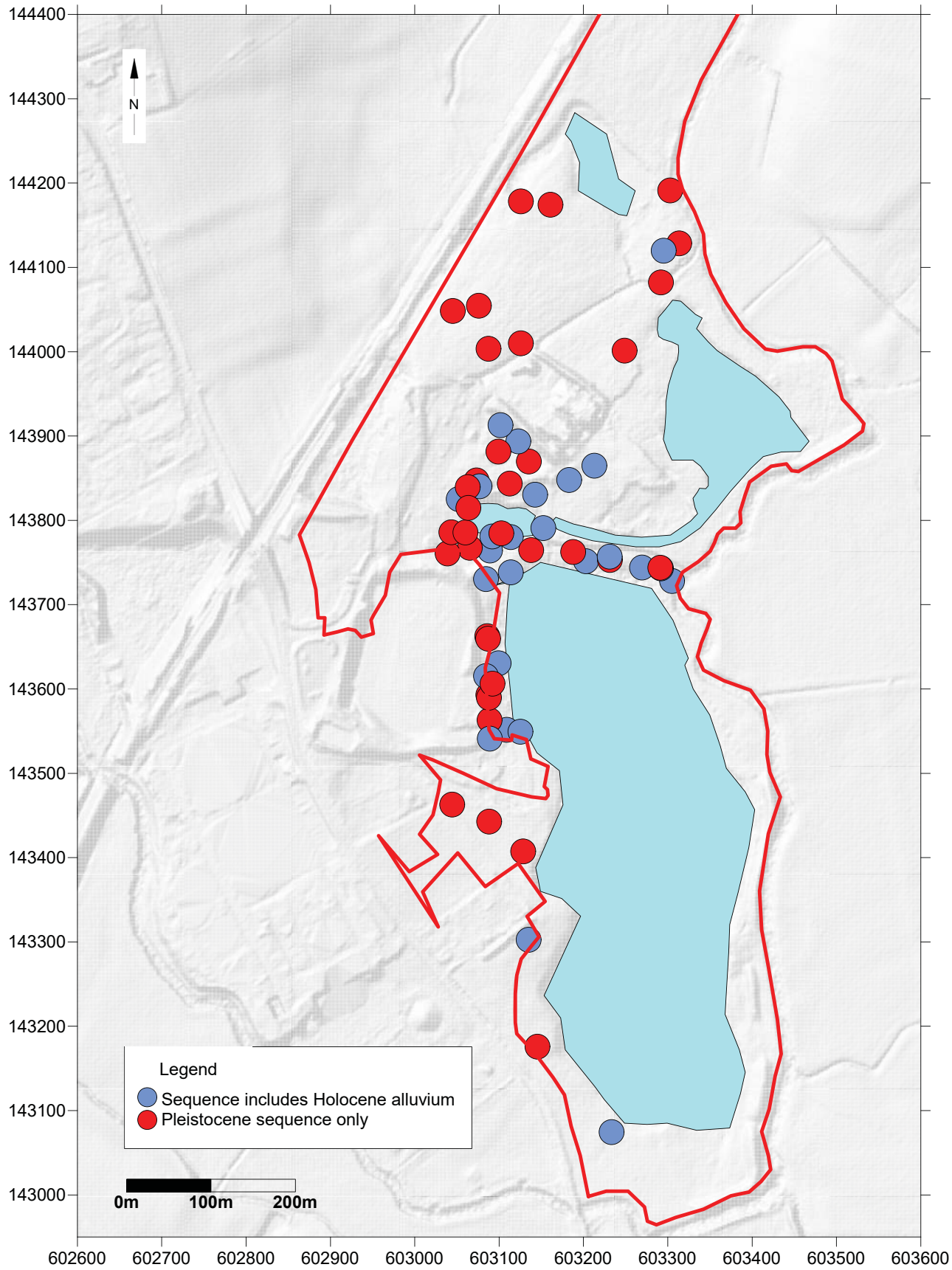
© Archaeology South-East		Conningbrook Quarry	Fig. 8
Project Ref: 170472	July 2017	British Geological Survey mapping of the immediate landscape around the site	
Report Ref:	Drawn by: JLR		



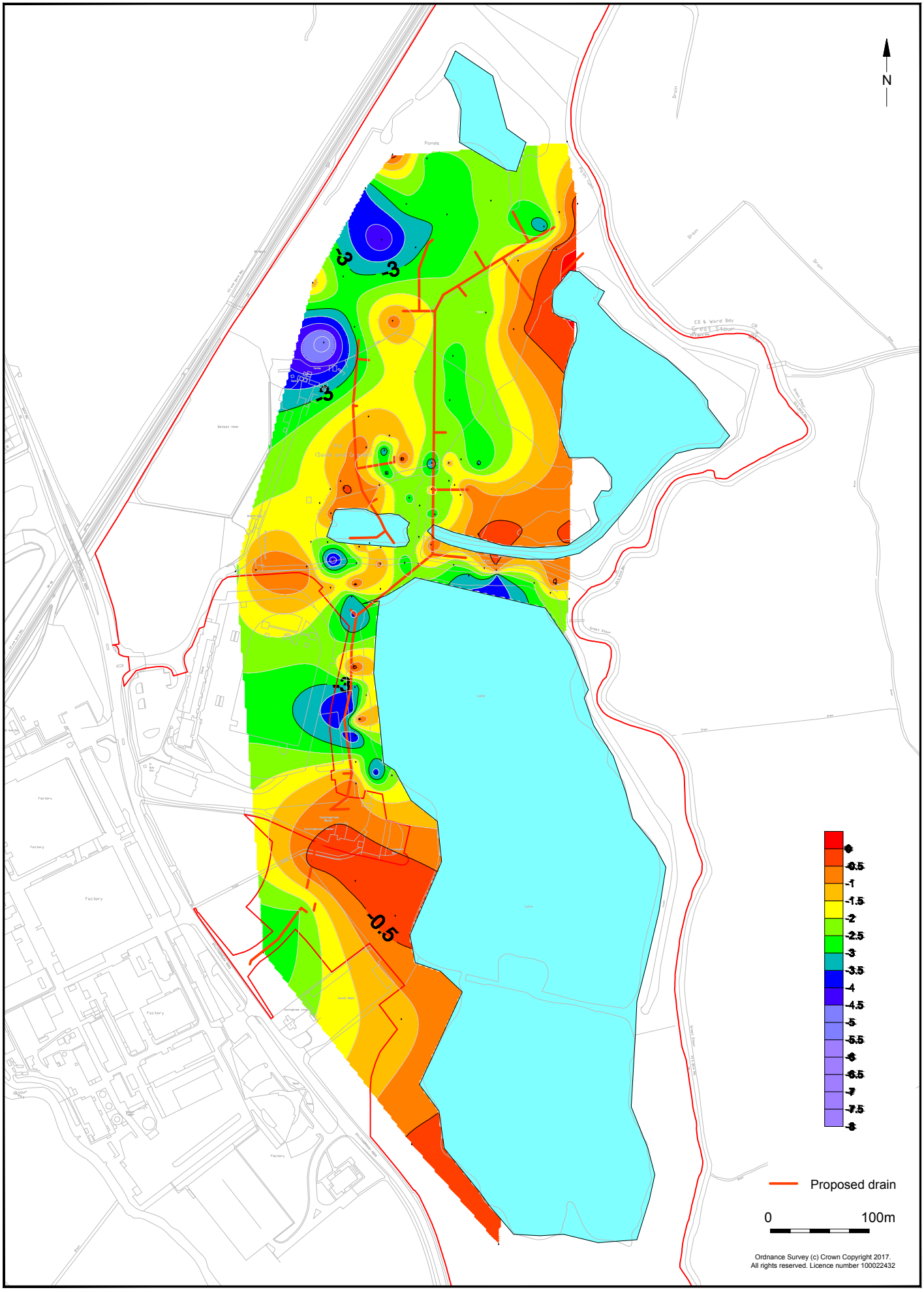
© Archaeology South-East		Conningbrook Quarry	Fig. 9
Project Ref: 170472	July 2017	Provisional Zoning of the site based on previous geotechnical investigations undertaken by Ecologia in 2012	
Report Ref:	Drawn by: JLR		



© Archaeology South-East		Conningbrook Quarry	Fig. 10
Project Ref: 170472	July 2017	Surface model showing top of preservation horizon (intact Quaternary sediments) below current ground level	
Report Ref:	Drawn by: JLR		



© Archaeology South-East		Conningbrook Quarry	Fig. 11
Project Ref: 170472	July 2017	Interventions showing the presence of depositional sequences preserving both Holocene and underlying Pleistocene sediments (in Blue) and those preserving only Pleistocene sediments (in Red)	
Report Ref:	Drawn by: JLR		



© Ar□□□□o□□ So□□□□□□		Conningbrook Quarry	Fig. 12
Project Ref: 170472	July 2017	Proposed drain run overlain on Surface model	
Report Ref:	Drawn by: JLR		

APPENDIX 2: PROPOSED DEVELOPMENT PLANS

Do not scale from this drawing.

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
2. THIS DRAWING IS BASED ON:-
   - TOPOGRAPHICAL SURVEY BY EVANS & LANGFORD LLP DRG Nos. S1 - S8.
   - SITE PLAN BY GDM ARCHITECTS 3775 - WD 001 RECEIVED ON 19.05.2017.
3. FINISH FLOOR LEVELS SHOWN ARE SUBJECT TO DETAILED DESIGN OF RELEVANT PHASE COMMENCES.

DESIGN ASSUMPTIONS/PHILOSOPHY

1) MANHOLE COVER LEVELS ARE INDICATIVELY DERIVED FROM THE SUGGESTED FINISHED LEVEL OF THE BUILDINGS. ALSO INFLUENCED BY THE ASSUMED CROSS FALL OF THE CARRIAGEWAY AS DICTATED BY 'RMB' STORM-WATER STRATEGY.
2) IN KEEPING WITH THE REQUIREMENTS OF SEWERS FOR ADOPTION 7TH EDITION,100mm DIAMETER PIPES ARE PROPOSED AT THE HEAD OF THE RUN AT A MINIMUM GRADIENT OF 1:80. THIS TYPICAL SERVE LESS THAN 10 DWELLINGS
3) THE GEOMETRY OF THE FOUL NETWORK ADOPTED WAS DRIVEN BY THE DESIRE TO MINIMIZE GRADIENTS OF THE PIPE, THUS MINIMIZING WHERE POSSIBLE,THE DEPTH OF EXCAVATION.
4) THE RESULTING OUTFALL MANHOLE IS AT A MAXIMUM DEPTH OF 4.6m TO BE CONFIRMED.
5) THE GEOMETRY AND THE LEVELS OF THE FOUL NETWORK IS DESIGNED WITH ADEQUATE CLEARANCE TO THE 'RMB' SURFACE WATER STRATEGY SUBJECT TO DETAILED DESIGN.
6) ROUTE OF RISING MAIN OUTFALL TO BE DETERMINED BY OTHERS.

PROPOSED PUMPING STATION SUBJECT TO ACCEPTABLE ACCESS ARRANGEMENT. THE LOCATION OF WHICH IS SUBJECT T THE REQUIREMENTS OF SEWERS FOR ADOPTION.

Area of initial works for sales & access road

Lakeside plot part of phase 1, but later stage

Approximate alignment of foul sewer

Phase 5 - last to be built although road will be earlier to get drainage in place.

This area subject to discussion on location of emergency foul drainage overflow & available space for highways

Pumping station

LOCATION AND INVERT LEVELS OF FOUL MANHOLES F101, F102 AND F104 ARE APPROXIMATED FROM 'BDB' DRAWING NO. 722-1063 A. THE ACTUAL POSITION TOGETHER WITH THE DESIGN CAPACITES OF THE OUTLET PIPES ARE HELD IN ABEYANCE OF UNTIL MORE CLARIFYING INFORMATION IS ARE PROVIDED

Drainage from here south subject to further clarification with ABC to serve Conningbrook Manor & others.

KEY:

ADOPTABLE DRAINAGE

- 150Ø, 1:80 — -FOUL WATER SEWER. (pipe dia. & gradient)
- F1 — -FOUL WATER MANHOLE.
- -FOUL PUMPING STATION..
- -FOUL RISING MAIN.

Rev.	Date	Description	Drwn.	Chkd.	Appd.
-	06.17	PRELIMINARY ISSUE - FOR COMMENT ONLY	IO	DAP	X

FAIRHURST
160 LONDON ROAD
SEVENOAKS
TN13 2JA
Tel: 01732 460 142
Fax: 01732 459 249

Client: CHARTWAY.

Project Title: CONNINGBROOK LAKES ASHFORD.

Drawing Title: FOUL WATER DRAINAGE SECTION 104 SITE WIDE LAYOUT PLAN (SHEET 3 OF 3).

Scale at A1:	Status:	
1:500	INFORMATION	
Drawn:	Checked:	Approved:
MT	DAP	-
Date:	Date:	Date:
MAY'17	MAY'17	-

Drawing No.: **560/C/00/00/PL/026**

Revision:

FAIRHURST JOB No: 116346

Do not scale from this drawing.

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
2. THIS DRAWING IS BASED ON:-
   - TOPOGRAPHICAL SURVEY BY EVANS & LANGFORD LLP DRG Nos. S1 - S8.
   - SITE PLAN BY GDM ARCHITECTS 3775 - WD 001 RECEIVED ON 19.05.2017.
3. FINISH FLOOR LEVELS SHOWN ARE SUBJECT TO DETAILED DESIGN OF RELEVANT PHASE COMMENCES.

DESIGN ASSUMPTIONS/PHILOSOPHY

1) MANHOLE COVER LEVELS ARE INDICATIVELY DERIVED FROM THE SUGGESTED FINISHED LEVEL OF THE BUILDINGS. ALSO INFLUENCED BY THE ASSUMED CROSS FALL OF THE CARRIAGEWAY AS DICTATED BY 'RMB' STORM-WATER STRATEGY.
2) IN KEEPING WITH THE REQUIREMENTS OF SEWERS FOR ADOPTION 7TH EDITION,100mm DIAMETER PIPES ARE PROPOSED AT THE HEAD OF THE RUN AT A MINIMUM GRADIENT OF 1:80. THIS TYPICAL SERVE LESS THAN 10 DWELLINGS
3) THE GEOMETRY OF THE FOUL NETWORK ADOPTED WAS DRIVEN BY THE DESIRE TO MINIMIZE GRADIENTS OF THE PIPE, THUS MINIMIZING WHERE POSSIBLE,THE DEPTH OF EXCAVATION.
4) THE RESULTING OUTFALL MANHOLE IS AT A MAXIMUM DEPTH OF 4.6m TO BE CONFIRMED.
5) THE GEOMETRY AND THE LEVELS OF THE FOUL NETWORK IS DESIGNED WITH ADEQUATE CLEARANCE TO THE 'RMB' SURFACE WATER STRATEGY SUBJECT TO DETAILED DESIGN.
6) ROUTE OF RISING MAIN OUTFALL TO BE DETERMINED BY OTHERS.

KEY:

ADOPTABLE DRAINAGE

- 150Ø, 1:80 -FOUL WATER SEWER. (pipe dia. & gradient)
- F1 -FOUL WATER MANHOLE.
- -FOUL PUMPING STATION..
- -FOUL RISING MAIN.

Rev.	Date	Description	Drwn.	Chkd.	Appd
-	06.17	PRELIMINARY ISSUE - FOR COMMENT ONLY	IO	DAP	X

FAIRHURST
160 LONDON ROAD
SEVENOAKS
TN13 2JA
Tel: 01732 460 142
Fax: 01732 459 249

Client: CHARTWAY.

Project Title: CONNINGBROOK LAKES ASHFORD.

Drawing Title: FOUL WATER DRAINAGE SECTION 104 SITE WIDE LAYOUT PLAN (SHEET 2 OF 3).

Scale at A1: 1:500	Status: INFORMATION	
Drawn: MT	Checked: DAP	Approved: -
Date: MAY'17	Date: MAY'17	Date: -

Drawing No.: **560/C/00/00/PL/025**

Revision:

FAIRHURST JOB No: 118346

Do not scale from this drawing.

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
2. THIS DRAWING IS BASED ON:-
   - TOPOGRAPHICAL SURVEY BY EVANS & LANGFORD LLP DRG Nos. S1 - S8.
   - SITE PLAN BY GDM ARCHITECTS 3775 - WD 001 RECEIVED ON 19.05.2017.
3. FINISH FLOOR LEVELS SHOWN ARE SUBJECT TO DETAILED DESIGN OF RELEVANT PHASE COMMENCES.

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ADOPTABLE DRAINAGE

- 150Ø, 1:80 — -FOUL WATER SEWER. (pipe dia. & gradient)
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Rev.	Date	Description	Drwn	Chkd	Appd
-	06.17	PRELIMINARY ISSUE - FOR COMMENT ONLY	IO	DAP	X

FAIRHURST

160 LONDON ROAD
SEVENOAKS
TN13 2JA

Tel: 01732 460 142
Fax: 01732 459 249

Client:

CHARTWAY.

Project Title:

CONNINGBROOK LAKES
ASHFORD.

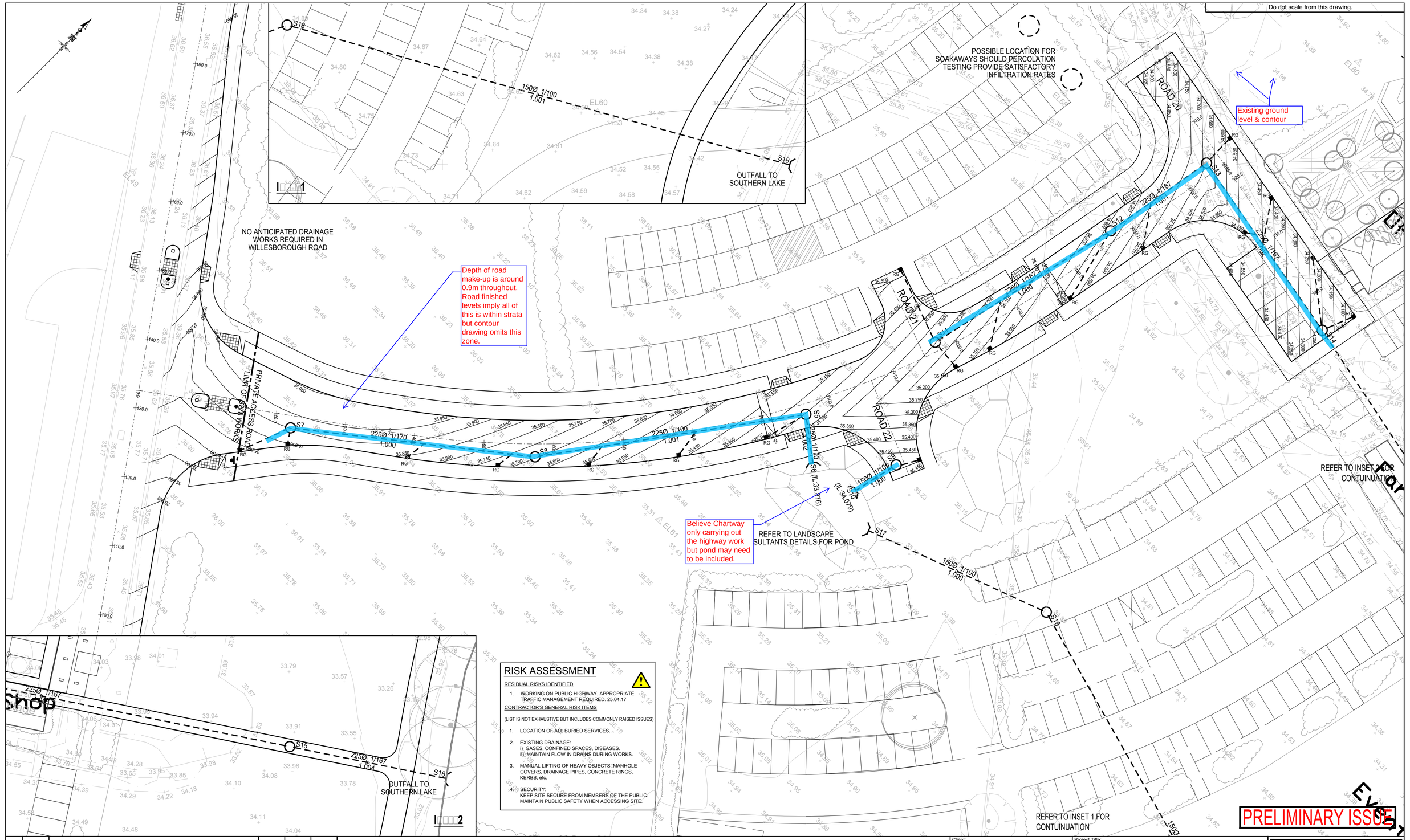
Drawing Title:

FOUL WATER DRAINAGE
SECTION 104 SITE WIDE LAYOUT PLAN
(SHEET 1 OF 3).

Scale at A1: 1:500	Status: INFORMATION	
Drawn: IO	Checked: DAP	Approved: -
Date: JUN'17	Date: JUN'17	Date: -
Drawing No.: **560/C/00/00/PL/024**		Revision:

FAIRHURST JOB No: 118346

Do not scale from this drawing.



RISK ASSESSMENT

RESIDUAL RISKS IDENTIFIED

1. WORKING ON PUBLIC HIGHWAY. APPROPRIATE TRAFFIC MANAGEMENT REQUIRED. 25.04.17

CONTRACTOR'S GENERAL RISK ITEMS

(LIST IS NOT EXHAUSTIVE BUT INCLUDES COMMONLY RAISED ISSUES)

1. LOCATION OF ALL BURIED SERVICES.
2. EXISTING DRAINAGE:
   i). GASES, CONFINED SPACES, DISEASES.
   ii). MAINTAIN FLOW IN DRAINS DURING WORKS.
3. MANUAL LIFTING OF HEAVY OBJECTS: MANHOLE COVERS, DRAINAGE PIPES, CONCRETE RINGS, KERBS, etc.
4. SECURITY:
   KEEP SITE SECURE FROM MEMBERS OF THE PUBLIC. MAINTAIN PUBLIC SAFETY WHEN ACCESSING SITE.

Rev.	Date	Description	Drawn	Checked	Approved
-	23.05.17	PRELIMINARY ISSUE	PW	DAP	X

1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. ALL MATERIALS AND WORKMANSHIP SHALL COMPLY FULLY WITH THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME ONE, SPECIFICATION FOR HIGHWAY WORKS AND THE LOCAL AUTHORITY SPECIFICATION FOR ROAD CONSTRUCTION AND STANDARD DETAILS.
6. THE CONTRACTOR SHALL UNDERTAKE SUCH MATERIALS TESTING AS INDICATED IN THE SPECIFICATIONS AND SHALL INCLUDE THE COST OF TESTING IN THE TENDER.
7. UNLESS STATED OTHERWISE, ALL EXCAVATED MATERIAL SHALL BE DISPOSED OF AT AN APPROVED TIP OFF-SITE.
8. THE PUBLIC HIGHWAY AND WORKS WILL BE KEPT CLEAN AND FREE OF DEBRIS BY USE OF WHEEL WASHING FACILITIES AND ROAD SWEEPERS TO THE COUNCIL'S SATISFACTION.
9. ALL SETTING OUT SHALL BE AGREED ON-SITE WITH THE ENGINEER, PRIOR TO THE COMMENCEMENT OF THE WORKS.
10. UPON COMPLETION OF THE WORKS, THE CONTRACTOR SHALL UNDERTAKE ALL NECESSARY MAINTENANCE REPAIRS TO RETURN THE HIGHWAY TO ITS FORMER CONDITION.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE LOCAL AUTHORITY PRIOR TO COMMENCING WORKS ON THE HIGHWAY.
12. DRAINS TO BE CONSTRUCTED USING VITRIFIED CLAY PIPES TO BS 65 1991 AND BS EN 295-1:2013 OR FLEXIBLY JOINTED CONCRETE PIPES TO BS 5911-1:2002: A2 2010 BEDDED AND BACK FILLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. ALL TESTED IN ACCORDANCE WITH BS EN 1610:2015.
13. BACK FILLING OF DRAIN TRENCHES ADJACENT TO DWELLINGS OR OTHER STRUCTURES TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS PART H: DIAGRAM 8.
14. DRAINS IN AREAS OF MADE GROUND TO BE CONSTRUCTED BY FIRST MAKING UP THE AREA TO APPROXIMATELY FINISHED LEVEL AND THEN EXCAVATE THROUGH THE FILL MATERIAL INTO UNDISTURBED GROUND. THE DRAIN TRENCH IS THEN TO BE BACK FILLED TO FORMATION LEVEL USING SUITABLE GRANULAR FILL MATERIAL WELL COMPACTED IN LAYERS NOT EXCEEDING 225MM.
15. ALL COVERS IN VEHICULAR AREAS TO BE GROUP 4 CLASS D400.
16. NO SEWER SHALL BE ABANDONED UNTIL THE CONTRACTOR HAS CONFIRMED THAT THERE ARE NO CONNECTIONS REMAINING.
17. MANHOLES, SEWERS ETC AND ANY OTHER PART OF THE WORKS INTENDED FOR ADOPTION UNDER A SECTION 104 AGREEMENT OR GULLIES ETC INTENDED FOR ADOPTION AS HIGHWAY DRAINAGE ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE WATER SERVICES ASSOCIATION PUBLICATION "SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS" 7TH EDITION AND TO THE APPROVAL OF THE WATER AUTHORITY.
18. PROPOSED GULLY GRATINGS AND FRAMES SHALL BE SET AT A LEVEL OF 6MM BELOW THE FINISH LEVEL OF THE CARRIAGEWAY.
19. GULLIES TO BE IN ACCORDANCE WITH CLAUSE 508 OF SPECIFICATION FOR HIGHWAY WORKS.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR POSITIONING ROAD GULLIES AT ALL LOW SPOTS IN THE CARRIAGEWAY.

Client:

CHARTWAY

Project Title:

CONNINGBROOK LAKES
ASHFORD

Drawing Title:

COUNTRY PARK
SECTION 278 ACCESS/
PRIVATE ACCESS ROAD
SURFACE WATER DRAINAGE AND LEVELS

PRELIMINARY ISSUE

FAIRHURST
160 LONDON ROAD,
SEVENOAKS, TN13 2JA
Tel: 01732 460 142 Fax: 01732 459 249

Scale at A1:	Status:
1:250	PRELIMINARY

Drawn:	Checked:	Approved:
PW	DAP	-
Date:	Date:	Date:
APRIL 2017	APRIL 2017	-

Drawing No.: **560 / C / 00 / 00 / PL / 005**

Revision:

FAIRHURST JOB No. 118346

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