



Geo-Environmental

GEOTECHNICAL INTERPRETATIVE REPORT

for the site at

PHASE 2 AREA, WOODCROFT FARM,

LOVEDEAN, HAMPSHIRE PO8 9QA

on behalf of

GRAINGER PLC



Report:	GEOTECHNICAL INTERPRETATIVE REPORT
Site:	PHASE 2 AREA, WOODCROFT FARM, LOVEDEAN, HAMPSHIRE PO8 9QA
Client:	GRAINGER PLC
Date:	3 rd AUGUST 2018
Reference:	GE16942-GIR-AUG18
Version:	1.1
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author's initials
1.0	02/07/2018	First issue	GR
1.1	03/08/2018	Inclusion of aerial survey findings	GR

**CONTENTS**

1.0	INTRODUCTION	1
1.1	General	1
1.2	Form of Development	1
1.3	Objectives	1
1.4	Standards	1
1.5	Conditions	2
2.0	SITE SETTING	3
2.1	Site Description	3
2.2	Geomorphology	3
2.3	Geology	4
2.4	Hydrology	5
2.5	Hydrogeology	5
2.6	Previous Geotechnical Investigation	6
2.7	Scope of Supplementary Investigation	6
3.0	MORPHOLOGY, GROUND CONDITIONS & MATERIAL PROPERTIES	7
3.1	Morphology	7
3.2	Soils	7
3.3	Groundwater	9
3.4	Obstructions	9
3.5	Geotechnical Testing	9
4.0	GEOTECHNICAL ASSESSMENT	10
4.1	Ground Model	10
4.2	Foundations	10
4.3	Floor Slabs	12
4.4	Excavations	12
4.5	Soakaways	12
4.6	Abnormal Conditions	12

FIGURES

FIGURE 1	Site Location Plan
FIGURE 2	Proposed Scheme Layout
FIGURE 3	Exploratory Hole Location Plan
FIGURE 4	Lines of section Plan
FIGURE 5	SPT Plot
FIGURE 6	TP708-708A section sketch
FIGURE 7	TP709 section sketch
FIGURE 8	TP710 section sketch
FIGURE 9	Section BH603-WS514
FIGURE 10	Section WS201-TP237
FIGURE 11	Section WS501-WS507
FIGURE 12	Section WS501-BH606
FIGURE 13	Section WS507-BH302
FIGURE 14	Section TP233-TP710
FIGURE 15	Section TP705-TP701
FIGURE 16	3D ground surface model
FIGURE 17	3D ground surface contour model



FIGURE 18	Aerial photograph with depth to chalk overlay
FIGURE 19	Chalk level 3D model on aerial overlay
FIGURE 20	Pre-development ground level contours on development layout
FIGURE 21	Chalk level contours on development layout
FIGURE 22	Depth to chalk on development layout

APPENDICES

APPENDIX A	Exploratory Hole Logs and In-situ Test Results
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1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Grainger plc to undertake an investigation of the geotechnical factors pertaining to land within the Phase 2 development area at Woodcroft Farm, Lovedean (see Figure 1). The area to be investigated included a series of surface depressions, including four sinkholes as identified by previous third party investigation. The ground between the previously identified sinkholes undulated and included several other smaller surface depressions.

1.2 Form of Development

The proposed development is understood to comprise the development of 288 residential units, associated car parking, open space and landscaping. The portion of the site assessed within this report includes c. 60 houses and flats.

The development layout incorporates retention of the four main sinkholes, i.e. Sinkholes 1 to 4 as referred to in the PBA reports, but includes development on the land between these features, i.e. on land where further solution features are suspected to be present and where there was limited information on variation in composition and condition of shallow strata, or clarification of the depth to the Chalk beneath the site.

1.3 Objectives

The investigation was undertaken to target the land around Sinkholes 1-4 where development is proposed with an aim of clarifying the ground conditions in terms of composition, condition and variation across the development area and from this to identify potential foundation options.

1.4 Standards

Where practicable, the ground investigation and subsequent geotechnical and environmental assessments were undertaken in accordance with the following documents and guidance:

- EN ISO 14688 – Geotechnical investigation and testing
- BS5930: 2015 - Code of Practice for Site Investigations, BSI 2015
- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990
- EN 1990: Eurocode – Basis of Structural Design
- BS EN 1997-1. Eurocode 7: Geotechnical Design – General Rules 1997-1:2004, BSI
- British Standards Institute - Eurocode 7 – Geotechnical Design - Parts 1 & 2 (BS EN1997-1:2004 & BS EN1997-2:2007).
- National Annex to BS EN 1997-1. UK National Annex to Eurocode 7: Geotechnical Design – General Rules 1997-1:2004, BSI.
- CIRIA C574 – Engineering in Chalk (2002);
- The nature, formation and engineering significance of sinkholes related to dissolution of chalk in SE Hampshire, England. P W McDowell, J Coulton, C N Edmonds and A J Poulson. Quarterly Journal of Engineering Geology and Hydrogeology, Volume 41, Part 3, August 2008, pp 279-290.
- A Hole lot of Trouble. Farrant, A. and Cooper, A. Geoscientist. July 2014.
- NHBC Standards Chapter 4.2 Building Near Trees.

**1.5 Conditions**

The data collected from the investigations have been used to provide an interpretation of the geotechnical conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occurs between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

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2.0 SITE SETTING

2.1 Site Description

The site comprised an irregularly shaped parcel of land located at NGR 468150, 112100 which extended to c. 2.6ha and was situated in the north-western portion of the wider Woodcroft Farm development site. Four distinct depressions were present within the investigation area and these correlated with Sinkholes 1 – 4 as identified in previous phases of investigation.

The investigation area comprised fallow grassed fields which had formerly been used for horse grazing, but which had been vacated such that the grass had grown to an uncropped height. Numerous mature deciduous trees including oaks were located around the site's perimeter.

Sinkhole 1 was located in the north-western portion of the investigation area and comprised a surface depression in and around which several mature and immature trees were present. Sinkhole 2 was located in the north-eastern portion of the investigation area and formed part of the grassed field. Sinkhole 3 was located in the south-eastern portion of the investigation area and several mature trees were located within and around the edge of the depression. Sinkhole 4 was located in the central southern portion of the investigation area and had been cleared of vegetation. During previous site visits, Sinkhole 4 appears to have been used as a pond associated with the former farmyard located to the south of the investigation area.

In addition to Sinkholes 1-4, the ground around and between Sinkholes 2,3 and 4 was observed to undulate and include several changes in slope profile and orientation. Two shallow, small scale depressions were located between Sinkholes 2 and 3 and appeared to be located along a break in slope with ground levels falling towards the west. A shallow elongated surface depression trending east-north-east to west-south-west was located to the west of Sinkhole 2. Ground levels rose to the south of this elongated depression to form an undulating dome extending towards Sinkhole 4 and with an undulating slope profile falling towards the west.

A hardcore surfaced track extended through the site from the southern to the northern boundaries. Sinkholes 2, 3 and 4 were located to the east of this track and Sinkhole 1 was located to the west of the track.

The ground surface around Sinkhole 1 was more uniform and comprised a very gentle slope falling towards the south-south-west.

The investigation area was accessed from Woodcroft Lane and the former farmyard located to the immediate south.

The site was bounded to the north by a line of trees with fields beyond; to the east by a field which formed part of the wider development area; to the south by the former farmyard and farmhouse and continuation of the fields, with an existing housing development to the south; and a line of trees with a field to the west.

The land beyond the western boundary comprised a shallow valley plunging at a relatively shallow gradient towards the south-west (approx.). Several depressions were observed on the northern flank of the valley. In addition, the land to the north of the site was observed to include several other depressions and areas of undulating ground.

2.2 Geomorphology

With regards to the description of geomorphological features and sub-surface cavities, the following terms are used and comply with general UK and international terminology. As can be seen there is a degree of cross over between the various terms:



- Doline – commonly a circular or oval shaped depression at ground level caused by dissolution of sub-surface strata, e.g. Chalk.
- Sinkhole – a depression at ground level caused due to the subsidence or collapse of surface strata into sub-surface cavities.
- Solution Feature – a cavity, or infilled former cavity extending into underlying strata, e.g. Chalk. The infill is derived from overlying strata but there may be no evidence of the feature at ground level.
- Solution Pipe – a solution feature which is typically cylindrical in section.
- Crown Hole – typically a circular feature where a sub-surface void has migrated to ground level. Foundered strata are present within the crown hole often a shallow depth below ground level.
- Swallow Hole – a sink hole into which surface water flows.
- Denehole – man made shaft or cavity extending into the Chalk. Deneholes date from the Neolithic period (Stone Age) to recent past. CIRIA C574 describes deneholes as typically formed of a vertical shaft approximately 1m in diameter. The cavities were created often to recover chalk for use as lime although occasionally also as a source of flint or for storage. Deneholes were excavated using hand tools and were typically unsupported and unlined. The shafts were often backfilled with mined spoil and/or overburden placed on top of vegetation (trees, branches or bushes) dropped into the shaft. Decomposition of the organic material and settlement of the soil backfill can result in unstable ground and the regression of the void back to ground level.
- Ice wedge – a conical depression in the upper portion of a stratum created by localised freezing of the ground which resulted in degradation of the frozen soil/ground and subsequent infilling with overlying soils. These can be very similar in appearance to solution features but may be more uniform in section.
- Suffusion and dropout sinkholes form in superficial deposits overlying the soluble rock, typically limestone. Suffusion sinkholes occur where sediment is gradually washed down into fissures in underlying limestone which have been enlarged by ‘solution’ activity, causing gradual subsidence. Dropout failures form similarly, but in more cohesive soils which are able to bridge voids until they become unsupportable, resulting in sudden failure and collapse. Where the Chalk is covered by a thin cover of clay or sand, acidic drainage can gradually dissolve out the Chalk beneath, creating dissolution pipes up to 10m deep. Normally they gradually become infilled with sediment as they form, so rarely contain voids and are generally stable where surface conditions remain constant although changes in loading, compaction and drainage can reduce this stability.

As noted in Section 2.1, four oval to circular depressions had previously been identified and referenced as Sinkholes 1 to 4. In addition, the ground surface around Sinkholes 2,3 and 4 was observed to undulate and incorporate additional smaller scale depressions between Sinkholes 2 and 3, an elongated depression to the west of Sinkhole 2 and undulating ground between Sinkholes 2 and 4.

The land to the north included undulating ground and several depressions and the land to the west comprised a south-west trending valley with several depressions observed on the northern flank. As such, the features located within the site appeared to be associated with a more extensive zone of undulating ground and geomorphological features.

In addition, with reference to McDowell *et al* (2008) the position of the depressions on the side of a shallow post Ice Age valley and the general orientation of these depressions appeared to correlate well with solution features elsewhere within the Lovedean, Clanfield and Horndean area.

2.3 Geology

British Geological Survey mapping indicated the subject site to be underlain by Head Deposits, Lambeth Group and Tarrant Chalk Member. The area indicated to be underlain by Head Deposits appeared to correlate with the general orientation of the valley to the west of the site and to extend through the site towards the north-east.



Head Deposits are drifts produced by solifluction, the downslope movement of debris outwash during the periglacial period, and characteristically vary from silt and clay to poorly sorted sands gravels and chalk of local derivation.

The **Lambeth Group** is a sedimentary complex characterised by red, orange, yellow and grey mottled clay and sandy clay with a basal bed (the Bottom Bed) composed of clayey glauconitic sand. A bed of green-coated flints is also commonly present.

Tarrant Chalk is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments. Flint occurs as nodular courses, tabular beds and linings to fractures.

At various levels clay sized material occurs as marl seams and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering and general dissolution of the chalk. Weathering by frost action may extend to a depth of several metres.

Occasional solution features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are found in the chalk, sometimes manifesting themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

With reference to McDowell *et al* (2008), the occurrence of solution features in the general Lovedean and Horndean area (encompassing/bordering the subject site) is significantly higher than elsewhere within south-east Hampshire, with approximately 55 features per km², the average being 15 per km². The solution features reported by McDowell *et al* are predominantly associated with a shallow cover of drift deposits and palaeo-valley features. The majority of these features have been identified from shallow depressions (dolines) at ground level rather than collapse at ground level and the formation of sinkholes. The document reports that given the frequency of solution features in this area surprisingly few collapses at ground level have been recorded. Whilst the primary focus of McDowell *et al*'s study was approximately 2km to the east of the subject site, the ground conditions on the subject site and located close to the head of a paleo-valley form a similar ground model for the occurrence of solution features within the Chalk, this being further supported by the geomorphological evidence as described in Section 2.2 above.

2.4 Hydrology

No surface water features were located on or in close proximity to the subject site.

2.5 Hydrogeology

With reference to Environment Agency records and the Groundwater Vulnerability Map No 52 entitled South Hampshire, the site is indicated to overlie a Secondary Aquifer (undifferentiated); a Secondary 'A' Aquifer; over a Principal Aquifer (inferred to be the Head Deposits, Lambeth Group and Chalk respectively).

The 'Secondary (undifferentiated)' Aquifer classification has been assigned in cases where the stratum in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the strata.

Secondary 'A' Aquifers are defined as fractured or potentially fractured rocks which do not normally have a high primary permeability. Although these formations will seldom produce large quantities of water for abstraction they are important both for local supplies and in supplying base flow to rivers.

Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability,



meaning that they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The soil cover across the site varies from low to intermediate vulnerability classification. Intermediate leaching potential soils have some ability to attenuate diffuse source pollutants and in which non-absorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or to shallow groundwater.

The site is located within the Inner zone of a Source Protection Zone (SPZ I) which is associated with a potable water abstraction located 1.1km to the north of the site.

With reference to previous phases of assessment, groundwater is anticipated to be present at depth, possibly in excess of 25m below site ground level.

2.6 Previous Geotechnical Investigation

The site as a whole, has been the subject to Phase I Ground Condition Report, ref 21834, dated 2010 prepared by Peter Brett Associates (PBA), which included a desk study and preliminary risk assessment for the overall Woodcroft Farm site; a Factual Report, ref RML 4750, dated October 2011 prepared by Risk Management Limited, which included ground investigation and laboratory test results; and a Geoenvironmental and Geotechnical Ground Investigation Report, ref 21834-030-R02, dated July 2013 prepared by PBA, which presented an interpretative assessment of the overall Woodcroft Farm site. These previous phases of assessment included targeting of the known sinkholes but there was limited assessment and intrusive investigation of the undulating land around the known sinkholes. Third party information is assumed to be factually correct and Geo-Environmental accepts no liability for errors or omissions within third party documents.

The investigations reported by PBA included trial pitting, window sampling and dynamic probing within Sinkholes 1, 2 and 3 and window sampling close to the northern fringe of Sinkhole 4. The PBA reports should be referred to for further detail.

In addition, Geo-Environmental has undertaken intrusive investigations on the wider site, some of which included the construction of exploratory holes within the portion of the site being considered within this report. The previous phases of ground investigation undertaken by Geo-Environmental were in 2017 (report refs. GE16662-FG02-170929 and GE16662-GR04-170929) and 2018 (report refs. GE16943-RSVP-FY-JUL18, GE16943-RSVP-CP-JUL18 and GE16943-RSVP-HA-JUL18).

Where relevant to this assessment, the findings of previous investigations undertaken by Geo-Environmental have been incorporated into this assessment.

2.7 Scope of Supplementary Investigation

The scope of the supplementary investigation incorporated the following elements to clarify the variations in ground conditions and inform the supplementary assessment of the sinkhole area.

- Undertake an aerial LiDAR and photogrammetry survey to capture data to develop a digital terrain model (DTM).
- The construction of machine dug trial pits and trenches across the investigation area and to target key features.
- Construction of 6No. cable percussion boreholes to a provisional depth of 15m bgl together with in-situ testing and sampling at regular intervals.
- Construction of 15No. dynamic sampler boreholes to depths of up to 8m bgl, depending on drilling conditions, using a self-propelled track mounted rig.



3.0 MORPHOLOGY, GROUND CONDITIONS & MATERIAL PROPERTIES

A factual record of the conditions encountered during the physical investigation of the subject site is presented in the following sections. Exploratory hole locations are shown in Figure 3.

For further details of the ground conditions encountered, reference should be made to Figures 5 to 14 and the exploratory hole logs presented in Appendix A.

Cable percussion boreholes BH601 to BH606 were positioned to provide information to depth where development is proposed in proximity to Sinkholes 1-4 and other surface features as well as providing general coverage. Window sampler boreholes WS501 to WS515 were positioned along three survey lines crossing between the main sinkholes to clarify the ground conditions through the area of undulating and hummocky ground and target areas of proposed development. Trial pits and trenches TP701 to TP711 were located to provide further information on the ground conditions around specific sinkholes and also to target areas of hummocky/undulating ground surface, e.g. TP703 and TP704 targeted smaller scale surface depressions between Sinkholes 2 and 3, and TP711 targeted an elongated depression to the west of Sinkhole 2.

Unless stated otherwise, all depths are reported as metres below ground level (m bgl).

3.1 Morphology

The aerial survey incorporated photogrammetry and LiDAR surveys to develop a Digital Terrain Model (DTM) of the site in its current condition, as shown in Figures 16 and 17. The DTM showed the ground levels to vary across the site and correlate with observed conditions, i.e. with a shallow and relatively broad valley feature crossing through the site from the northern boundary to the western boundary and extending into a more extensive dry valley feature located to the west and calling towards the west and south-west. Whilst the valley feature within the site was relatively broad, i.e. extend across much of the site, the extension upgradient across the northern boundary was much narrower and appeared to tie-in with ground level undulations and depressions observed on the land to the north.

The DTM supports the hypothesis stated in previous phases of assessment that the site was located close to the head of a palaeo-valley, now a dry valley and also showed the correlation of the sinkhole features in the wider valley context, i.e. with sinkholes located around the periphery of the valley. Several other sinkhole features were identified in similar context where the valley extended off-site to the north and also along the northern flank of the valley extending to the west of the site.

The DTM was developed further by incorporating information from all phases of ground investigation undertaken across the site to develop a ground model for the site and thereby assist in determining foundation solutions across this portion of the site.

3.2 Soils

The ground conditions encountered were consistent with those anticipated based on published geological mapping and previous phases of intrusive investigation. However, it was difficult to differentiate between Head Deposits and weathered Lambeth Group in several exploratory holes and Head Deposits were observed to vary in composition, with depth and laterally within individual trial pits and trenches, as indicated in Figures 5-7. Reference has been made to published geological mapping to assist in assigning soils to specific strata. In addition, strata encountered in some exploratory holes appeared to include frost shattered gravel and these were considered likely to comprise Head Deposits derived from highly weathered Lambeth Group.

Whilst a summary of the ground conditions encountered in exploratory holes on the subject site is presented in Table 3.1, reference should be made to the individual exploratory hole logs for further details.



Top (m bgl)	Base (m bgl)	Description
0	0.2 – 0.3	TOPSOIL: Brown silty sandy clay with roots
0.2 – 0.3	1.9 – 4.6	HEAD DEPOSITS: Stiff orange-brown, light grey and reddish brown mottled sandy CLAY with varying proportions of gravel and cobble of flint and chalk; stiff orange-brown and light grey CLAY; light grey and off-white clayey sandy GRAVEL and cobble of flint; grey silty chalk GRAVEL.
0.4 – 1.8	3.2 – 15+	LAMBETH GROUP: Stiff grey and orange-brown CLAY; medium dense brown SAND; stiff to very stiff grey CLAY
1.7 – 15+	15+	TARRANT CHALK: Structureless CHALK composed of light brown and off-white silty size matrix and gravel size clasts of very weak to weak chalk. CIRIA Grade Dc; Structureless CHALK composed of angular to blocky clasts of weak to moderately weak chalk with a silt matrix. Some brown discolouration on clast faces. CIRIA Grade Dc/C. Structureless CHALK composed of off-white silt matrix with off-white and white very weak to moderately weak chalk clasts. CIRIA Grade Dm/Dc; Off-white and white moderately weak CHALK. CIRIA Grade C/B

Table 3.1 Summary of Ground Conditions

As noted above, the ground conditions were observed to vary over relatively short distances, i.e. within the extent of some of the trial pits/trenches excavated. In addition, the depth to the Chalk was observed to vary significantly such that whilst Chalk was encountered at relatively shallow depth in some of the exploratory holes, it was not encountered in others. Soils of the Lambeth Group were encountered to the full depth of investigation, i.e. 15m bgl, in boreholes BH302 (part of the 2017 investigation) and BH603. In addition, as indicated in Figures 5-7, the depth to the Chalk was observed to vary over short distances within individual trenches where overlying strata were observed to penetrate deeper into the Chalk locally. These were considered to comprise localised dissolution features, or suffusion features. In all occurrences, the strata overlying the Chalk were observed to be in contact with the Chalk and no voids were encountered within these superficial strata. In several exploratory holes, the clay strata directly overlying the Chalk were observed to be discoloured from grey and brown mottled to brown or dark brown at the contact surface with the Chalk and flint gravel appeared to have been frost shattered.

Sections through the site are presented as Figures 9-15 and demonstrate the variation in superficial strata and depth to Chalk as well as the variation in ground surface level.

Figures 16-17 show the 3D DTM developed from the aerial survey and these clearly identify Sinkholes 1 to 4 and the valley feature described in Section 3.1. Figures 18 and 19 show the variation in depth to Chalk across this portion of the site and the chalk level 3D model, respectively. Figure 19 shows that there are sudden changes in the level of the upper surface of the Chalk around Sinkholes 1, 2 and 3, but no clear evidence around Sinkhole 4 despite the DTM indicating the presence of Sinkhole 4 and corroborating previous phases of investigation. It is possible that the variation in level of the Chalk is less pronounced around Sinkhole 4. Figure 19 also indicates the presence of a sharp change (lowering) in level to the upper surface of the Chalk along the northern boundary between Sinkholes 1 and 2, as postulated in a previous third party report, and appears to extend off-site to the north. The boundary of this additional feature may differ from that predicted in the model as there was no ground investigation information on the land to the north (outside of the site), but the portion of the feature within the site was modelled based on a combination of the DTM and ground investigation information.

No soils were recovered from 1.5-2.5m bgl in WS515, but there was no indication of encountering a void during the drilling process, e.g. a sudden drop in the drill string, and it was considered that the lack of recovery was associated with driving a gravel to cobble sized flint through the soil mass and that this was finally broken through at 2.5m bgl



Whilst no loose or voided zones were encountered at any of the exploratory hole locations, the presence of voids or weaker strata cannot be discounted elsewhere particularly associated with any sinkholes. It is noted that the proposed development is based on retention of Sinkholes 1 to 4 as landscape features with development around their periphery and beyond.

3.3 Groundwater

Groundwater was not encountered within any of the exploratory holes during the intrusive investigation. Whilst no monitoring wells were installed as part of this phase of investigation, monitoring of wells elsewhere on the site has not encountered groundwater. With reference to previous phases of assessment, groundwater is anticipated to be present at depth within the Chalk, possibly c. 25m bgl or deeper.

It should be noted that changes in groundwater levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer installed within appropriate response zones.

Changes in groundwater level can have a direct effect on the stability of excavations and slopes, and the presence of water (groundwater, perched water or run-off) in granular or interbedded strata can result in rapid loss of stability.

3.4 Obstructions

Several of the window sampler boreholes were terminated shallower than their target depth of 8m bgl due to refusal, i.e. no penetration, and was considered likely to be associated with the presence of gravel and cobble sized flint.

In addition, buried services crossed the southern portion of the site and whilst the site was no longer in use at the time of the investigation, the services had not been cut off.

3.5 Geotechnical Testing

Geotechnical laboratory testing was not undertaken as part of the scope of investigation. However, in-situ testing was undertaken and comprised Standard Penetration Tests (SPTs) in the cable percussion boreholes, BH601-BH606. These showed a general trend of increasing SPT 'N' value with depth as indicated on Figure 4.



4.0 GEOTECHNICAL ASSESSMENT

Subsequent to the intrusive investigation of the site and receipt of the laboratory results, the following geotechnical assessment has been made.

4.1 Ground Model

As described previously, the ground surface in the area around Sinkholes 1 to 4 was variable. The ground surface to the east of Sinkholes 2 to 3 was generally level, with a break in slope running approximately north to south just to the east of Sinkholes 2 and 3. Two localised and shallow surface depressions were located within this break in slope. The ground surface to the west of this line was observed to undulate and an elongated depression was located to the west of Sinkhole 2.

Whilst Sinkholes 1 to 4 comprised localised and relatively well defined surface features, as noted previously, surface depressions were also observed on the land immediately to the north of the site and along the northern flank (south facing slope) of a shallow valley which extended to the west of the site and the site appeared to be located towards the head of the valley feature. As such, the features observed within the site were considered to form a part of a larger complex of sinkholes/features associated with the shallow valley.

Intrusive investigation of this portion of the site revealed variable and relatively complex ground conditions. The variations included interbedded sand and clay within both the Head Deposits and Lambeth Group, with some sand layers within the Head Deposits appearing to form lenses and infilled channel features cutting into underlying clay and gravelly clay soils. The depth to the junction with the underlying Chalk was also highly variable, with localised deeper penetration of Head Deposits as suffusion features in some trial pit/trench sections. A plunging junction between the chalk and overlying Head Deposits was encountered in trial pit TP708, the junction being at c. 70-80° towards the west-south-west. This was considered likely to be associated with an infilled solution feature/suffusion feature on the eastern fringe of Sinkhole 1.

Figures 20 to 22 show the variation in existing ground level, level of the upper surface of the Chalk and depth to Chalk respectively. These demonstrate that there is variation in depth to the Chalk and that the key sinkhole features as identified in previous phases of assessment are outside of the main development areas, i.e. form part of the development soft landscaping, based on the current development layout. Figures 21 and 22 indicate that there is variation in level of, and depth to, the Chalk within the development areas but the variations are generally much less marked than around Sinkholes 1 to 4. However, as discussed in Section 3.2, an additional sub-surface feature was identified along the site's northern boundary whereby the depth to the Chalk was more variable and could be indicative of an additional sinkhole (with no surface expression) or erosion surface (such as valley scour) in the top of the Chalk. With reference to Figures 21 and 22, this sub-surface feature was located beneath proposed plots 177 to 181, albeit with the most significant variation being located in the road and soft landscaped area to the north and north-west of Plot 181.

Based on the findings of the intrusive investigation it is anticipated that substantial variation in ground conditions is likely to be encountered within foundation trenches and should be accounted for in foundation design and construction.

4.2 Foundations

The intrusive investigation has confirmed the presence of highly variable strata in terms of both composition and depth across this portion of the site. The three key strata comprise sand, clay and Chalk. Sand and clay were attributed to both Head Deposits and Lambeth Group, with the strata differentiated in part based on geological mapping and observation of Head Deposits cutting into and through underlying strata as lenses, channels and the like.



On the basis of the ground conditions encountered, it is considered that conventional foundations could be used for the proposed development, with strip foundations extending through any Made Ground, disturbed, reworked, desiccated ground or root zones and terminating within the soils of the Head Deposits, Lambeth Group or Chalk.

Previous phases of investigation have shown the more cohesive soils to vary from low to high volume change potential as defined in NHBC Standards. The sand and Chalk would be considered non-shrinkable. Given the high degree of variability in ground conditions over short distances, it is not considered feasible to zone the site and thus foundation design should account for the presence of clay soils of high volume change potential and thus a minimum founding depth of 1m bgl is recommended.

It should be noted that near surface soils (<1m bgl) were visually assessed to be desiccated and this should be accounted for in foundation design. In addition, the junction between the Head Deposits and/or Lambeth Group and the underlying Chalk was found to be highly variable and solution features (infilled with gravelly clay) were encountered within several pits as summarised above. Localised deepening to terminate on a single soil type is not considered feasible and thus, it is thus recommended that reinforcement is incorporated within all foundations. Such reinforcement typically comprises an upper and lower layer of steel mesh laid within the foundation during construction. The specification of the mesh, construction requirements and placement positions within the foundation should be confirmed by the structural engineer responsible for designing foundations on this site. Given that sink holes and solution pipes have been identified at various locations across the site, it is recommended that the inclusion of reinforcement in foundations is maintained throughout the development of this portion of the Woodcroft Farm site.

On the basis of ground conditions encountered, a net allowable bearing capacity of 100kPa is recommended for the soils of the Head Deposits. This could be increased to 125kPa for the high strength soils of the Lambeth Group and to 150kPa for the structureless Chalk and 200kPa for the weathered, blocky Chalk. However, where it is likely that foundations will span Head Deposits, the lower bearing capacity of 100kPa is recommended in order to minimise the potential for localised overstressing of the founding strata and possible resultant differential settlement.

In the event that superficial strata are removed from a building footprint, e.g. following a reduced dig exercise, and that foundations will terminate entirely within weathered Chalk, it may be possible to increase the net allowable bearing capacity to 150-200kPa, subject to confirmation from a Geotechnical Engineer at the time of construction.

Given the potential for foundations to be constructed within the zone of influence of trees in some portions of the site, it is possible that foundation bases would require to be stepped and as such, it is recommended that steps do not exceed 0.225m in height at any point and are at least 1.0m (lateral distance) away from any corner or node point on the foundations. Where this cannot be accommodated, the foundation should be formed at the greater depth.

Initial modelling using the NHBC Foundation Depth Calculator indicates that deepened foundations could be required in proximity to trees. This is dependent on the species, condition, water demand of the tree(s) and their distance from the proposed foundation.

Where foundations extend to depths in excess of 1.5m bgl, heave precaution measures should be included to the face of foundations in accordance with NHBC Standards Chapter 4.2.

It is recommended that foundation excavations be concreted or blinded as soon after excavation as possible. Where concreting could take place the following day it is recommended that excavations are not taken to full depth overnight and that the final 0.5m of cover is only removed immediately prior to concreting.

It is unknown whether the former farm house originally drew water from a well thus an allowance for treatment



and possibly infilling of voids such as a former well would be prudent. In addition, the use of reinforcement in foundations would serve to minimise any deflection if foundations were to span any such backfill feature.

4.3 Floor Slabs

It is recommended that suspended ground floor slabs should be utilised across the site due to the presence of shrinkable soils at shallow depth.

4.4 Excavations

Shallow excavations on level ground should remain stable in the short term assuming an absence of water ingress, although may require battering to a safe angle if open in the medium to long term. It is anticipated that all excavations would become unstable where water ingress occurs without measures to control water and support excavation faces. In addition, excavations across the slope should be kept to as short a distance as possible to avoid stability issues and associated collapse.

Ground works should be designed in such a manner to avoid man entry into excavations.

4.5 Soakaways

The intrusive investigation has identified the presence of sinkholes and suffusion/solution features extending into the Chalk with high variability in overlying soils. This area of the site is considered high risk in terms of solution feature activation and thus a minimum offset of 10m is recommended between any soakaway and structure (i.e. in line with NHBC guidance). However, if soakaways could be constructed at depths beneath the solution features, i.e. discharging in to blocky chalk, then there is no risk of water discharging through the solution feature, or infill and thus collapse risk is markedly reduced. However, the use of deeper soakaways would be subject to the agreement of the Environment Agency given the site's location in SPZ I for a potable water abstraction.

Given the positional constraints associated with a 10m offset rule for soakaways, it may be necessary to consider disposal of storm water via alternative means to conventional soakaways in individual or groups of gardens. One possible option would be to construct fewer, larger soakaways to act as collector and attenuation tanks and discharge either at depth in to blocky Chalk or to be located in set aside areas 10m away from any structures, such as possible communal open space.

4.6 Abnormal Conditions

In the event that abnormal, or unexpected ground conditions are encountered during construction, the advice of a Geotechnical Engineer should be sought.



FIGURES





Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Site Location Plan	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.0			
Drawn:	Grainger plc	Date:	28/06/2018			
Figure:	1	Scale:	Not To Scale			
				 Geo-Environmental		



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Proposed Scheme Layout	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	 Geo-Environmental	
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	28/06/2018			
Figure:	2	Scale:	Not To Scale			



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Exploratory Hole Location Plan	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.1			
Drawn:	GR	Date:	02/08/2018			
Figure:	3	Scale:	Not To Scale			
					 Geo-Environmental	



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Lines of section plan	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	4	Scale:	Not To Scale			
					 Geo-Environmental	

FIGURE 5 SPT N Value vs Level

Project ID: **GE16942**

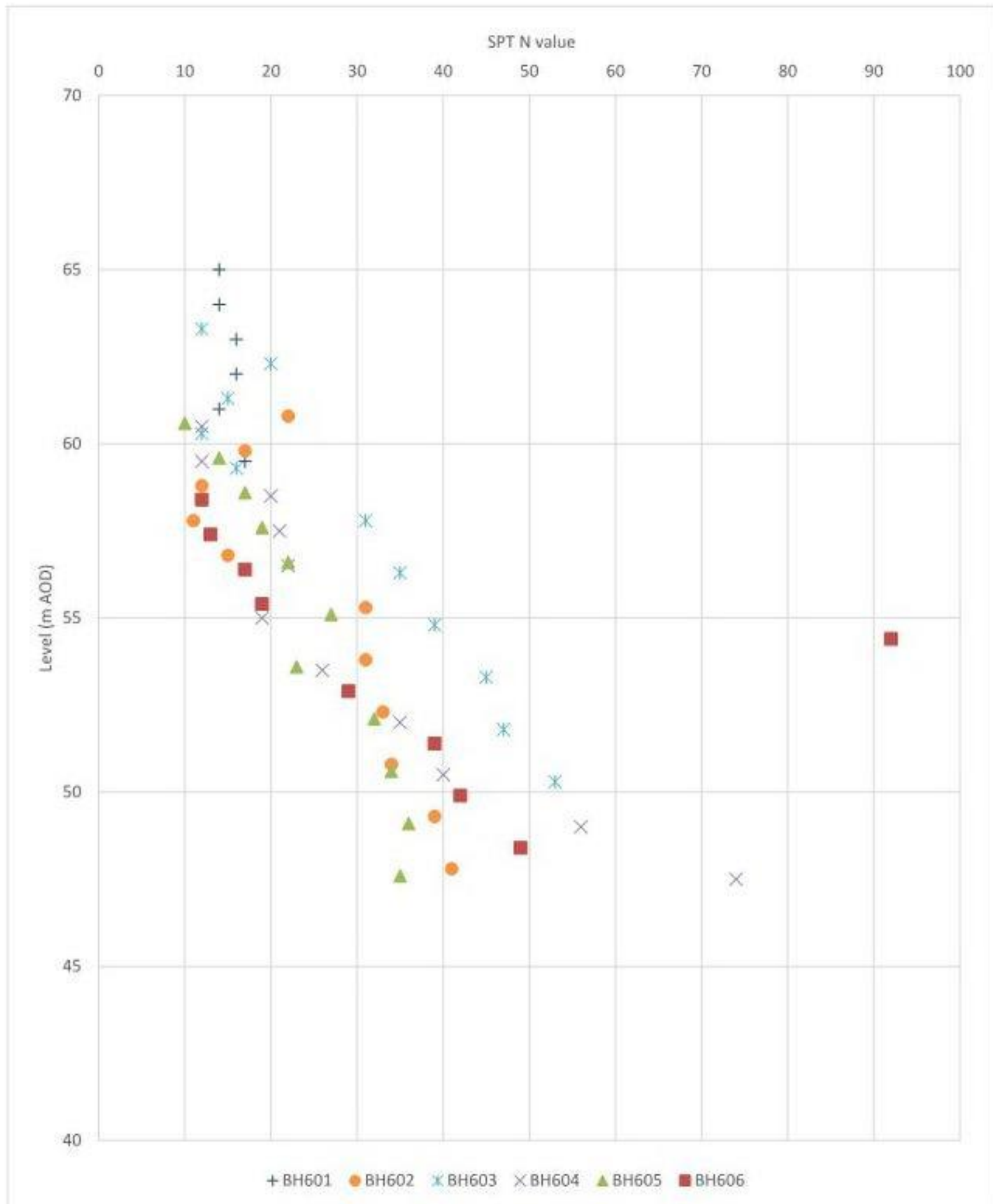
Project Title:

Woodcroft - Phase 3 Supplementary GI

Client: **Grainger PLC**

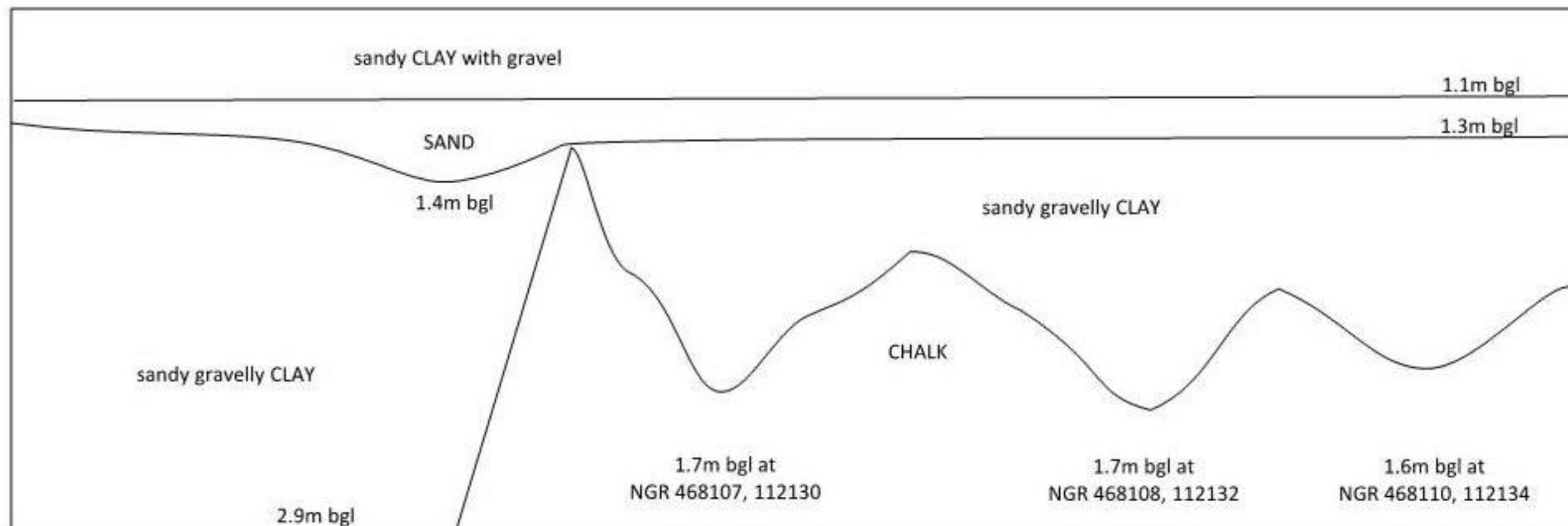
Location:

Woodcroft Farm, Lovedean



Trench start NGR 468105, 112132

Trench end NGR 468111, 112135



Chalk interface with sandy gravelly
CLAY plunging WSW at c.70-80° at
NGR468109, 112136

Refer to TP708 and TP708A logs for detailed descriptions of strata

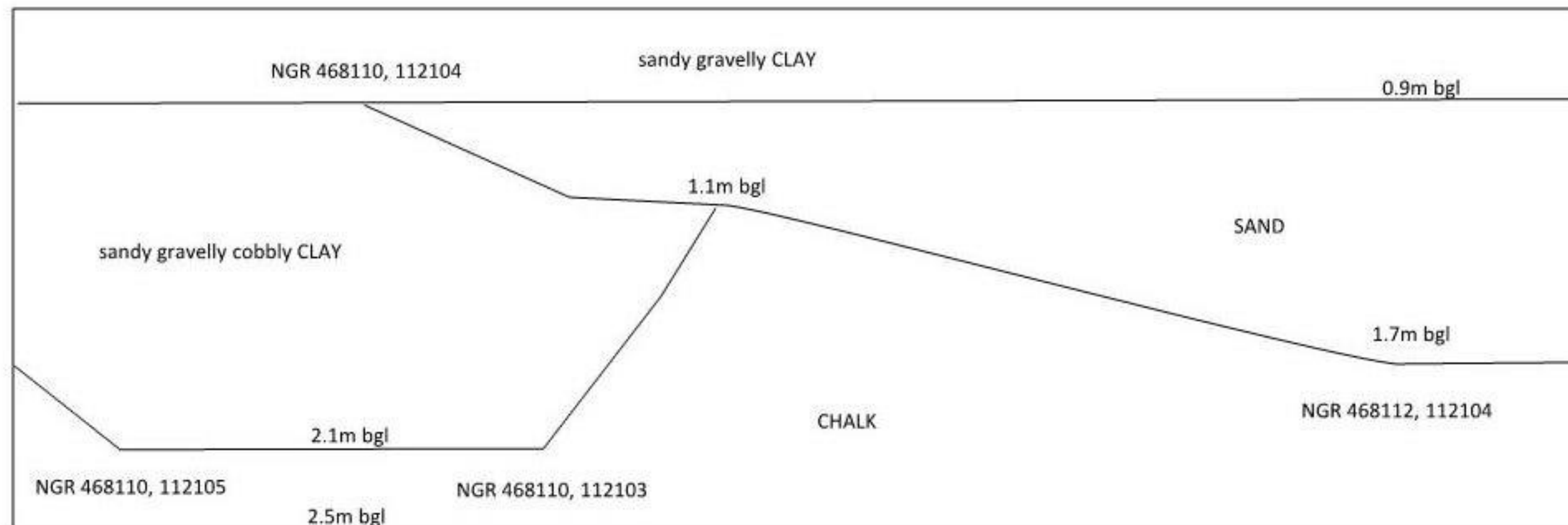
Project:	Woodcroft Farm, Lovedean			Title	TP708-708A Section sketch	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE19642	Revision:	1.1			
Drawn:	GR	Date:	02/08/2018			
Figure:	6	Scale:	Not To Scale			



Geo-Environmental

Trench start NGR 468109, 112107

Trench end NGR 468113, 112104



Refer to TP709 log for detailed descriptions of strata

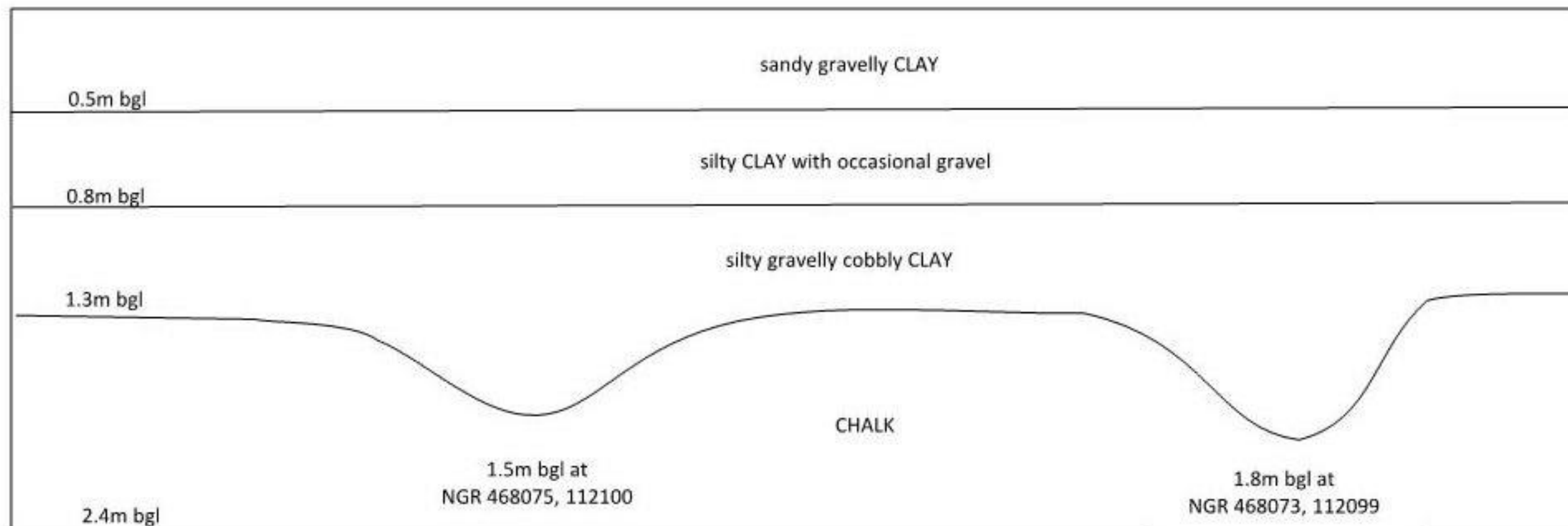
Project:	Woodcroft Farm, Lovedean			Title	TP709 Section sketch	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE19642	Revision:	1.1			
Drawn:	GR	Date:	02/08/2018			
Figure:	7	Scale:	Not To Scale			



Geo-Environmental

Trench start NGR 468074, 112103

Trench end NGR 468072, 112099



Refer to TP710 log for detailed descriptions of strata

Project:	Woodcroft Farm, Lovedean			Title	TP710 Section sketch	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE19642	Revision:	1.1			
Drawn:	GR	Date:	02/08/2018			
Figure:	8	Scale:	Not To Scale			
				 Geo-Environmental		

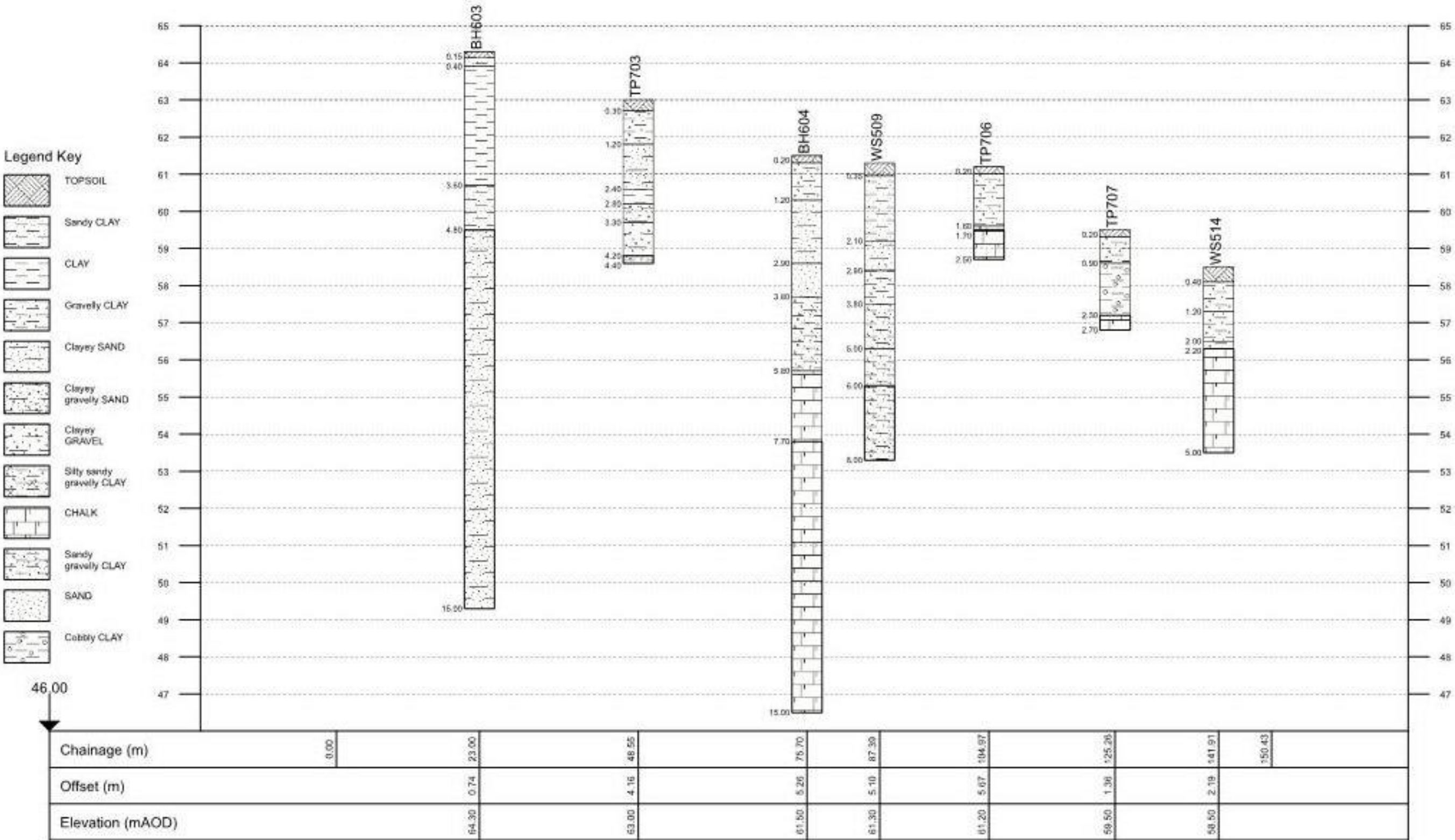


Geo-Environmental

Project Id: GE16942
Project Title: Woodcroft - Phase 3 Supplementary GI
Location: Woodcroft Farm, Lovedean
Client: Grainger PLC

Title: BH603 to WS514
Vertical Scale: 1:146
Horizontal Scale: 1:872
Engineer: GR

Figure 9 Section BH603 to WS514



Project Id: GE16942
Project Title: Woodcroft - Phase 3 Supplementary GI
Location: Woodcroft Farm, Lovedean
Client: Grainger PLC

Title: WS201 to TP237
Vertical Scale: 1:146
Horizontal Scale: Not to scale
Engineer: GR

Figure 10 Section WS201 to TP237

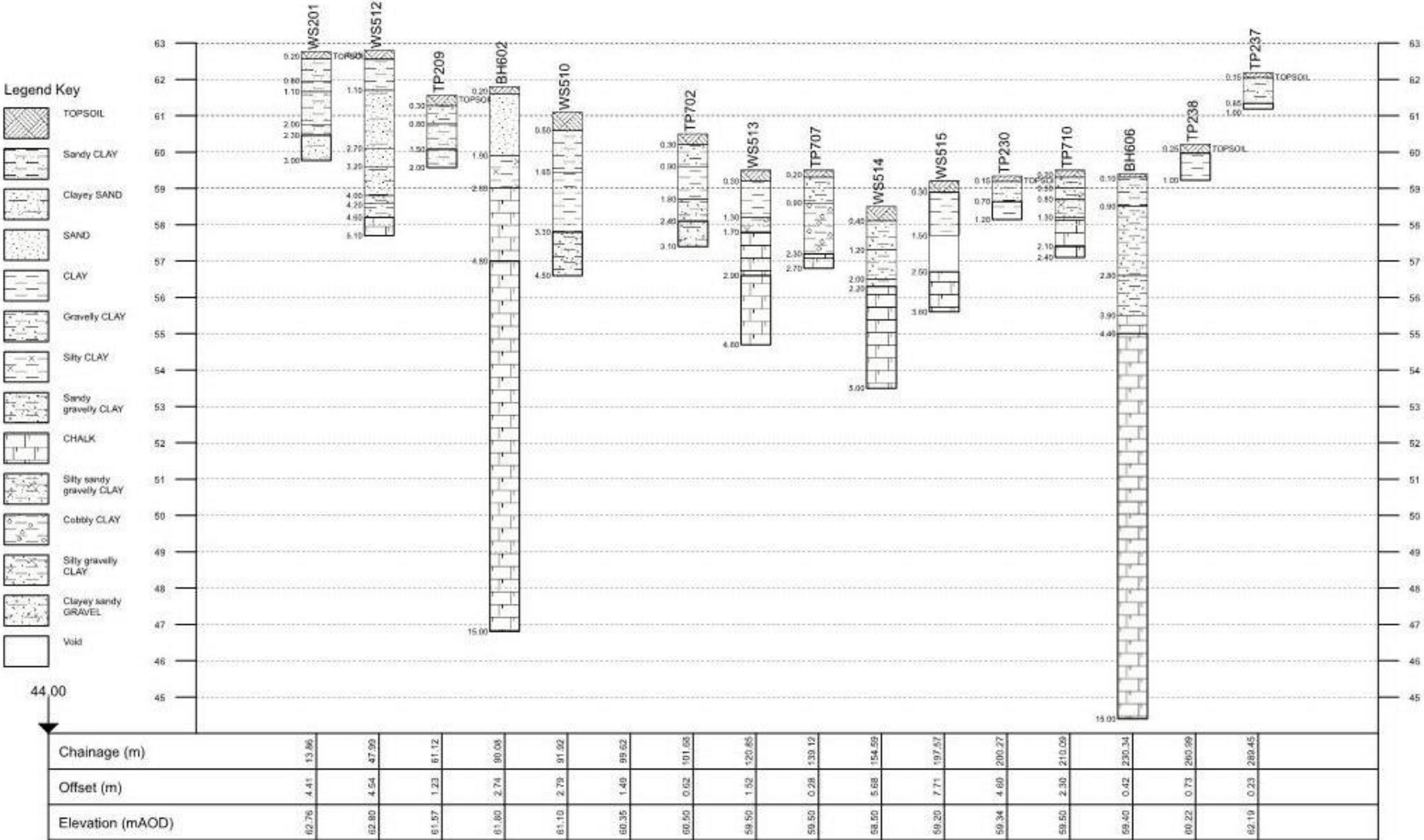
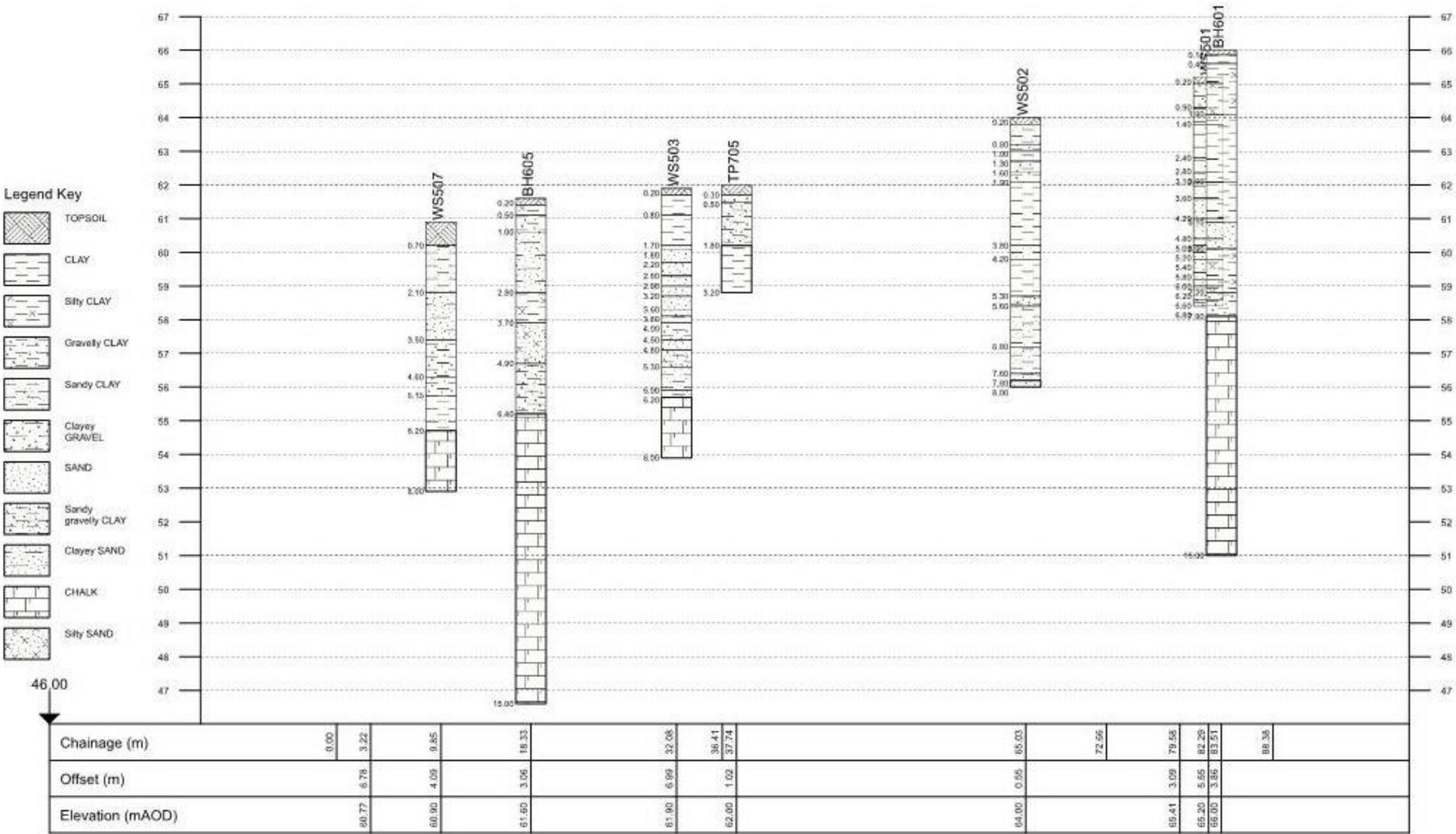


Figure 11 Section WS501 to WS507



Project Id: GE16942
Project Title: Woodcroft - Phase 3 Supplementary GI
Location: Woodcroft Farm, Lovedean
Client: Grainger PLC

Title: WS501 to BH606
Vertical Scale: 1:176
Horizontal Scale: Not to scale
Engineer: GR

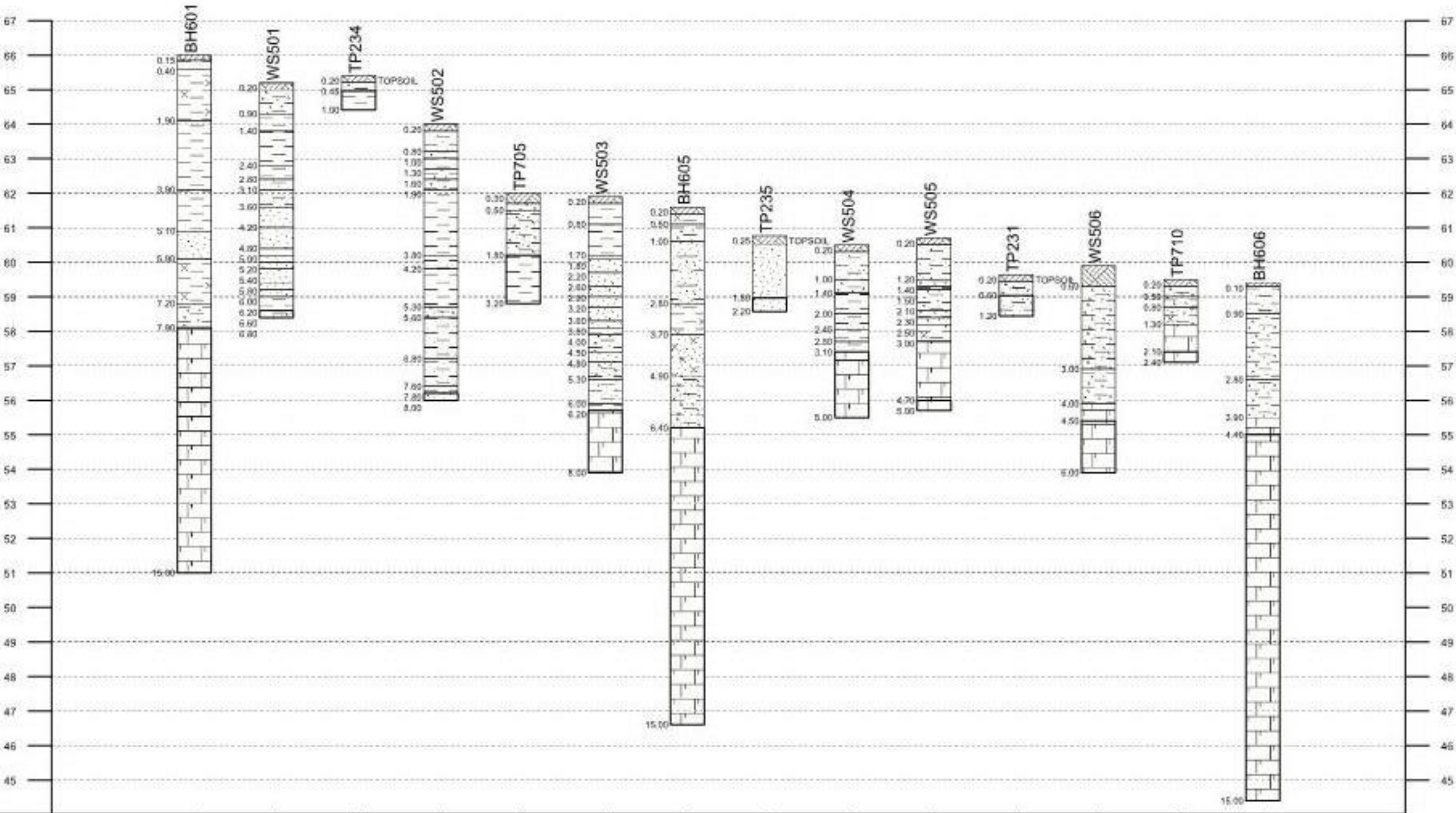
Figure 12 Section WS501 to BH606



Legend Key

- TOPSOIL
- CLAY
- Silty CLAY
- Gravelly CLAY
- Sandy CLAY
- Clayey GRAVEL
- SAND
- Sandy gravelly CLAY
- Clayey SAND
- Silty sandy gravelly CLAY
- GRAVEL
- CHALK
- Silty SAND

44.00



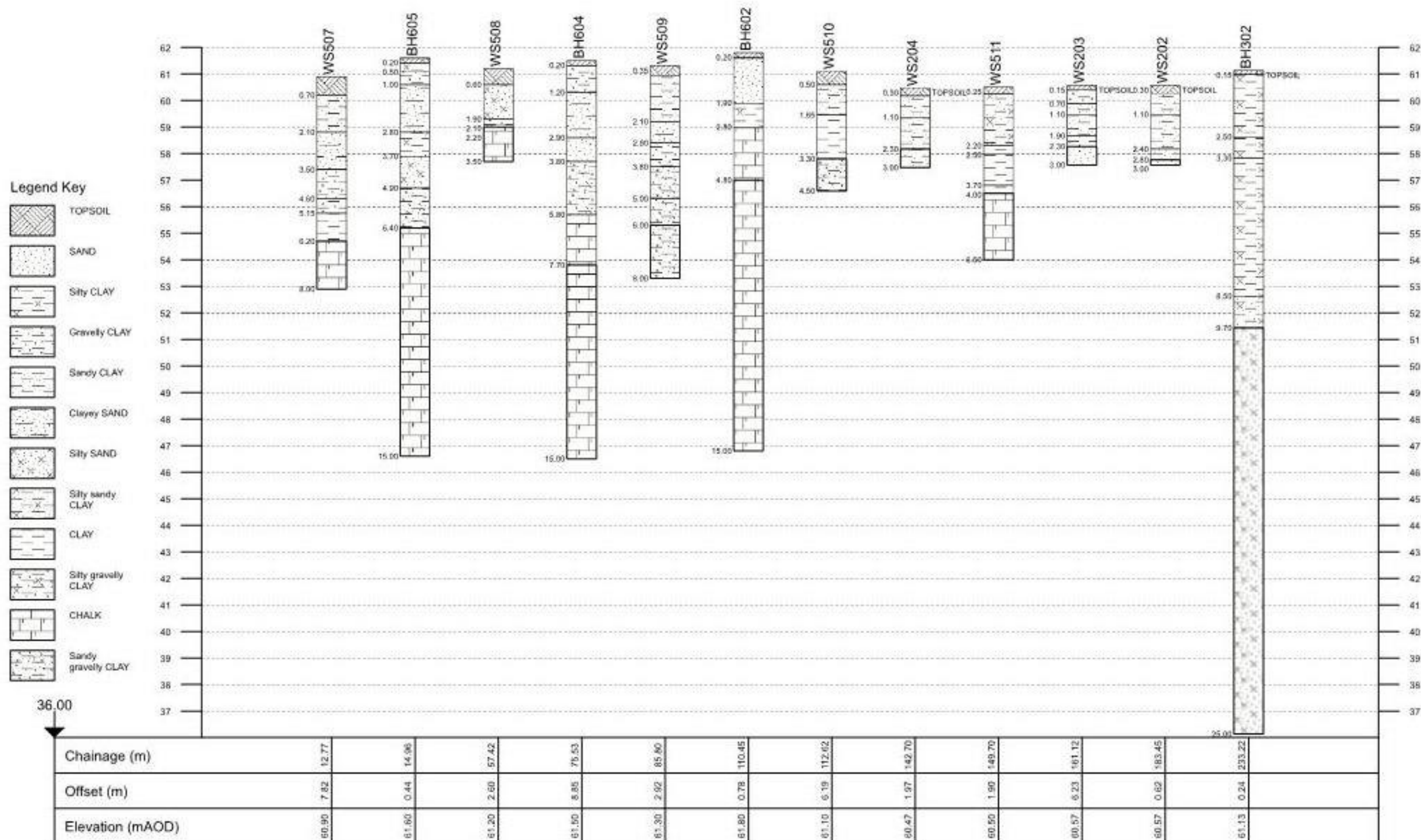
Chainage (m)

Offset (m)

Elevation (mAOD)

13.39	14.80	17.33	31.94	59.22	67.32	75.62	83.70	94.09	125.32	130.59	144.85	188.50	205.03
5.41	3.87	4.73	1.17	0.47	6.17	8.53	5.53	2.52	1.14	2.25	3.28	8.40	1.58
66.00	65.20	65.41	64.00	62.00	61.90	61.60	60.77	60.50	60.70	59.64	59.90	59.50	59.40

Figure 13 Section WS507 to BH302



Project Id: GE16942

Project Title: Woodcroft - Phase 3 Supplementary GI

Location: Woodcroft Farm, Lovedean

Client: Grainger PLC

Title: TP233 to TP710

Vertical Scale: 1:77

Horizontal Scale: 1:908

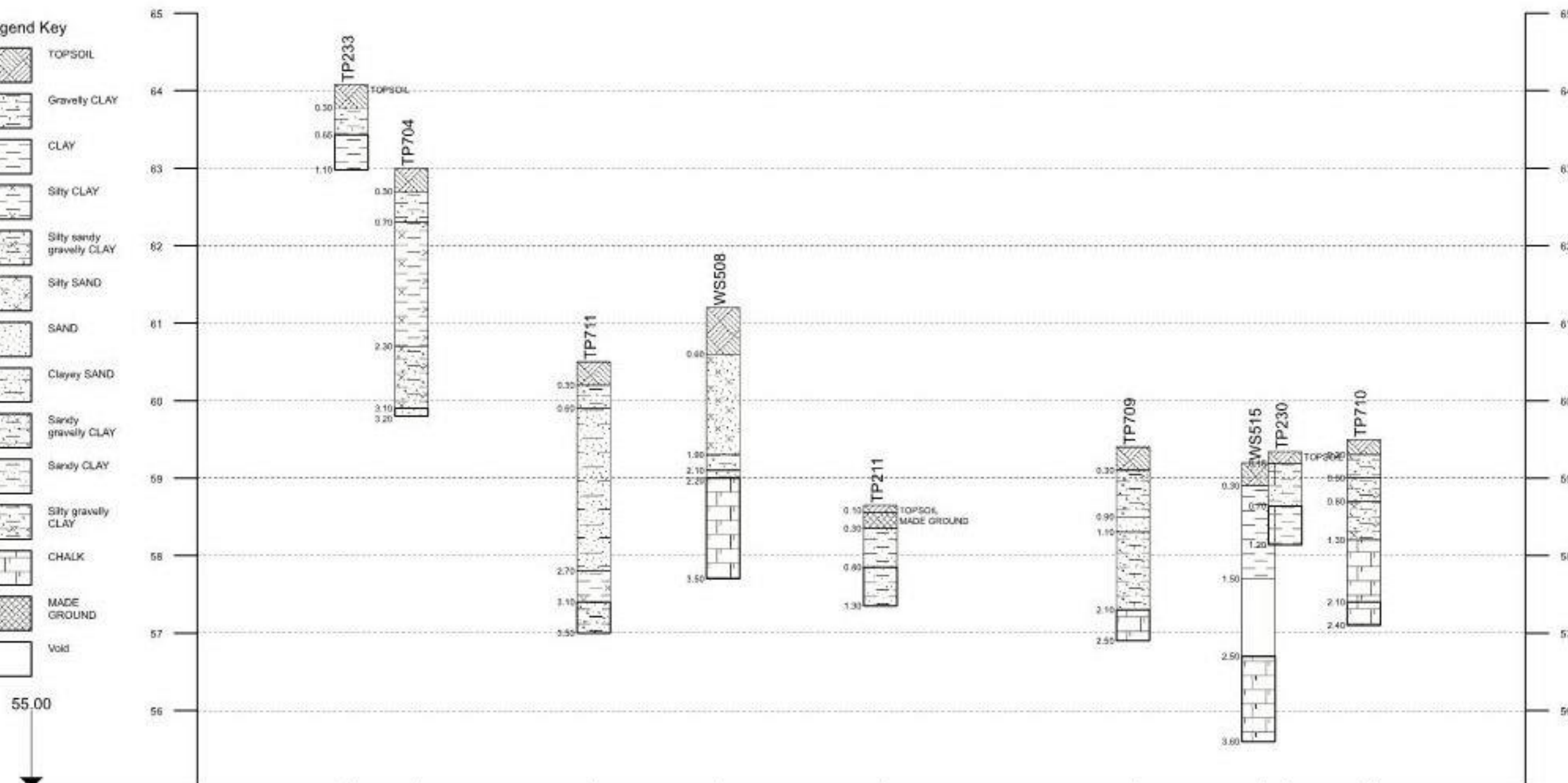
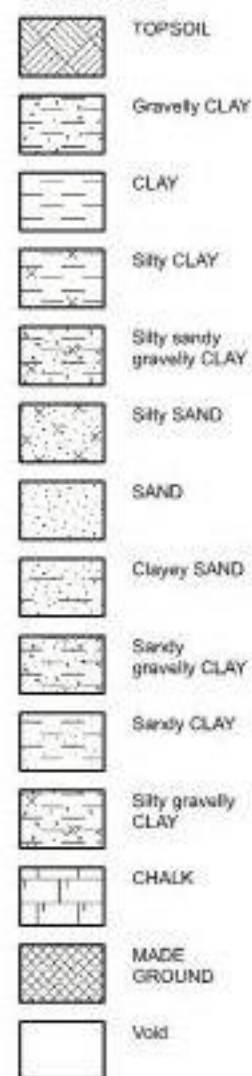
Engineer: GR

Figure 14 Section TP233 to TP710



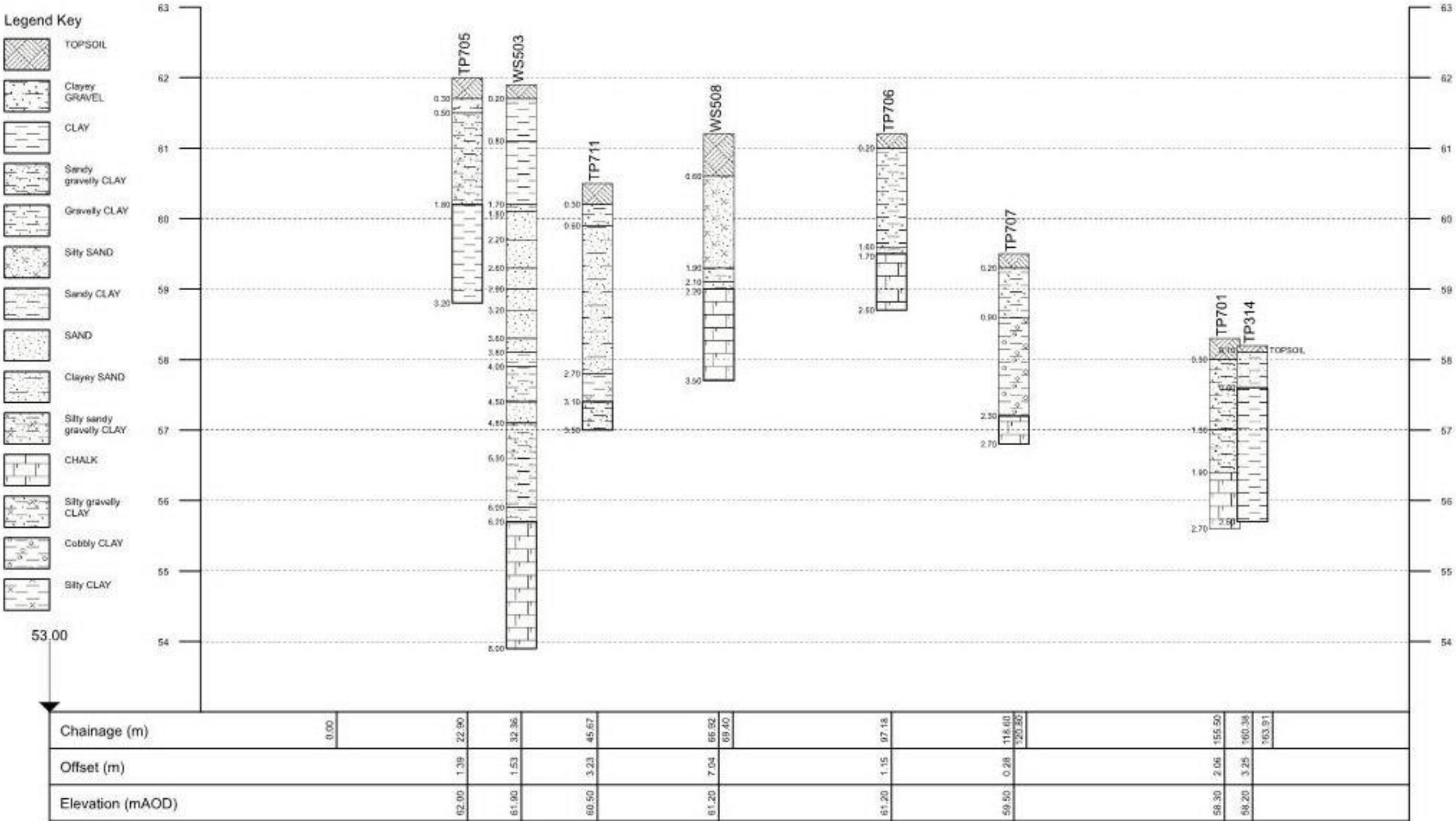
Geo-Environmental

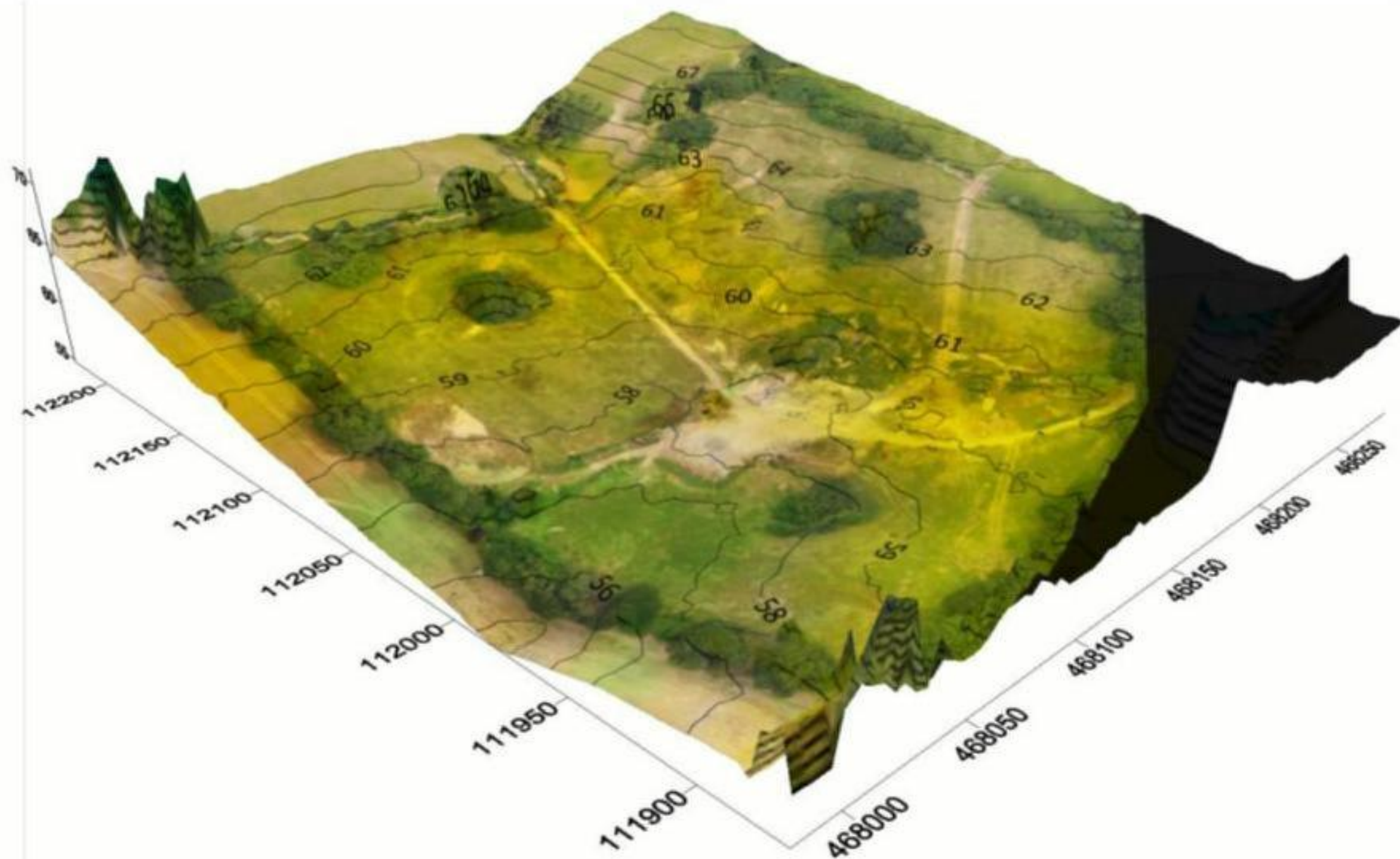
Legend Key



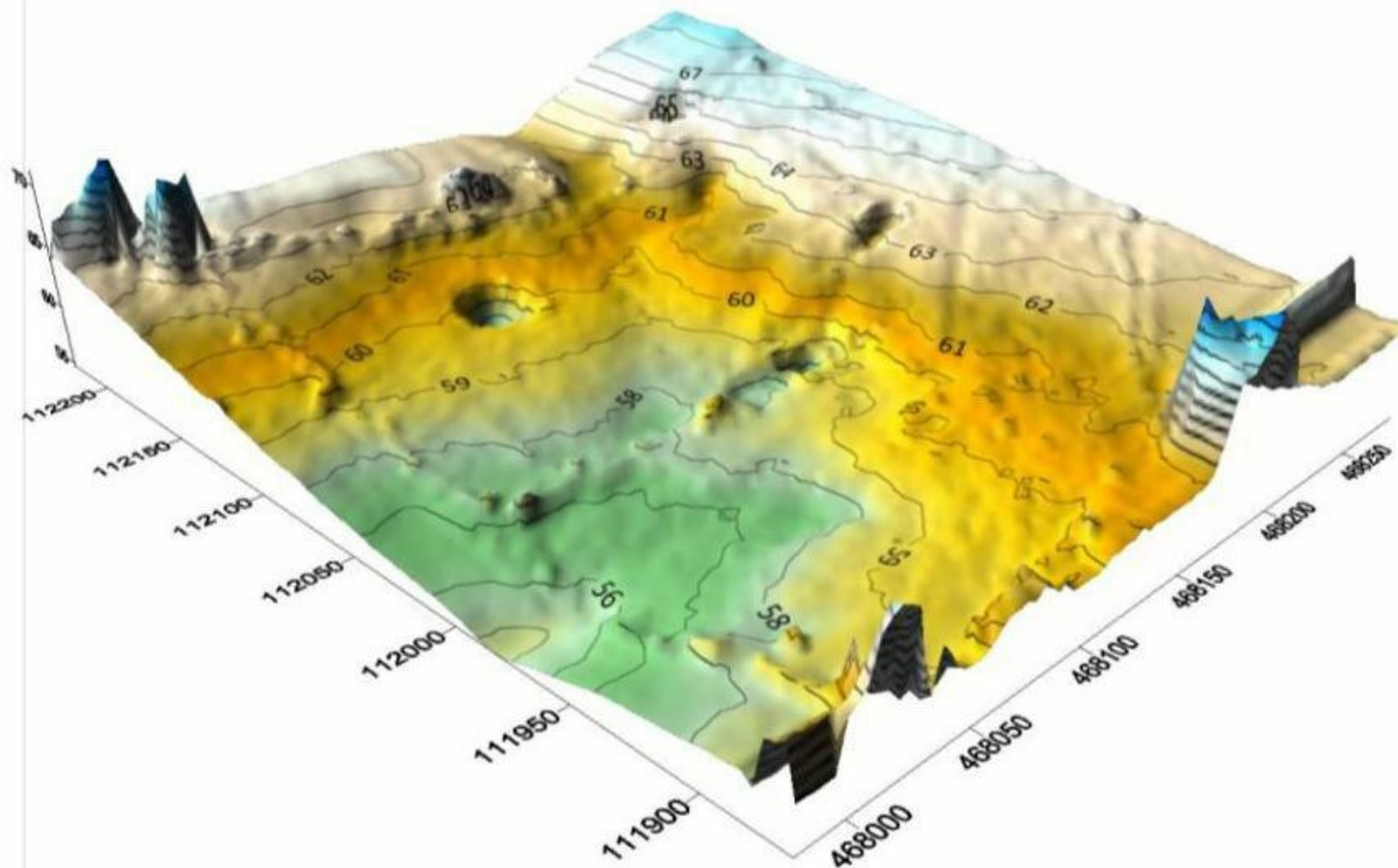
Chainage (m)	8.96	9.84	37.59	57.31	81.27	119.74	138.83	142.92	154.91	156.67
Offset (m)	0.27	2.79	2.68	10.30	9.04	2.01	0.01	0.77	0.14	
Elevation (mAOD)	64.06	63.00	60.50	61.20	58.55	59.40	59.20	59.34	59.50	

Figure 15 Section TP705 to TP701

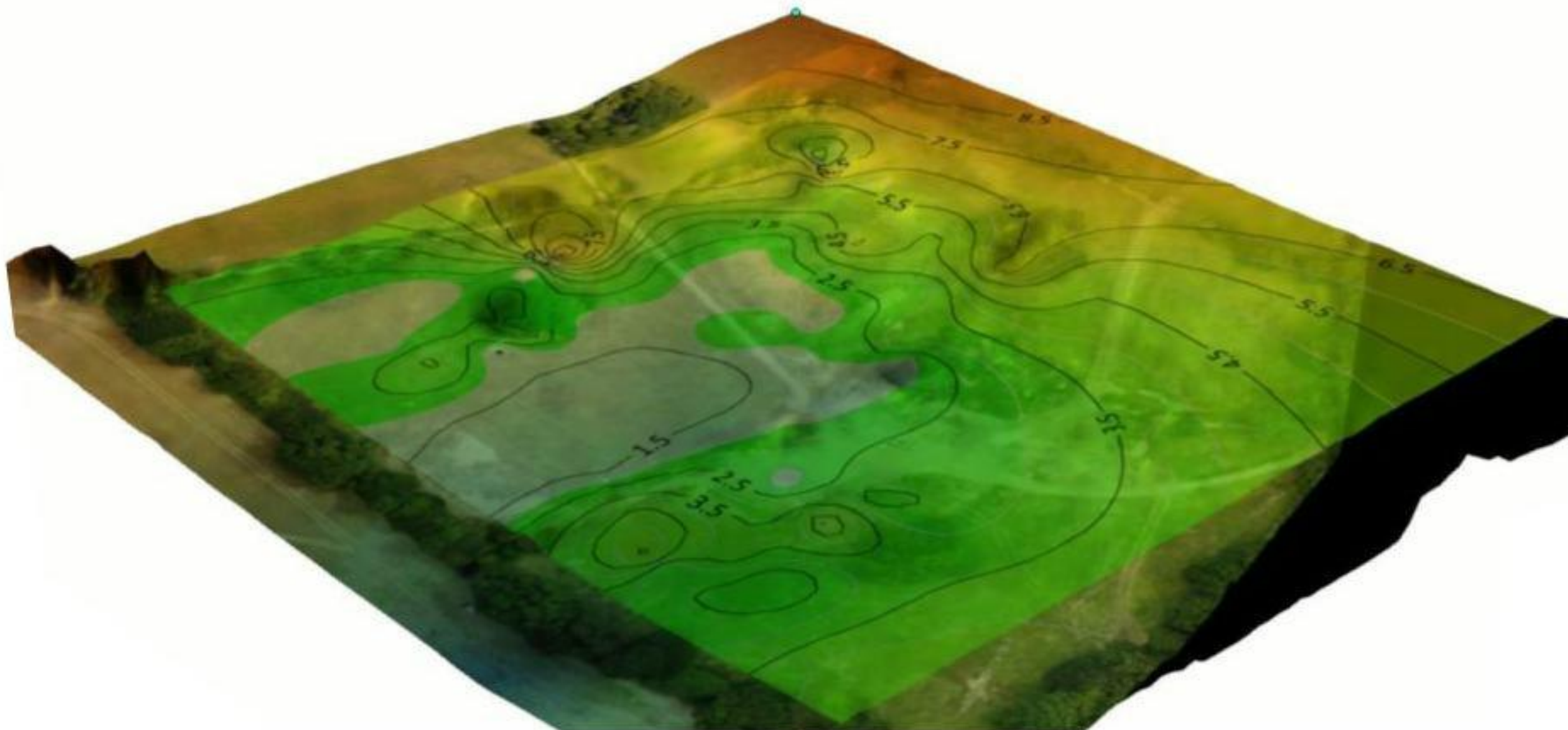




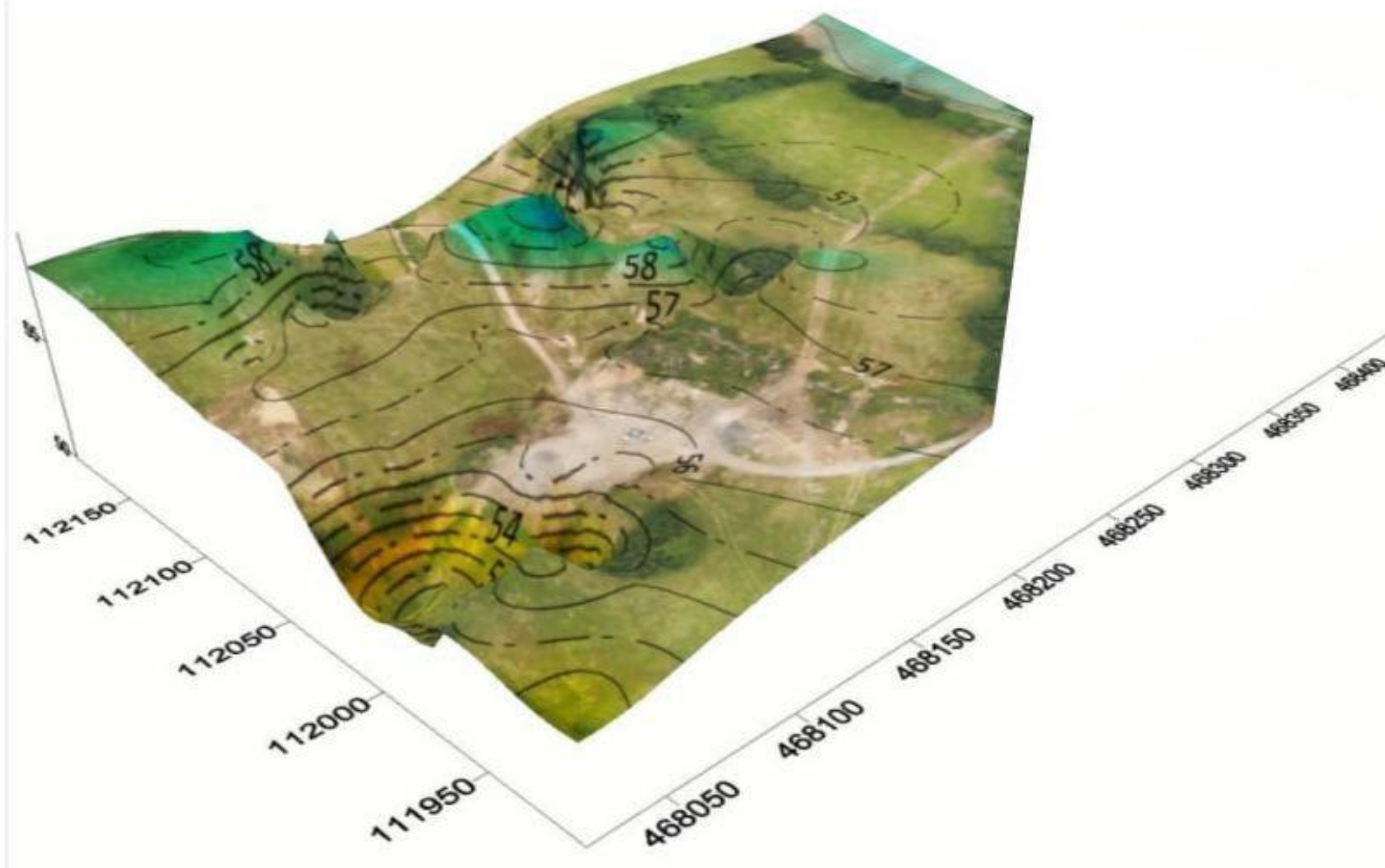
Project:	Woodcroft Farm, Lovedean, Hampshire			Title	3D Ground surface model	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	16	Scale:	Not To Scale			
				 Geo-Environmental		



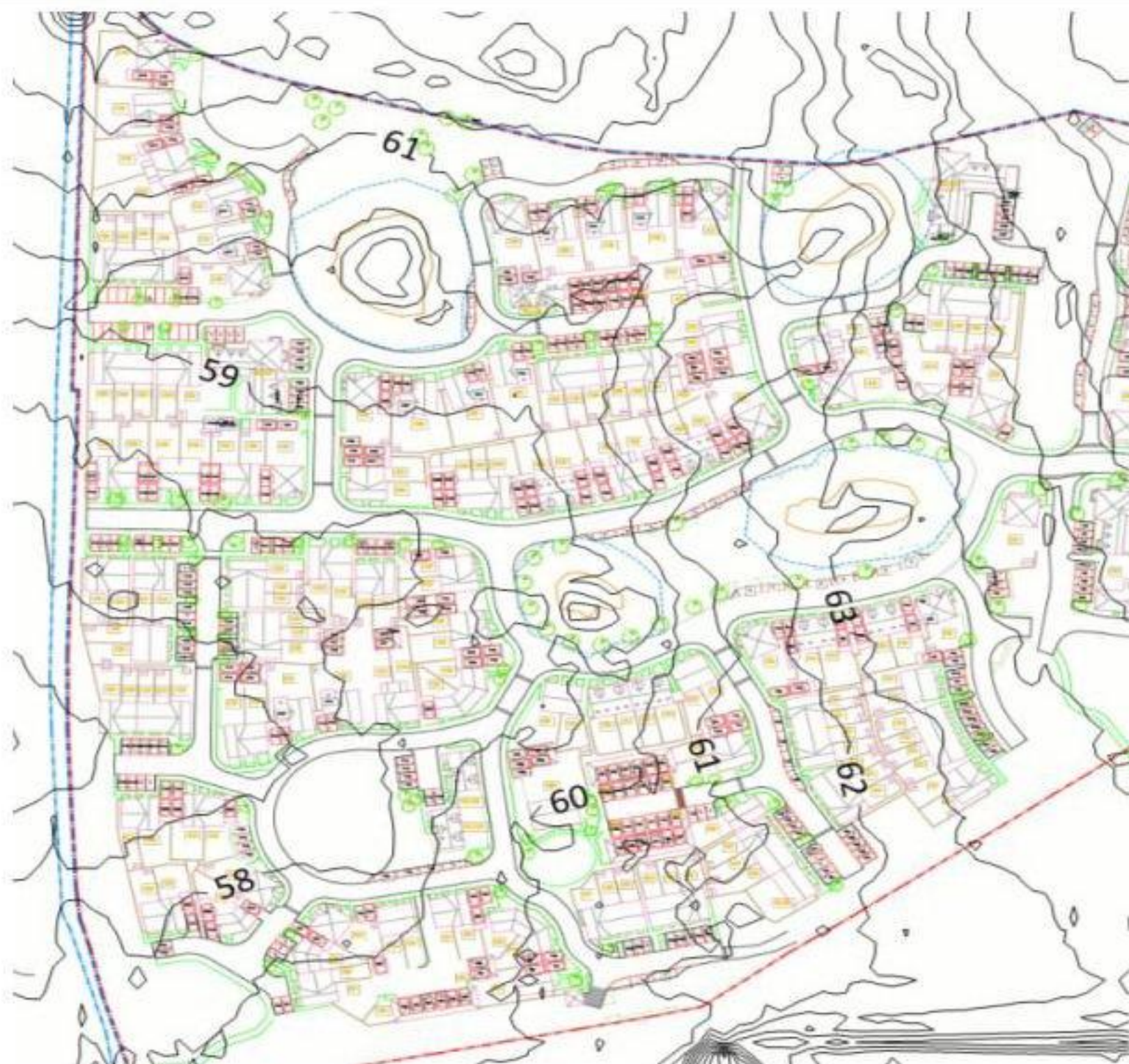
Project:	Woodcroft Farm, Lovedean, Hampshire			Title	3D ground surface contour model	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	17	Scale:	Not To Scale			
					 Geo-Environmental	



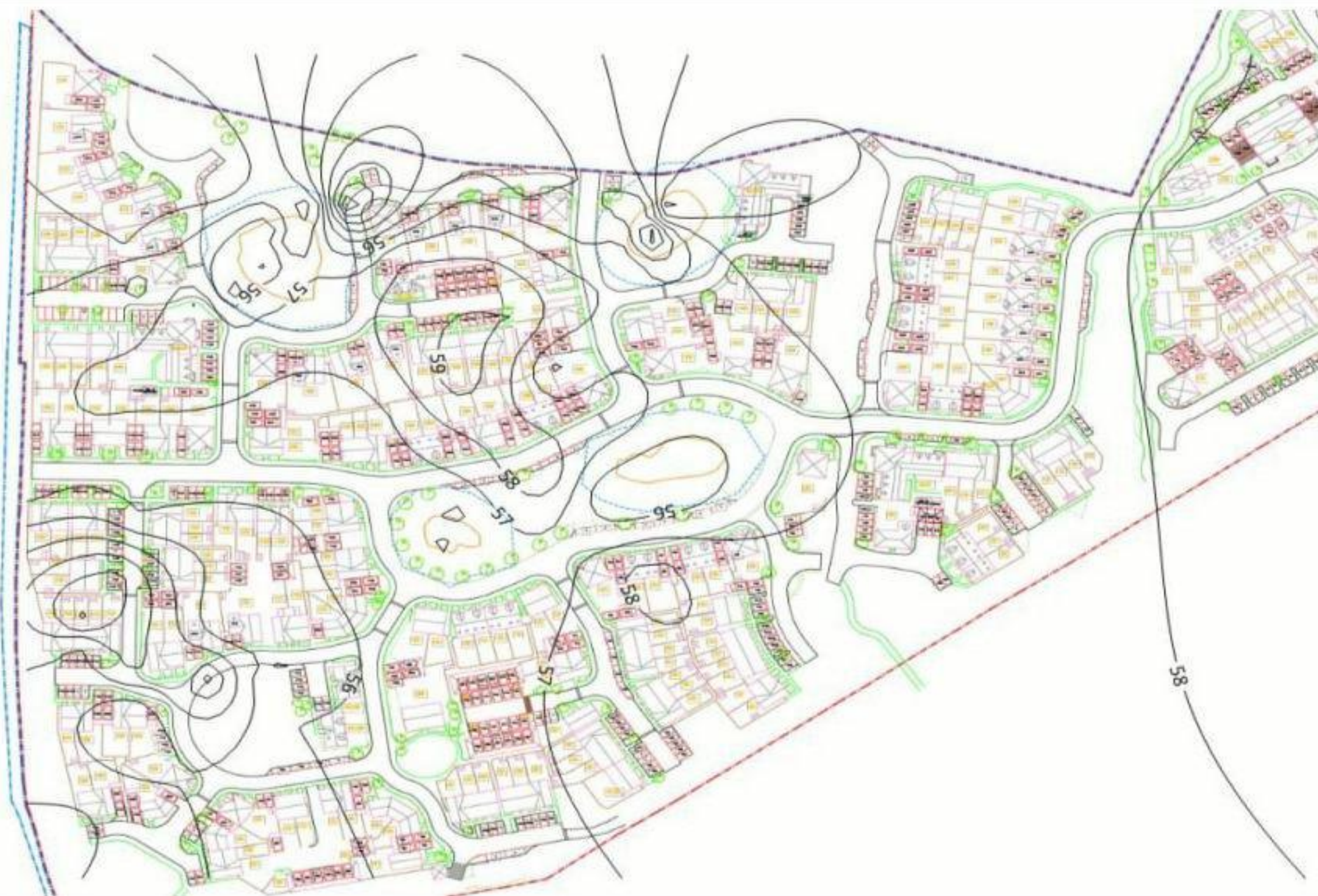
Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Aerial photograph with depth to chalk overlay	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		 Geo-Environmental
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	18	Scale:	Not To Scale			



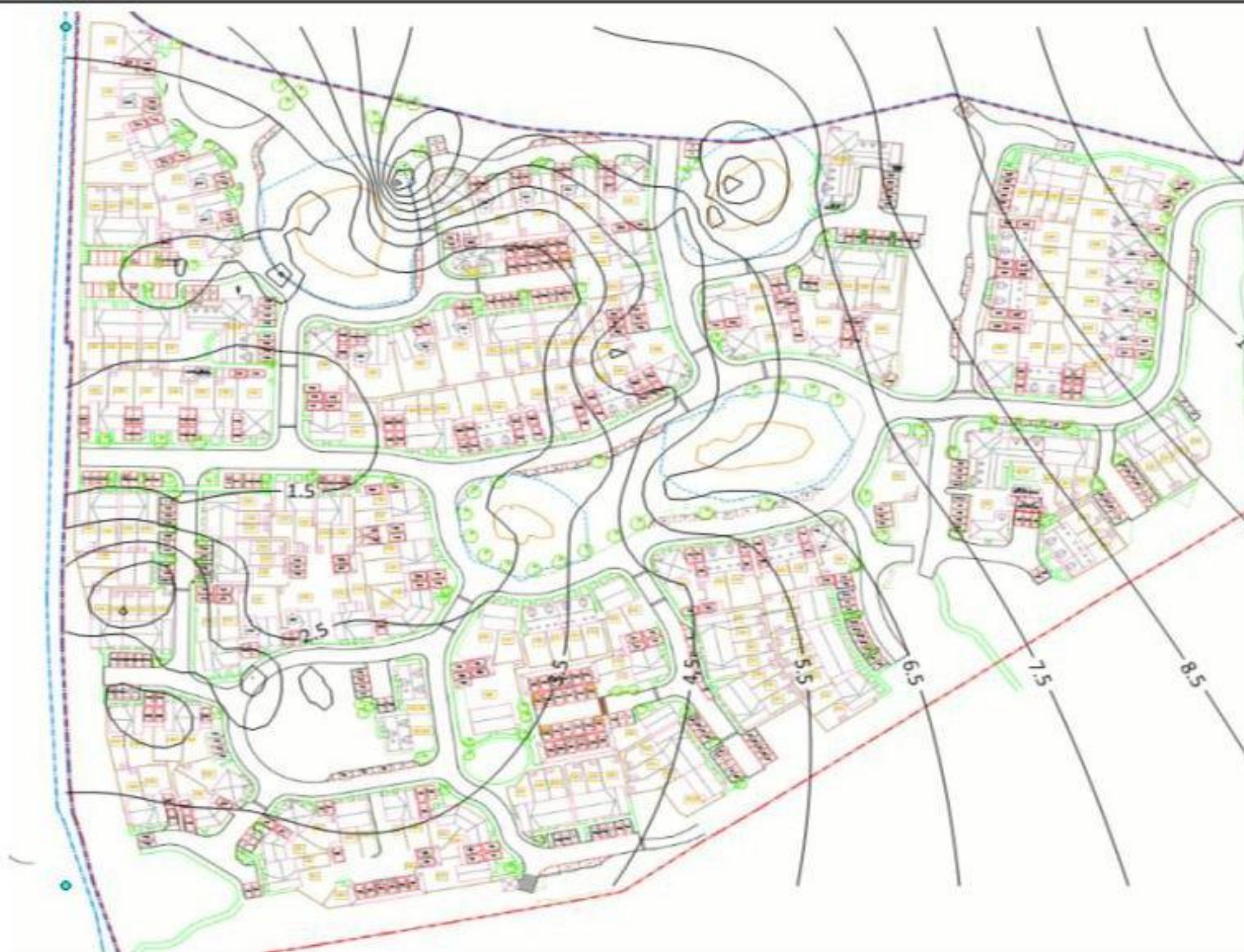
Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Chalk level 3D model on aerial overlay	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		 Geo-Environmental
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	19	Scale:	Not To Scale			



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Pre-development ground level contours on development layout	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	20	Scale:	Not To Scale			



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Chalk level contours on development layout	
Client:	Grainger plc			 Geo-Environmental		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	21	Scale:	Not To Scale			
				Geo-Environmental Services Ltd		
				Unit 7 Danworth Farm, Cuckfield Road		
				Hurstpierpoint, West Sussex BN6 9GL		
				+44(0)1273 832972 www.gesl.net		



Project:	Woodcroft Farm, Lovedean, Hampshire			Title	Depth to chalk on development layout	
Client:	Grainger plc			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net		
Ref No:	GE16942	Revision:	1.0			
Drawn:	GR	Date:	02/08/2018			
Figure:	22	Scale:	Not To Scale			
				 Geo-Environmental		

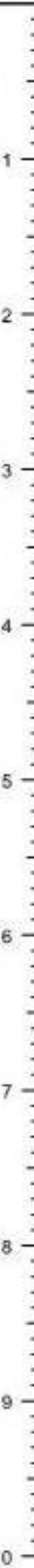
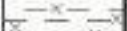
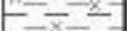
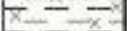
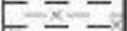
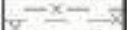
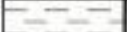
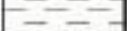
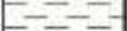
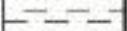
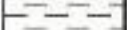
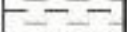
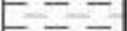
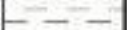


APPENDIX A

Exploratory Hole Logs

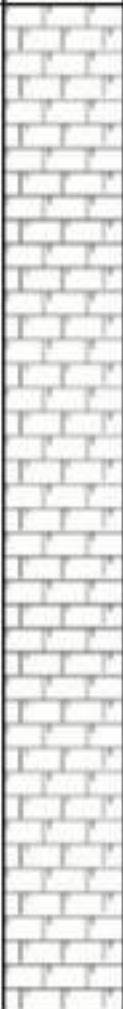
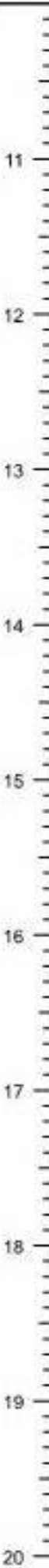


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH601 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468246E - 112136N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 66.00		Scale 1:50	
Client: Grainger PLC				Dates: 28/06/2018		Logged By GR	

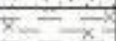
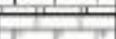
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15	65.85		Grass over brown silty clay with roots	
		0.40			0.40	65.60		Friable brown CLAY (visually assessed to be desiccated)	
		0.50 - 1.00	B					Stiff brown orange-brown and greyish brown mottled silty CLAY	
		1.00	S	N=14 (5/4,3,4,3)					
		1.45	D						
		1.50 - 2.00	B						
		2.00	S	N=14 (4/3,3,4,4)	1.90	64.10		Stiff brown and grey mottled silty CLAY	
		2.45	D						
		2.50 - 3.00	B						
		3.00	S	N=16 (4/3,4,5,4)					
		3.45	D						
		4.00	S	N=16 (5/4,4,4,4)	3.90	62.10		Stiff light grey and purple mottled CLAY	
		4.45	D						
		5.00	S	N=14 (4/3,4,3,4)	5.10	60.90		Medium dense brown medium to coarse SAND	
		5.45	D						
		6.00	D		5.90	60.10		Stiff grey silty CLAY	
		6.50	S	N=17 (5/4,4,4,5)					
		6.95	D						
		7.20			7.20	58.80		Stiff to very stiff grey gravelly to very gravelly CLAY. Gravel is fine to medium angular to subrounded flint.	
		7.50	D						
	8.00	S	0 (50 for 75mm/0 for 0mm)	7.90	58.10		Off-white and white CHALK composed of silt size matrix with weak to moderately weak clasts becoming blocky chalk with depth. CIRIA Grade Dm/Dc becoming Grade C/B at depth		
	8.45	D							
	9.00	D							
	9.50	S	0 (50 for 50mm/0 for 0mm)						
	9.95	D							
Continued on Next Sheet								10	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		
				7.90	10.00		
				10.00	15.00		

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH601 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468246E - 112136N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 66.00		Scale 1:50	
Client: Grainger PLC				Dates: 28/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D						
		11.00	S	0 (50 for 65mm/0 for 0mm)					
		11.45	D						
		12.00	D						
		12.50	S	0 (50 for 75mm/0 for 0mm)					
		12.95	D						
		13.50	D						
		14.00	S	0 (50 for 25mm/0 for 0mm)					
		14.45	D						
		15.00	D		15.00	51.00			
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.			
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				
				0.00	1.00				
				7.90	10.00				
				10.00	15.00				

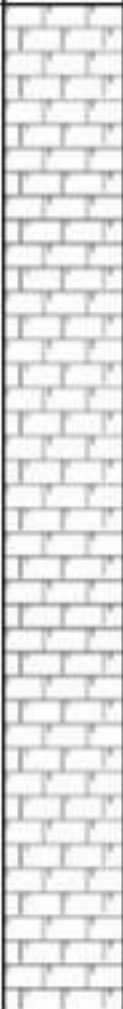
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH602 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468179E - 112045N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.80		Scale 1:50	
Client: Grainger PLC				Dates: 27/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	61.60		Grass over brown silty clay with roots	
		0.50 - 1.00	B					Medium dense brown fine and medium SAND	
		1.00	S	N=22 (7,5,6,5,6)					1
		1.45	D						
		1.50 - 2.00	B						
		2.00	S	N=17 (5,4,4,4,5)	1.90	59.90		Stiff grey silty CLAY	2
		2.45	D						
		2.50 - 3.00	B						
		3.00	S	N=12 (5,3,3,2,4)	2.80	59.00		Structureless CHALK composed of off-white silt matrix with off-white and white very weak to moderately weak chalk clasts. CIRIA Grade Dm/Dc	3
		3.45	D						
		4.00	S	N=11 (3,2,3,3,3)					4
		4.45	D						
		5.00	S	N=15 (4,3,3,4,5)	4.80	57.00		Off-white and white moderately weak CHALK. CIRIA Grade C/B	5
		5.45	D						
		6.00	D						6
		6.50	S	N=31 (7,6,7,8,10)					
		6.95	D						7
		7.50	D						
	8.00	S	N=31 (9,7,7,8,9)					8	
	8.45	D							
	9.00	D						9	
	9.50	S	N=33 (8,7,8,9,9)						
	9.95	D						10	
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
				0.00	1.00	Groundwater not encountered.

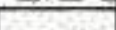


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH602 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468179E - 112045N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.80		Scale 1:50	
Client: Grainger PLC				Dates: 27/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D						
		11.00	S	N=34 (9,7,8,9,10)					11
		11.45	D						
		12.00	D						12
		12.50	S	N=39 (11,9,10,11,9)					
		12.95	D						13
		13.50	D						
		14.00	S	N=41 (12,9,10,11,11)					14
		14.45	D						
		15.00	D		15.00	46.80			End of Borehole at 15.00m
								16	
								17	
								18	
								19	
								20	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH603 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468236E - 112083N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 64.30		Scale 1:50	
Client: Grainger PLC				Dates: 27/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15	64.15		Grass over brown silty clay with roots	
		0.40			0.40	63.90		Friable brown sandy CLAY (visually assessed to be desiccated) Stiff reddish brown light grey and brown mottled CLAY	
		0.50 - 1.00	B						
		1.00	S	N=12 (3/2,3,3,4)					1
		1.45	D						
		1.50 - 2.00	B						
		2.00	S	N=20 (5/4,5,6,5)					2
		2.45	D						
		2.50 - 3.00	B						
		3.00	S	N=15 (4/3,4,4,4)					3
		3.45	D						
		3.60			3.60	60.70		Stiff brown sandy CLAY	4
		4.00	S	N=12 (3/2,3,3,4)					
		4.45	D						
		4.80			4.80	59.50		Medium dense becoming dense brown fine to medium SAND with bands of stiff grey and brown clay	5
		5.00	S	N=16 (4/3,4,4,5)					
		5.45	D						
		6.00	D						6
		6.50	S	N=31 (9/7,7,8,9)					
		6.95	D						7
	7.50	D							
	8.00	S	N=35 (11/8,9,9,9)					8	
	8.45	D							
	9.00	D						9	
	9.50	S	N=39 (10/7,9,11,12)						
	9.95	D						10	
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
				0.00	1.00	Groundwater not encountered.



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log			Borehole No. BH603 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468236E - 112083N		Hole Type CP
Location: Woodcroft Farm, Lovedean		Level: 64.30		Scale 1:50		
Client: Grainger PLC		Dates: 27/06/2018		Logged By GR		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D						
		11.00	S	N=45 (11./9,11,12,13)					11
		11.45	D						
		12.00	D						12
		12.50	S	N=47 (12./10,11,12,14)					
		12.95	D						13
		13.50	D						
		14.00	S	N=53 (13./11,12,14,16)					14
		14.45	D						
		15.00	D		15.00	49.30		End of Borehole at 15.00m	15
								16	
								17	
								18	
								19	
								20	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH604 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468183E - 112081N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.50		Scale 1:50	
Client: Grainger PLC				Dates: 26/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	61.30		Grass over brown silty clay with roots	
								Stiff brown CLAY with fine to coarse flint gravel	
		0.50 - 1.00	B						
		1.00	S	N=12 (3/2,3,4,3)	1.20	60.30			1
		1.45	D						
		1.50 - 2.00	B						
		2.00	S	N=12 (3/2,3,4,3)					2
		2.45	D						
		2.50 - 3.00	B						
		3.00	S	N=20 (5/4,5,6,5)	2.90	58.60			3
		3.45	D						
		4.00	S	N=21 (6/5,5,5,6)	3.80	57.70			4
		4.45	D						
		5.00	S	N=22 (7/5,6,5,6)					5
		5.45	D						
		6.00	D		5.80	55.70			6
		6.50	S	N=19 (5/4,5,4,6)					
		6.95	D						7
		7.50	D						
		8.00	S	N=26 (8/5,6,7,8)	7.70	53.80			8
	8.45	D							
	9.00	D						9	
	9.50	S	N=35 (9/7,9,10,9)						
	9.95	D						10	
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
				0.00	1.00	Groundwater not encountered.

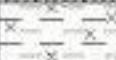
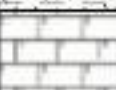


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH604 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468183E - 112081N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.50		Scale 1:50	
Client: Grainger PLC				Dates: 26/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description									
		Depth (m)	Type	Results													
		10.50	D						11								
		11.00	S	N=40 (11,/8,9,11,12)						12							
		11.45	D								13						
		12.00	D									14					
		12.50	S	N=56 (12,/11,13,15,17)									15				
		12.95	D											16			
		13.50	D												17		
		14.00	S	N=74 (20,/18,15,19,22)												18	
		14.45	D														19
		15.00	D														
			15.00	46.50	End of Borehole at 15.00m												

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH605 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468182E - 112139N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.60		Scale 1:50	
Client: Grainger PLC				Dates: 25/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	61.40		Grass over brown silty clay with roots	
		0.50 - 1.00	B		0.50	61.10		Friable brown CLAY (visually assessed to be desiccated)	
		1.00	S	N=10 (3/2,3,2,3)	1.00	60.60		Stiff orange-brown sandy CLAY	1
		1.45	D						
		1.50 - 2.00	B						
		2.00	S	N=14 (4/3,4,3,4)					2
		2.45	D						
		2.50 - 3.00	B						
		3.00	S	N=17 (4/3,4,4,6)	2.80	58.80		Stiff grey and brown mottled silty CLAY	3
		3.45	D						
		4.00	S	N=19 (5/4,4,5,6)	3.70	57.90		Medium dense light greyish and light brown silty SAND	4
		4.45	D						
		5.00	S	N=22 (7/5,6,5,6)	4.90	56.70		Stiff brown sandy CLAY with fine to coarse gravel of flint and chalk	5
		5.45	D						
		6.00	D						6
		6.50	S	N=27 (9/7,6,7,7)	6.40	55.20		Off-white and white CHALK composed of silt size matrix with weak to moderately weak clasts becoming blocky chalk with depth. CIRIA Grade Dm/Dc becoming Grade C/B at depth	7
		6.95	D						
		7.50	D						
		8.00	S	N=23 (6/5,7,6,5)					8
		8.45	D						
	9.00	D						9	
	9.50	S	N=32 (9/7,8,8,9)						
	9.95	D						10	
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
				0.00	1.00	Groundwater not encountered.

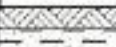
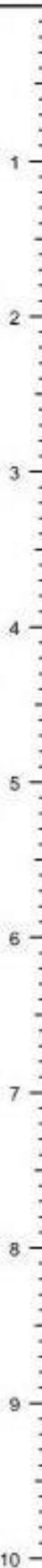
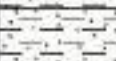
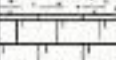
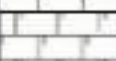
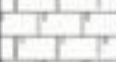
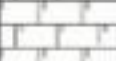
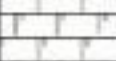
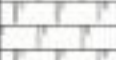


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH605 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468182E - 112139N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 61.60		Scale 1:50	
Client: Grainger PLC				Dates: 25/06/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D	N=34 (10,8,8,9,9)		46.60			11
		11.00	S						
		11.45	D						
		12.00	D						
		12.50	S						
		12.95	D						
		13.50	D						
		14.00	S						
		14.45	D						
		15.00	D						
									12
									13
									14
									15
									16
									17
									18
									19
									20

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log			Borehole No. BH606 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468056E - 112110N		Hole Type CP
Location: Woodcroft Farm, Lovedean				Level: 59.40		Scale 1:50
Client: Grainger PLC				Dates: 27/03/2018		Logged By GR

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	59.30		Grass over brown silty clay with roots	
		0.50 - 1.00	B					Stiff brown sandy CLAY (Visually assessed to be desiccated)	
		1.00	S	N=12 (4,3,2,4,3)	0.90	58.50		Stiff brown gravelly CLAY. Gravel is medium to coarse flint	
		1.45 1.50 - 2.00	D B						
		2.00	S	N=13 (5,3,3,3,4)					
		2.45 2.50 - 3.00	D B						
		3.00	S	N=17 (3,4,4,5,4)	2.80	56.60		Firm to stiff light grey and off-white silty CLAY with much fine to medium gravel of very weak chalk.	
		3.45	D						
		4.00	S	N=19 (7,4,5,5,5)	3.90	55.50		Structureless CHALK composed of off-white silt matrix with off-white and white very weak to moderately weak chalk clasts. CIRIA Grade Dm/Dc	
		4.45	D		4.40	55.00		Off-white and white moderately weak CHALK. CIRIA Grade C/B	
		5.00	S	N=92 (38,20,22,24,26)					
		5.45	D						
		6.00	D						
		6.50	S	N=29 (9,6,7,8,8)					
		6.95	D						
		7.50	D						
		8.00	S	N=39 (10,8,9,10,12)					
		8.45	D						
	9.00	D							
	9.50	S	N=42 (12,9,11,11,11)						
	9.95	D							
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
				0.00	1.00	Groundwater not encountered.
				12.50	13.00	
				13.20	15.00	



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. BH606 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468056E - 112110N		Hole Type CP	
Location: Woodcroft Farm, Lovedean				Level: 59.40		Scale 1:50	
Client: Grainger PLC				Dates: 27/03/2018		Logged By GR	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D	N=49 (11,9,12,13,15)					11
		11.00	S						
		11.45	D						
		12.00	D						
		12.50	S	0 (50 for 75mm/0 for 0mm)					
		12.95	D						
		13.50	D						
		14.00	S	0 (50 for 40mm/0 for 0mm)					
		14.45	D						
		15.00	D						
				15.00	44.40		End of Borehole at 15.00m	15	
								16	
								17	
								18	
								19	
								20	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Groundwater not encountered.	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
				0.00	1.00		
				12.50	13.00		
				13.20	15.00		

Trial Pit Log

Project Name: Woodcroft - Phase 3 Supplementary GI

Project No.
GE16942

Co-ords: 468130.00 - 112031.00
Level: 58.30

Date
25/06/2018

Location: Woodcroft Farm, Lovedean

Dimensions
(m):

Scale
1:25

Client: Grainger PLC

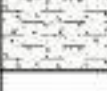
Depth
2.70

Logged

[illegible]

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP702 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468168.00 - 112050.00 Level: 60.50			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 3.10			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	60.20		Grass over brown silty sandy clay with roots
				0.90	59.60		Stiff orange-brown slightly sandy CLAY. Visually assessed to be desiccated
				1.80	58.70		Stiff orange-brown and light grey CLAY
				2.40	58.10		Dark grey light grey and orange-brown sandy CLAY with abundant fine angular to subangular flint gravel and rare flint cobble. Orange brown colour dominant in western half of the trench and grey colour dominant in eastern half of the trench.
				3.10	57.40		Dark grey light grey and off-white clayey sandy GRAVEL and cobble of flint with some moderately weak to moderately strong gravel and cobble sized chalk. Chalk gravel from 2.4m bgl at eastern end of pit and from 2.6m bgl through the remainder of the pit.
End of Pit at 3.10m							
Pit stable and dry. Unable to penetrate gravel and cobble in base of pit. Untraceable plastic water pipe at 0.6m broken and repaired with stop-end fitting.							
Stability							



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP703 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468210.00 - 112084.00 Level: 63.00			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 4.40			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	62.70		Grass over brown silty sandy clay with roots
				1.20	61.80		Stiff light brown and orange-brown mottled slightly sandy silty CLAY with pockets of slightly clayey sand
				2.40	60.60		Orange-brown light grey and yellow-brown mottled slightly clayey medium to coarse SAND
				2.80	60.20		Stiff light grey and brown mottled CLAY. Closely fissured with occasional subangular medium flint gravel. Dark grey and dark brown discolouration on some clay fissure block faces. Occasional localised red mottling.
				3.30	59.70		Grey clayey SAND with fine angular to very angular flint gravel (frost shattered?)
				4.20	58.80		Grey silty GRAVEL of chalk with some moderately weak to moderately strong chalk of cobble size.
				4.40	58.60		Stiff dark grey and orange-brown sandy CLAY with some fine to medium angular flint gravel
				End of Pit at 4.40m			
Remarks Pit stable and dry. Excavated into side of a doline/depression feature. GL falls by c. 1.5m from west to east.		Stability					

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		TrialPit No TP704 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468219.00 - 112108.00 Level: 63.00			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 3.20			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	62.70		Grass over brown silty sandy clay with roots
				0.70	62.30		Stiff orange-brown slightly sandy silty CLAY. Visually assessed to be desiccated
				2.30	60.70		Very stiff orange-brown silty CLAY becoming slightly sandy silty CLAY. Light grey and orange-brown mottled from 1.7m bgl.
				3.10	59.90		Stiff to very stiff orange-brown light grey yellow-brown and red mottled closely fissured silty CLAY with rare fine to coarse flint gravel.
				3.20	59.80		Yellow and orange-brown medium to coarse SAND.
End of Pit at 3.20m							
1 2 3 4 5							
Remarks Pit stable and dry. Chalk not encountered.							
Stability							





Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL

Geo-Environmental www.gesl.net

Trial Pit Log

Trial Pit No
TP705
Sheet 1 of 1

Project Name: Woodcroft - Phase 3 Supplementary GI

Project No.
GE16942

Co-ords: 468200.00 - 112133.00
Level: 62.00

Date
25/06/2018

Location: Woodcroft Farm, Lovedean

Dimensions
(m):



Scale
1:25

Client: Grainger PLC

Depth
1.80

Logged

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	61.70		Grass over brown silty sandy clay with roots	
				0.50	61.50		Brown slightly sandy clayey fine to coarse GRAVEL of subangular to subrounded flint	
				1.80	60.20		Stiff orange-brown slightly sandy CLAY with occasional fine to coarse gravel of flint. Root 10mm diameter at 0.9m bgl at NGR 468198, 112132	1
							Stiff grey and orange-brown mottled CLAY End of Pit at 1.80m	2
				3.20	58.80			3
								4
								5

Remarks Pit stable and dry. Chalk not encountered.

Stability



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		TrialPit No TP706 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468154.00 - 112077.00 Level: 61.20			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 2.50			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20	61.00		Grass over brown silty sandy clay with roots
							Stiff orange-brown sandy CLAY with rare coarse flint gravel at depth. Visually assessed to be desiccated and friable texture to 0.9m bgl. Lenses of orange-brown medium to coarse sand from 1.2m bgl to depth at NGR 468154, 112079.
				1.60 1.70	59.60 59.50		Stiff to very stiff light grey sandy CLAY with fine and medium gravel of flint and chalk. Clay present from 1.8m bgl at NGR 468154, 112084 Structureless CHALK composed of light brown and off-white silt size matrix with gravel to cobble sized clasts of very weak to moderately strong chalk and occasional gravel and cobble sized flint. Chalk initially encountered at 1.7m bgl at NGR 468156, 112080 and at 2.3m bgl at NGR 468154, 112084
				2.50	58.70		End of Pit at 2.50m
Remarks Variable depths of strata along the trench. Pit stable and dry.							
Stability							

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP707 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468135.00 - 112067.00 Level: 59.50			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 2.70			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20	59.30		Grass over brown silty sandy clay with roots
				0.90	58.60		Stiff orange-brown sandy to very sandy CLAY becoming sandy very gravelly clay from 0.6m bgl at eastern end of pit and extending to 1.4m bgl at NGR 468137, 112068. Clay visually assessed to be desiccated and friable to c. 0.5m bgl.
				2.30	57.20		Stiff light grey and yellow-brown CLAY with some medium to coarse gravel and cobble of weak to moderately strong chalk and flint.
				2.70	56.80		Structureless CHALK composed of light brown and off-white slightly clayey silty gravel and cobble sized weak to moderately strong chalk clasts with occasional flint cobble [from NGR 468135, 112067 to 468136, 112066]. CIRIA Grade Dc. Chalk present as gravel in clay/silt chalk matrix from 1.1m bgl at NGR 468139, 112065 becoming CIRIA Grade Dc from 1.9m bgl. End of Pit at 2.70m
1 2 3 4 5							
Remarks Variable depth to and composition of Chalk. Pit stable and dry.							
Stability							

Trial Pit Log

Project Name: Woodcroft - Phase 3 Supplementary GI

Project No.
GE16942

Co-ords: 468105.00 - 112132.00
Level: 60.20

Date
26/06/2018

Location: Woodcroft Farm, Lovedean

Dimensions
(m):

Scale
1:25

Client: Grainger PLC

Depth
2.90

Logged

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	59.90		Grass over brown silty sandy clay with roots	1 -
				0.60	59.60		Orange-brown sandy CLAY/clayey SAND. Friable texture and visually assessed to be desiccated.	
				1.10	59.10		Stiff orange-brown sandy to very sandy CLAY with some fine and medium subangular to subrounded flint gravel. Becoming very gravelly from 0.9m bgl.	
				1.20	59.00		Orange-brown SAND	
				2.90	57.30		Stiff brownish grey slightly sandy to sandy CLAY with some medium to coarse gravel and cobble sized flint occasional gravel and cobble sized chalk. Becoming more gravelly from 2.3m bgl and gravel becoming angular to very angular (frost shattered?) and occasional ironstone nodules. Plunging interface with chalk at north end of trench and remainder of trench logged as TP708A	2 -
							End of Pit at 2.90m	3 -
								4 -
								5 -

Remarks: Pit stable and dry.

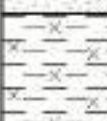
Stability:

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP708A Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468109.00 - 112136.00 Level: 60.20			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 2.80			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	59.90		Grass over brown silty sandy clay with roots
				0.60	59.60		Orange-brown sandy CLAY/clayey SAND. Friable texture and visually assessed to be desiccated.
				1.10	59.10		Stiff orange-brown sandy to very sandy CLAY with some fine and medium subangular to subrounded flint gravel. Becoming very gravelly from 0.9m bgl.
				1.30	58.90		Orange-brown SAND
				2.80	57.40		Structureless CHALK composed of light brown and off-white silty size matrix and gravel size clasts of very weak to weak chalk. CIRIA Grade Dc. Junction between chalk and overlying stratum is irregular with deepest superficial intrusion to 1.7m bgl at NGR 468107, 112130, 1.7m bgl at NGR 468108, 121132 and 1.6m bgl at NGR 468110, 121134. Chalk interface at western end of trench formed a plunging profile inclined at c. 70-80° towards WSW
							End of Pit at 2.80m
Remarks Trench follows on directly from TP708. Section split where plunging chalk junction encountered.							
Stability							

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP709 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468109.00 - 112107.00 Level: 59.40			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 2.50			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	59.10		Grass over brown silty sandy clay with roots
				0.90	58.50		Brown and orange-brown sandy gravelly CLAY. Gravel is fine to coarse subangular to rounded flint.
				1.10	58.30		Orange-brown and brown SAND. Junction between the sand and underlying gravelly clay is variable along the trench - 1.1m bgl from NGR 468109, 112107 to 468110, 112104 increasing to 1.7m bgl by NGR 468112, 112104.
				2.10	57.30		Stiff light grey and brown mottled sandy CLAY with fine to coarse gravel and cobble of flint. Some frost shattered angular to very angular flint and ironstone nodules/ staining at depth. Clay within c. 10mm of chalk is a dark brown colour.
				2.50	56.90		Structureless CHALK composed of off-white light brown and yellow sandy silt size matrix with gravel and cobble sized clasts of weak to moderately strong chalk and occasional gravel and cobble sized flint. Chalk encountered around NGR 468110, 112105 to 468110, 112103 at 1.1m bgl and to NGR 468110, 121104 at 2.5m bgl
End of Pit at 2.50m							
1 2 3 4 5							
Remarks Pit stable and dry.							
Stability							

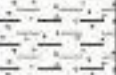
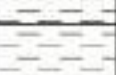
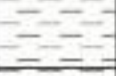
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		TrialPit No TP710 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468074.00 - 112103.00 Level: 59.50			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 2.40			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20	59.30		Grass over brown silty sandy clay with roots
				0.50	59.00		Orange-brown sandy CLAY with occasional medium and coarse flint gravel. Friable texture and visually assessed as desiccated.
				0.80	58.70		Stiff orange-brown and brown mottled silty CLAY with occasional medium to coarse subrounded to subangular flint gravel and occasional flint cobble.
				1.30	58.20		Stiff light grey light brown and orange-brown mottled silty CLAY with medium to coarse flint gravel and occasional cobble sized flint and chalk gravel from 1.1m bgl. Brown to dark brown colour within c. 10mm of junction with underlying chalk. Junction with underlying chalk is irregular and extends as localised suffusion features to 1.5m bgl at NGR 468075, 112100 and 1.8m bgl at NGR 468073, 112099.
				2.10	57.40		Structureless CHALK composed of brown off-white and light brown silty gravel of chalk with occasional cobble sized chalk. Clasts are weathered irregular in shape and very weak to moderately strong. Occasional gravel and cobble sized flint. CIRIA Grade Dc.
				2.40	57.10		Structureless CHALK composed of angular to blocky clasts of weak to moderately weak chalk with a silt matrix. Some brown discolouration on clast faces. CIRIA Grade Dc possibly becoming Dc/C. Very hard digging (8tonne excavator and toothed bucket) from 2.2m bgl. End of Pit at 2.40m
Remarks Pit dry. Some overdig in chalk.							
Stability							



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmental www.gesl.net		Trial Pit Log		Trial Pit No TP711 Sheet 1 of 1			
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468191.00 - 112112.00 Level: 60.50			
Location: Woodcroft Farm, Lovedean				Dimensions (m):			
Client: Grainger PLC				Depth 3.50			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	60.20		Grass over brown silty sandy clay with roots
				0.60	59.90		Stiff orange-brown slightly sandy silty CLAY. Visually assessed to be desiccated
							Orange-brown slightly clayey SAND with occasional impersistent clay partings. Becoming orange-brown and yellow-brown from 1.8m bgl.
				2.70	57.80		Very stiff light grey and orange-brown silty to very silty CLAY becoming dark grey from 3.0m bgl.
				3.10	57.40		Stiff light grey silty sandy CLAY with much subrounded to rounded flint gravel lenses of clayey fine to medium angular to very angular (frost shattered?) flint gravel and lenses of stiff to very stiff dark grey clay.
				3.50	57.00		End of Pit at 3.50m
Remarks Pit dry and stable. Chalk not encountered.							
Stability							



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS501 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468243E - 112145N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 65.20		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	65.00		Grass over brown slightly sandy gravelly CLAY with frequent rootlets	
		0.50	PP	1.2kg/cm2				Firm orange and grey mottled desiccated gravelly CLAY. Gravel is medium to coarse sub angular to sub rounded of flint	
		1.00	PP	1.7kg/cm2	0.90	64.30		Firm to stiff orange and grey mottled slightly desiccated CLAY with occasional flint gravel	
		1.50	PP	1.9kg/cm2	1.40	63.80		Firm to stiff orange and grey mottled slightly desiccated CLAY	
		2.00	PP	2.0kg/cm2					
		2.50	PP	2.1kg/cm2	2.40	62.80		Firm to stiff orange and grey mottled CLAY with occasional flint gravel	
		2.80			62.40			Firm to stiff orange and grey slightly sandy CLAY. Sand is fine	
		3.00	PP	2.1kg/cm2	3.10	62.10		Firm orange/brown and occasionally grey sandy CLAY. Sand is fine	
		3.40	PP	1.6kg/cm2					
		3.60			61.60			Orange and grey slightly clayey fine to medium SAND	
4.20			61.00			Orange, yellow and grey fine to medium SAND			
4.80			60.40			Firm orange and grey mottled CLAY			
4.90	PP	1.7kg/cm2							
				5.00	60.20		Continued on Next Sheet	5	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 6.8m bgl



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS501 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468243E - 112145N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 65.20		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.20	60.00		Yellow and grey medium SAND	
					5.40	59.80		Orange and grey fine to medium SAND	
								Orange and grey fine to medium SAND with rare flint gravel	
					5.80	59.40		Orange and grey fine SAND with rare flint gravel	
					6.00	59.20		Orange and yellow medium SAND	
					6.20	59.00		Firm orange and grey CLAY with occasional flint gravel	
					6.60	58.60		Firm dark brown and dark grey slightly sandy gravelly CLAY with occasional chalk gravel. Sand is fine gravel is red medium sub angular of flint	
					6.80	58.40		End of Borehole at 6.80m	
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Refused at 6.8m bgl			
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				

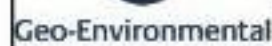


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS502 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468227E - 112137N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 64.00		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.20	63.80		Grass over dark brown silty CLAY with frequent rootlets and occasional flint gravel		
										Firm brown slightly sandy CLAY with occasional flint gravel
		0.90	PP	1.6kg/cm2	0.80	63.20		Firm orange, grey and black slightly gravelly CLAY. Gravel is medium sub angular of flint		
		1.10	PP	1.8kg/cm2	1.00	63.00		Firm orange and grey desiccated CLAY with occasional flint gravels		
					1.30	62.70		<u>Black flecking</u>		
		1.50	PP	1.5kg/cm2				Firm orange and grey gravelly CLAY. Gravel is coarse sub angular of flint		
					1.60	62.40		Firm orange and grey slightly gravelly CLAY. Gravel is coarse sub angular of flint		
		2.00	PP	2.0kg/cm2	1.90	62.10		Firm to stiff orange and grey mottled CLAY with occasional flint gravel		
		2.50	PP	1.9kg/cm2						
		3.00	PP	1.6kg/cm2						
		3.50	PP	1.6kg/cm2						
					3.80	60.20		Firm orange and grey slightly sandy CLAY. Sand is fine		
			4.00							
			4.20	59.80		Firm orange and grey mottled CLAY with occasional flint gravel				
			4.50							
Continued on Next Sheet										

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	





BN6 9GL
www.gesl.net

Borehole Log

WS502

Sheet 2 of 2

Project Name:

Woodcroft - Phase 3
Supplementary GI

Project No.
GE16942

Co-ords:

468227E - 112137N

Hole Type
WLS

Location:

Woodcroft Farm, Lovedean

Level:

64.00

Scale
1:25

Client:

Grainger PLC

Dates:

13/06/2018

Logged By
FG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		5.30	PP	1.1kg/cm2	5.30	58.70			
					5.60	58.40		Soft orange/brown slightly sandy slightly gravelly CLAY. Sand is fine and gravel is medium sub angular of flint	
								Soft orange/brown slightly sandy CLAY. Sand is fine	
					6.80	57.20		Soft orange/brown sandy CLAY. Sand is fine	
					7.60	56.40		Soft orange/brown very sandy CLAY. Sand is fine	
					7.80	56.20		Grey and orange medium SAND	
					8.00	56.00		End of Borehole at 8.00m	
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks			
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS503 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468193E - 112126N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 61.90		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.20	61.70		Grass over dark brown slightly silty gravelly CLAY with frequent rootlets		
										Firm orange/brown desiccated CLAY with frequent flint cobbles
		0.50	PP	2.0kg/cm2						
					0.80	61.10				
		1.00	PP	2.3kg/cm2						
		1.50	PP	2.3kg/cm2						
					1.70	60.20				
					1.80	60.10				
					2.20	59.70				
					2.60	59.30				
					2.90	59.00				
					3.20	58.70				
			3.60	58.30						
			3.80	58.10						
			4.00	57.90						
			4.50	57.40						
			4.80	57.10						
							Continued on Next Sheet			

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



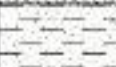
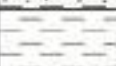
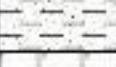
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS503 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468193E - 112126N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 61.90		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.30	56.60	flint Large flint cobble		
					6.00	55.90	Soft light brown sandy CLAY with occasional chalk and flint gravel		
					6.20	55.70	Firm light brown sandy CLAY with frequent chalk gravel		
							Recovered as. Structureless CHALK composed of white sub angular to sub rounded coarse moderately weathered weak chalk in a comminuted matrix		
					8.00	53.90	End of Borehole at 8.00m		

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



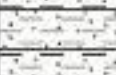
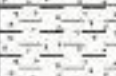
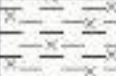
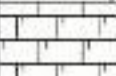
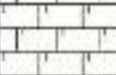
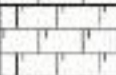
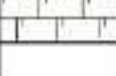
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS504 Sheet 1 of 1	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468166E - 112125N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 60.50		Scale 1:25		Logged By FG	
Client: Grainger PLC		Dates: 13/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	60.30		Grass over dark brown slightly silty gravelly CLAY with frequent rootlets	
								Soft orange/brown sandy CLAY with frequent flint gravel. Sand is medium	
		0.80	PP	1.2kg/cm2					
					1.00	59.50		Firm red and orange very gravelly CLAY. Gravel is medium sub angular of flint	
		1.20	PP	1.5kg/cm2					
					1.40	59.10		Firm orange and grey mottled CLAY with occasional flint gravel	
		1.50	PP	2.0kg/cm2					
					2.00	58.50		Firm orange/brown sandy CLAY. Sand is medium	
		2.10	PP	1.2kg/cm2					
					2.45	58.05		<u>Band of red flint gravel</u> <u>Large flint cobble</u> Firm green/grey CLAY with occasional chalk gravel	
			2.80	57.70		Firm brown sandy CLAY with frequent chalk gravel. Sand is medium			
			3.10	57.40		<u>Large flint cobble</u> Recovered as, Structureless CHALK composed of white sub angular to sub rounded coarse moderately weathered weak chalk in a comminuted matrix with little brown CLAY			
			5.00	55.50		End of Borehole at 5.00m		5	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS505 Sheet 1 of 1	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468135E - 112121N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 60.70		Scale 1:25	
Client: Grainger PLC				Dates: 13/06/2018		Logged By FG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.20	60.50		Grass over dark brown slightly silty gravelly CLAY with frequent rootlets	1		
								Soft orange/brown very sandy CLAY with frequent flint gravel			
					1.20	59.50		Firm orange and grey mottled desiccated gravelly CLAY. Gravel is medium to coarse sub angular to sub rounded of flint	2		
					1.40	59.30		Firm orange and grey mottled desiccated gravelly CLAY. Gravel is medium to coarse sub angular to sub rounded of chalk			
					1.50	59.20		Firm white and brown very gravelly CLAY. Gravel is medium to coarse sub angular of chalk			
								<u>Large chalk cobble</u>			
					2.10	58.60		<u>Large chalk cobble</u>		3	
								Firm grey/green very gravelly CLAY. Gravel is coarse angular of flint			
					2.30	58.40		Off white fine to medium angular to sub angular chalk GRAVEL			
					2.50	58.20		Firm grey/green slightly silty CLAY with occasional flint gravel			
									<u>Large flint cobble</u>		4
					3.00	57.70		Recovered as, Structureless CHALK composed of white very weak highly weathered chalk in a comminuted matrix			
									<u>Large flint cobble</u>		
											5
			4.70	56.00		Recovered as, Structureless CHALK composed of white sub angular to sub rounded coarse moderately weathered weak chalk in a comminuted matrix					
			5.00	55.70		<u>Large flint cobble</u>					
End of Borehole at 5.00m											

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS506 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468115E - 112122N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 59.90		Scale 1:25	
Client: Grainger PLC				Dates: 14/06/2018		Logged By WH	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.60	59.30		Grass over brown slightly sandy CLAY with frequent rootlets and gravel. Gravel is fine to coarse sub-angular flint	1	
								Orangeish brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium sub-angular to rounded flint		
		2.00	PP	2.5kg/cm2						2
		3.00	PP	2.7kg/cm2	3.00	56.90		Becomes gravelly. Gravel is fine to coarse flint with occasional fine to medium chalk		3
		4.00	PP	1.2kg/cm2	4.00	55.90		Firm light brown with orange mottled gravelly CLAY. Gravel is fine to coarse sub-angular flint Becomes slightly gravelly sandy clay with frequent black flecks Becomes brown and orange mottled slightly gravelly CLAY		4
		4.50	PP	1.8kg/cm2	4.50	55.40		Recovered as, Structureless CHALK composed of white slightly clayey gravelly SILT. Gravel is fine to medium sub-rounded to sub-angular moderately weathered weak chalk within a comminuted chalk and orange clay matrix. With frequent fine to coarse sub-angular flint Gravel mostly flint Recovered as, Structureless CHALK composed of white slightly gravelly SILT with occasional orange clay infill. Gravel is fine to medium sub-rounded to sub-angular moderately weathered weak chalk within a comminuted matrix	5	
Continued on Next Sheet										

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 6.0m bgl.



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS506 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468115E - 112122N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 59.90		Scale 1:25		Logged By WH	
Client: Grainger PLC		Dates: 14/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		6.00	PP	1.6kg/cm2	6.00	53.90		End of Borehole at 6.00m	6 7 8 9 10

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 6.0m bgl.



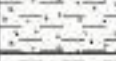
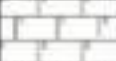
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS507 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468174E - 112142N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 60.90		Scale 1:25	
Client: Grainger PLC				Dates: 14/06/2018		Logged By WH	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.70	60.20		Brown slightly sandy CLAY with frequent rootlets and occasional gravel. Gravel is fine to coarse sub-angular flint	
		1.00	PP	1.5kg/cm2				Soft reddish brown very sandy CLAY with occasional fine to coarse sub-angular flint gravel	1
		1.50	PP	1.0kg/cm2					
		2.00	PP	7.0kg/cm2	2.10	58.80		Reddish brown very clayey coarse SAND with occasional fine to medium sub-angular flint gravel	2
					3.50	57.40		Firm brown and grey mottled slightly gravelly CLAY with frequent black flecks. Gravel is fine sub-angular red flint	3
		4.00	PP	1.6kg/cm2					4
		4.50	PP	1.5kg/cm2	4.60	56.30		Firm to stiff brownish grey slightly gravelly CLAY. Gravel is fine to medium angular weak white chalk	
		5.00	PP	2.0kg/cm2				Continued on Next Sheet	5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



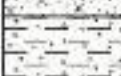
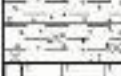
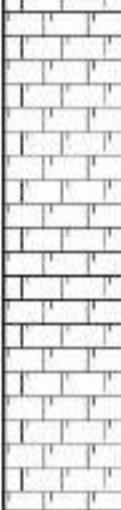
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS507 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468174E - 112142N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 60.90		Scale 1:25		Logged By WH	
Client: Grainger PLC		Dates: 14/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.15	55.75		Gravel becomes predominantly flint	6
		5.50	PP	1.7kg/cm2				Firm dark orangeish brown CLAY with abundant black flecks and frequent gravel. Gravel is fine to coarse sub-angular flint	
		6.00	PP	1.5kg/cm2				Recovered as. Structureless CHALK composed of white slightly gravelly SILT of comminuted chalk. Gravel is fine to medium sub-angular flint. Rare brown clay inclusions	
					6.20	54.70			7
					8.00	52.90		End of Borehole at 8.00m	8
									9
									10

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



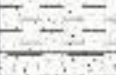
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS508 Sheet 1 of 1	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468172E - 112098N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 61.20		Scale 1:25		Logged By WH	
Client: Grainger PLC		Dates: 14/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.60	60.60		Turf over brown sandy CLAY with occasional rootlets and gravel. Gravel is fine to medium sub-angular flint.	1	
								Dark orangeish brown slightly clayey medium to coarse SAND with occasional gravel. Gravel is fine to medium sub-angular flint.		
					1.90	59.30		Stiff greyish brown gravelly CLAY with abundant black flecks. Gravel is fine to medium sub-angular red flint.		2
					2.10 2.20	59.10 59.00		Stiff light grey slightly gravelly silty CLAY with frequent black flecks. Gravel is fine to medium sub-rounded to sub-angular weak chalk.		
								Recovered as, Structureless CHALK composed of white and cream mottled gravelly clayey SILT. Gravel is fine to coarse with occasional cobbles sub-rounded to sub-angular moderately weathered weak to medium strong chalk with occasional fine to medium flint within a comminuted matrix with orange clay infill.		3
						Orangeish brown clay matrix supporting chalk gravel.				
					3.50	57.70	End of Borehole at 3.50m		4	
									5	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 3.5m bgl.



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS509 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468173E - 112069N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 61.30		Scale 1:25	
Client: Grainger PLC				Dates: 14/06/2018		Logged By WH	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35	60.95		Grass over brown sandy CLAY with abundant rootlets and occasional gravel. Gravel is fine flint	1
								Orangeish brown sandy CLAY with occasional gravel. Gravel is fine to medium sub-angular flint.	
								5cm sand lense	
								5cm sand lense	
								Orangeish brown slightly clayey coarse SAND	
					2.10	59.20			2
					2.90	58.40		Very stiff dessicated slightly sandy CLAY	3
					3.50			5.0kg/cm2	4
					3.80	57.50		Very stiff brownish grey with dark orange mottling slightly sandy gravelly CLAY. Gravel is fine to coarse angular flint with frequent fine to medium sub-rounded to sub-angular weak chalk	4
					4.00			5.0kg/cm2	5
					5.00	56.30			
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS509 Sheet 2 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468173E - 112069N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 61.30		Scale 1:25		Logged By WH	
Client: Grainger PLC		Dates: 14/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					6.00	55.30		Very stiff orange with grey mottling slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular flint with occasional fine weak chalk	6
								Orangeish brown slightly gravelly sandy CLAY. Gravel is fine to medium angular flint. Occasional grey and orange mottled clay inclusions. Sand is medium to coarse	7
					8.00	53.30		End of Borehole at 8.00m	8
									9
									10

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS510 Sheet 1 of 1	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468174E - 112042N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 61.10		Scale 1:25	
Client: Grainger PLC				Dates: 14/06/2018		Logged By WH	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.50	60.60		Grass over brown slightly sandy CLAY with frequent rootlets and gravel. Gravel is fine to coarse sub-angular flint	1	
								Orangeish brown very sandy CLAY with occasional fine gravel. Gravel is fine to medium sub-angular flint		
								Pale yellow clayey SAND with frequent orange sandy clay lenses		
		2.00	PP	1.2kg/cm2	1.65	59.45		Firm becoming stiff orange and grey mottled CLAY with rare fine sub-angular flint gravel		2
								Pale yellow clayey SAND with occasional grey clay lenses Additional red mottling		
									3	
					3.30	57.80		Whiteish grey and orangeish brown mottled slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular grey and red flint as well as abundant weathered weak fine gravel and comminuted chalk	4	
					4.50	56.60	End of Borehole at 4.50m		5	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 4.5m bgl.



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS511 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468179E - 112006N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 60.50		Scale 1:25	
Client: Grainger PLC				Dates: 15/06/2018		Logged By WH	

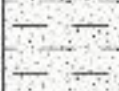
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25	60.25		Grass over brown slightly sandy CLAY with abundant rootlets and occasional gravel. Gravel is fine to medium sub-angular flint	
								Firm brown slightly sandy silty CLAY with occasional gravel. Gravel is fine to medium sub-angular flint	
		1.00	PP	2.4kg/cm2					
								<i>Becomes sandy</i>	
		1.50	PP	2.6kg/cm2					
		2.00	PP	2.6kg/cm2					
		2.20			58.30			Very stiff orange with grey mottling desiccated CLAY	
		2.30	PP	4.5kg/cm2					
					58.00			Very stiff grey and orange mottled desiccated CLAY <i>Layer of black staining</i>	
		3.00	PP	3.7kg/cm2					
						<i>Slightly sandy</i>			
			56.80			Very stiff dark orange and dark grey mottled desiccated CLAY with occasional dark orange sand lenses			
			56.50			Recovered as, Structureless CHALK composed of white slightly gravelly SILT with frequent orange clay infill. Gravel is fine to medium sub-rounded to sub-angular moderately weathered weak chalk with rare fine flint within a comminuted matrix			
Continued on Next Sheet									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 6.5m bgl.



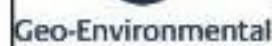


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS512 Sheet 1 of 2	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468207E - 112012N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean				Level: 62.80		Scale 1:25	
Client: Grainger PLC				Dates: 15/06/2018		Logged By WH	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.25	62.55		Grass over brown slightly gravelly slightly sandy CLAY with abundant rootlets. Gravel is fine to medium sub-angular flint	1	
								Grey and orangeish brown mottled sandy CLAY with frequent soft brown clay inclusions		
					1.10	61.70		Orange very clayey SAND		2
								Orange and grey mottled very sandy CLAY		
					2.70	60.10		Yellowish brown medium to coarse SAND		
					3.20	59.60		Dark orange slightly clayey coarse SAND		
					4.00	58.80		Very soft light brown slightly gravelly sandy CLAY. Gravel is fine rounded flint. Sand is coarse		4
					4.20	58.60		Stiff orange and grey mottled becoming grey slightly gravelly CLAY with frequent black flecks. Gravel is fine to medium sub-angular flint		
					4.60	58.20		Recovered as, Structureless CHALK composed of a white and grey mottled slightly sandy slightly gravelly SILT. Gravel is fine to medium sub-angular moderately weathered weak chalk within a comminuted matrix with frequent flint and occasional orange clay		
								Continued on Next Sheet		

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 5.0m bgl.





Borehole Log

Borehole No.

WS512

Sheet 2 of 2

Project Name:	Woodcroft - Phase 3 Supplementary GI
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Project No.
GE16942

Co-ords: 468207E - 112012N

Hole Type
WLS

Location: Woodcroft Farm, Lovedean

Level:	62.80
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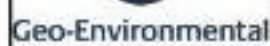
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Client: Grainger PLC

Dates: 15/06/2018

Logged By
WH

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Borehole Log

Borehole No.

WS513

Sheet 1 of 1

Project Name: Woodcroft - Phase 3
Supplementary GI

Project No.
GE16942

Co-ords: 468151E - 112058N

Hole Type
WLS

Location: Woodcroft Farm, Lovedean

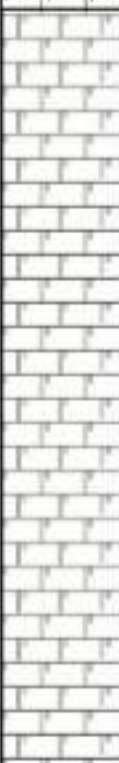
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Client: Grainger PLC

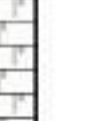
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Logged By
WH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		1.00	PP	1.2kg/cm2	0.30	59.20		Grass over brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse sub-angular flint	1	
								Grey and orangeish brown mottled desiccated CLAY with rare gravel. Gravel is fine to medium sub-angular flint		
		1.50	PP	4.0kg/cm2	1.30	58.20		Very stiff white and brown mottled slightly gravelly silty CLAY. Gravel is fine to medium angular grey and red flint with occasional chalk		
								Recovered as, Structureless CHALK composed of light grey slightly gravelly SILT with frequent orange clay lenses. Gravel is fine to medium sub-rounded to sub-angular moderately weathered weak chalk and flints		
		2.50	PP	4.5kg/cm2	2.90	56.60		Recovered as, Structureless CHALK composed of white slightly gravelly SILT structureless CHALK with occasional orange staining. Gravel is fine to medium sub-angular to rounded flint and moderately weathered weak chalk	3	
		3.00	PP	4.5kg/cm2						4
		4.80					54.70			5

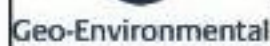
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks	AGS
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
						Refused at 4.8m bgl.	

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS514 Sheet 1 of 1	
Project Name: Woodcroft - Phase 3 Supplementary GI		Project No. GE16942		Co-ords: 468118E - 112068N		Hole Type WLS	
Location: Woodcroft Farm, Lovedean		Level: 58.50		Scale 1:25		Logged By WH	
Client: Grainger PLC		Dates: 14/06/2018					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40	58.10		Grass over brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse sub-angular flint	1
								Brown and orangeish brown mottled desiccated slightly gravelly CLAY. Gravel is fine to coarse sub-angular flint with rare chalk	
		1.10	PP	1.2kg/cm2	1.20	57.30		Soft light brown and light orangeish brown mottled desiccated slightly gravelly CLAY. Gravel is fine to coarse sub-angular white chalk	
		1.50	PP	1.2kg/cm2				<i>Fine to coarse sub-angular flint gravel</i>	
		2.00							
		2.10	PP	2.0kg/cm2	2.20	56.30		Firm reddish brown slightly gravelly CLAY with occasional black flecking. Gravel is fine to coarse sub-angular flint	
							Recovered as, Structureless CHALK composed of white slightly clayey GRAVEL within a comminuted matrix. Gravel is fine to coarse sub-rounded to sub-angular moderately weathered weak chalk with occasional black specks. Occasional fine to medium flint gravel. Frequent reddish brown clay infill becoming rarer with depth	3	
							<i>Reddish brown clay no longer present</i>	4	
					5.00	53.50		End of Borehole at 5.00m	5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Refused at 5.0m bgl.





Borehole Log

Borehole No.

WS515

Sheet 1 of 1

Project Name: Woodcroft - Phase 3
Supplementary GI

Project No.
GE16942

Co-ords: 468090E - 112104N

Hole Type
WLS

Location: Woodcroft Farm, Lovedean

Level: 59.20

Scale
1:25

Client: Grainger PLC

Dates: 15/06/2018

Logged By
WH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	58.90		Grass over brown slightly sandy SILT with frequent rootlets and gravel. Gravel is fine to coarse sub-angular flint	1
					1.50	57.70		Stiff orange CLAY with frequent black flecks and occasional gravel. Gravel is fine to coarse sub-angular flint with rare cobbles	
							NO RECOVERY		2
								2.50	56.70
					3.60	55.60	End of Borehole at 3.60m		
									5
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks			AGS
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				
						Refused at 3.6m bgl.			