

Desk Study and Preliminary Site Investigation Report



Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: Hamsland, Horsted Keynes, Haywards Heath, RH17 7DS

Client: Rydon Homes Ltd

Report Date: 9 August 2019

Project Reference: J14075

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SUMMARY

The site, comprises a broadly rectangular area of former agricultural land occupying approximately 1.2ha. It is proposed to redevelop the site with housing.

Geological records indicate the site is mainly underlain by the Upper Tunbridge Wells Sand Formation with the Ashdown Formation outcropping in the northern part of the site, with a faulted junction.

A historical Ordnance Survey map search and desk study was carried out and indicates that the site has a history of agricultural use with residential development beyond the site to the north.

A single phase of intrusive investigation has been carried out.

The soils encountered comprised of Topsoil over variable clayey silts and silty clays, with a variable series of Sandstone and Siltstone layers below.

Groundwater levels were not established during the course of the fieldwork, but are likely to be below the level of any groundworks on site.

The sulphate content of the natural soil was found to fall within Class DS-1. The ACEC classification for the site is AC-1.

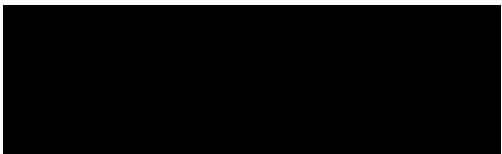
An allowable bearing capacity of 100kPa is recommended, for shallow foundations. NHBC Medium Volume Change Potential precautions will apply.

Suspended floor slabs are advised.

No significant contamination has been identified. The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

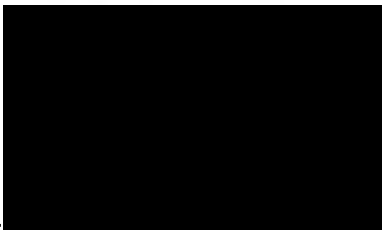
The site investigation was conducted and this report has been prepared for the sole internal use and reliance of Rydon Homes Ltd and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this Site Investigation Report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd believes are reliable. Nevertheless, Southern Testing Laboratories Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.



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(Countersigned)

For and on behalf of Southern Testing Laboratories Ltd



STL: J14075
9 August 2019

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a letter from Robert Ahier, Technical Manager for Rydon Homes Ltd that was dated 10th May 2019.

2 Location

The site is located approximately 6km north-east of Haywards Heath. The land in question is to the south-east of St Stephen's Church, off Hamsland, in Horsted Keynes. The approximate National Grid Reference of the site is TQ 384 278.

3 Proposed Construction

It is proposed to develop the site with housing.

Ground loadings for the proposed buildings have not been given, but are assumed to be in the range of 50-70kN/m (run).

For the purposes of the contamination risk assessment, the proposed development land use is classified as **Residential with plant uptake (CLEA model¹)**. **The gas sensitivity of the site is rated as High (CIRIA C665²)**.

4 Object

This is a Phase 1 Desk Study and Walkover and Phase II geotechnical and contamination (risk estimation and evaluation) investigation (Tier 1).

The object of the investigation was to assess foundation bearing conditions and other soil parameters relevant to the proposed development, and to assess the likely nature, and extent of soil and groundwater, contamination on the site.

5 Scope

This report presents our desk study findings, exploratory hole logs and test results and our interpretation of these data.

The site extents of the intrusive investigation are defined by the field boundaries (hedges and fencing) shown in Figure 2. The site covers the majority of original land property extents (as shown on client drawing no. 10593-L-01). A parcel of land containing a garden or vegetable plot, with a number of trees within the eastern part was not accessible.

As with any site there may be differences in soil conditions between exploratory hole positions.

¹ Environment Agency Publication SC050021/SR3 'Updated technical background to the CLEA Model' (2009).

² CIRIA C665 (2006) Assessing risks posed by hazardous ground gases to buildings.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The findings and opinions conveyed via this Site Investigation Report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd believes are reliable. Nevertheless, Southern Testing Laboratories Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The site investigation was conducted and this report has been prepared for the sole internal use and reliance of Rydon Homes Ltd and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the expressed written authorization of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes. The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

B DESK STUDY & WALKOVER SURVEY

6 Desk Study

A desk study has been carried out. Reference has been made to the following information sources.

- Geological Maps
- Hydrogeological/Groundwater Vulnerability maps
- Aerial Photographs
- Historical Ordnance Survey Maps
- Environmental Databases
- BRE Radon Atlas³

The environmental databases search report compiled for this desk study contains site-specific environmental data drawn from data sets that comprise publicly available information together with data from third parties, some of which is under review. Accordingly, Southern Testing Laboratories Limited does not warrant its accuracy, reliability or completeness.

The full report is included in Appendix F, and a summary of the salient features is included in the following sections of this report.

³ BR 211 (2015) 'Radon: guidance on protective measures for new buildings'

6.1 Geology

The British Geological Survey mapping indicates that the site geology consists mainly of the Upper Tunbridge Wells Sand Formation. The Ashdown Formation outcrops the northern portion of the site, where a fault forms a faulted junction with the Upper Tunbridge Wells Sand Formation (The Danehill Fault). The Danehill Fault is shown cutting across the site in a west-south-west to east-north-east alignment.

Upper Tunbridge Wells Sand

This formation is similar to the lower part of the Lower Tunbridge Wells Sand and consists of variegated soft mudstones, clays, silts, thinly bedded sandstones and occasional clay ironstones. The deposits are characteristically lenticular and impersistent, meaning that variability is to be expected. There are seams of harder rock from place to place, which cause difficulties to mechanical plant and may require drilling and blasting for economic excavation.

Sandstone commonly exhibits channel and slump structures, together with cross-bedding and visually prominent scarp and dip slope features. These are typically fine-grained and quartzose, weathering to a pale yellowish grey or brown colour. The clays commonly weather to red and the silts to mottled grey and orange ("catsbrain"). In the Cuckfield area, silt is the dominant component. Here, grey and greenish grey silty mudstones and siltstones, red-mottled in part, dominate in the lower part of the unit, whereas pale grey to yellowish grey sandstone mostly appear in the upper part. The siltstones are commonly bioturbated.

Ashdown Formation

The Ashdown Formation is a sub-division of the Wealden Group of lake and delta deposits, which were laid down in a shallow sea extending from the Thames to Paris. It consists of fine-grained silty sandstone, silt, and siltstone with subordinate amounts of silty clay, shale and mudstone.

6.2 Hydrology and Hydrogeology

Data from the Environment Agency, presented in the Envirocheck report, and other information relating to controlled waters is summarised below.

Data		Remarks	Possible Hazard to/from Site Y/N
Aquifer Designation	Superficial Deposits	The site is not shown to be within an area of superficial strata that contains an aquifer.	N
	Bedrock	Secondary A Aquifer ^a (Upper Tunbridge Wells Sands/Ashdown Formation)	Y
Groundwater Vulnerability		The groundwater is classified as having a High Vulnerability (for the secondary aquifer) on the Envirocheck Report.	Y
Abstractions		The nearest groundwater abstraction is for agriculture (general), 105m north of the site.	N
Source Protection Zones		The site is not situated within a Source Protection Zone (SPZ).	N

Data	Remarks	Possible Hazard to/from Site Y/N
Surface Water Features	The nearest feature shown on the OS mapping is an inland river, 513m north of the site. A dry small linear hollow was noted during the site walkover, within the western boundary hedge, at the south-west corner of the site. The feature is thought to be an old field ditch.	N N
Marine/Fluvial Flood Risk	The site is not shown within an area mapped as being at risk of flooding.	N
Surface Water Flood Risk	The site is not shown within an area mapped as being at risk. However, the north-east corner of the site possibly just falls within an area shown to be at low risk of flooding.	N
Discharge Consents (within 250m of the site)	There are several nearby discharge consents: • 3m (west of) – freshwater stream discharge of other matter (surface water); • 44m (north of) – freshwater stream discharge of other matter (surface water); • 141m (north-east of) – freshwater stream discharge of final effluent; • 193m (east of) – freshwater stream discharge of other matter (surface water); • 199m (south-east of) – freshwater stream discharge of other matter (surface water).	Y

*** Secondary A Aquifer:** Permeable layers capable of supporting water supplies a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

Based on the published geological data, the bedrock may have a variable permeability with a series of interbedded siltstones and fine silty sandstones. Where more arenaceous (coarse sands and sandstones) layers are present, there is likely to be a higher permeability and leaching potential.

The groundwater flow at site is considered likely to be in a southerly / south-westerly direction, towards Danehill Brook (850m to the south), on the south side of the Danehill Fault and the valley watershed. Danehill Brook flows in a south-westerly direction and is a tributary of the River Ouse.

Due to the vulnerability classification of the aquifer the sensitivity of the locally important groundwater resources, from any on-site contamination or from off-site contaminated groundwater, are considered to be high. It is possible that any on-site contamination sources could affect the controlled water receptors, by flowing through the aquifer to the watercourse. However, due to the flow path distance, with no permanent water features within 500m of the site, the risk to watercourse receptors, is deemed low.

Due to the presence of a small dry field ditch, noted at the south-west corner of the site, it is possible that any on-site contamination sources could affect controlled water receptors during times of prolonged or heavy rainfall, if the ditch outfalls into a watercourse further downstream.

6.3 Historical Map Search

Copy extracts of historical Ordnance Survey plans dating from 1875 to 2019 were obtained and are presented in Appendix F together with a summary of the salient features.

In brief, the site does not appear to have been subject to significant change since the first edition of the Ordnance Survey (OS) map (dated 1875) being published. The site formed part of an open field, with trees located within a smaller field to the north-west and along the field boundaries. Housing is constructed on land to the north of the site in between the 1950s and 1980s. An electricity substation adjacent to the site access, as part of the Hamsland residential development along the northern side of the site, is first shown on the 1975 map edition. In the 1970s St Stephen's churchyard was shown temporarily extending into the site and in the 1990s part of the field, in the north-east corner of the original land extents, was given over to a vegetable plot.

6.4 Environmental Databases

	Distance (m)	Direction	Details	Possible Hazard to site
Historical Industrial Land Uses (within 650m of the site)	250	N	Garage services and vehicle repair	N
	570	S	Quarrying of sand & clay, operation of sand and gravel pits, near Sandpit Woods (1899)	N
	570	S	Unknown filled ground - pit, quarry (1976)	N
Current Industrial Land Uses (within 500m of the site)	2	W	Electricity substation (noted from walkover)	Y
	184	N	Industrial features (unspecified works or factories)	N
	347	W	Farming	N
Current and Historical Landfills	None listed within 500m of the site.			N
Fuel Sites	None listed within 500m of the site.			N
Pollution Incidents	None listed within 500m of the site.			N
IPC Part B Authorisations	None listed within 500m of the site.			N
Hazardous Substances Consents	None listed within 500m of the site.			N
Sensitive Land Use Designations	0	-	High Weald - Area of Outstanding Natural Beauty (ANOB)	N
	270	SW	Sandpits Wood - Ancient Woodland	N
	386	E	Swithe Wood - Ancient Woodland	N
	442	W	Coneyborough Wood - Ancient Woodland	N

A potential source of contamination from polychlorinated biphenyls (PCBs) chemicals, associated with the electricity substation that is adjacent to the access track at the north-west corner of the site has been identified. This is further discussed in Section 9.

6.5 Geological Hazards and Mining Activities

Data from various sources relating to potential geological hazards at the site are summarized below. The Hazard Potentials listed for the BGS data are as presented in the Envirocheck/Groundsure report, derived from various generic BGS sources, which are not considered as site-specific. It is important that this information is considered in context of the actual site topography, ground conditions encountered during future investigation, and development proposals.

Data Source	Hazard	Hazard Potential to Site	Remarks
BGS	Potential for Collapsible Ground Stability Hazard	Very Low	
	Potential for Compressible Ground Stability Hazard	No Hazard	
	Potential for Ground Dissolution Stability Hazard	No Hazard	
	Potential for Landslide Ground Stability Hazard	Very Low	Accounting for site geology that may contain silty clay layers and the presence of Grinstead Clay (c.200m south of), lower down the valley, the risk should be considered as Low.
	Potential for Running Sand Ground Stability Hazard	Very Low	Possibly Moderate risk, if strata has high sand contents and perched groundwater/seepages are present.
	Potential for Swelling or Shrinking Clay Ground Stability Hazard	No Hazard	To account for site geology that may contain silty clays, the risk should be considered as Low to Medium.
	Shallow Mining Hazard	Rare	Although, no records within 250m of the site, there are several pits recorded within the surrounding area, so the risk should be considered as Low.
ARUP	Mining Instability	Low	No recorded areas of mining within 500m of the site. An area of iron ore mining is shown approximately 800m to the south, largely located on an outcrop of the Wadhurst Clay.
CSS/KURG*	Underground openings	Low	No records within 1km of the site.

**Chelsea Spelaeological Society/ Kent Underground Research Group*

6.6 Land Gases

No current or historic landfills, or areas of infilled land are listed within 500m of the site. Therefore, on this basis the potential risk to the site from land gases is considered low and gas monitoring is not considered necessary at this stage, subject to the intrusive investigation.

6.7 Radon Risk

According to the publication '*Radon - Guidance on protective measures for new buildings BR 211 (BRE, 2015)*' the site is not within an area affected by Radon and therefore no special radon gas protection measures are required. See www.ukradon.org for more details.

7 Walkover Survey

A walkover survey was carried out on 18th May 2019 prior to the intrusive investigation.

7.1 General Description and Boundaries

The site comprises of an open field, to the south of the residential street Hamsland, with residential properties and a church to the immediate north of the site. The surround land to the south is largely characterised by fields used for agricultural purposes and the site is situated within the High Weald (AONB).

A small strip of land, to the west of St Stephen's Church, provides access into the north-west corner of the field, from Hamsland. The northern boundary of the site comprises of a post-and-rail fence, with clusters of shrubs and sections of hedges located along the edge of gardens bordering the site. A man-made garden pond is located close to this site boundary. The north eastern field boundary has a hedge, separating the site from a garden plot within the north-east parcel of land that has been annexed from the main field. Along the eastern field boundary, of this parcel of land, agricultural stock wire fencing is used and a number of trees border the site. This was not accessible at the time of our investigation. A hedge lines the southern-half the eastern field boundary, with numerous trees located adjacent to the field.

The western and south western boundaries comprise of a hedge with numerous trees. Along the south western boundary, within the hedge, is a small linear hollow that is thought to be a ditch.

7.2 Topography and Drainage

The site is located on gently sloping ground, on the north side of the Danehill Brook valley. The hillside slopes down to the south-east, with a slope angle of about 1.5° to 3.5°. The elevation ranges from 84m, at the south-west corner of the site, to 92m AOD at the Hamsland access.

No watercourses or features are shown on the Ordnance Survey mapping. However, a small dry field ditch was noted within the western field boundary hedge, at south-west corner of the site. The Danehill Brook is located (850m to the south) flows in a south-westerly direction and is a tributary of the River Ouse.

7.3 Vegetation

The field is open and has been left for grass to grow. Buttercups were noted growing across the field and so this may indicate the site having damp soils (near to the surface) that are more argillaceous in nature.

There are trees and hedges along the majority of the field boundaries, notably the western and southern boundaries. The trees along boundary are predominately deciduous trees (including ash, birch and oak), with a number of conifer trees located within the eastern part of the north-east parcel of adjoining land, which was inaccessible.

7.4 Buildings and Land Use on Site and Nearby

There are no buildings or man-made structures on site. Beyond the north-west corner of the site, there is an electricity substation, on the west side of the site access and a modern brick built church and churchyard on the east side of the field access. Further east residential gardens and plots border the site to the north. To the south and west there are fields used for agricultural purposes.

An above ground tank was noted, within the eastern part of the north-east parcel of adjoining land, approximately 5m to the south of the site. The tank appears to be of plastic construction and is located on a concrete base. A short-section of the delivery pipe, leading from the tank, can be seen to be laid away from the site towards the nearby house. The tank appears to be most likely to be used for storing heating oil, for the nearby property.

No access into the north-east parcel of land was permitted and so the storage tank could be inspected at close quarters, as we did not have access rights to this at the time of the walkover.

7.5 Photographs

A series of photographs showing views of the site and investigation are included in Appendix E.

C PRELIMINARY CONCEPTUAL MODEL

8 Introduction

In the context of this report, the conceptual model summarises the potential pollutant linkages identified for the site and forms the basis of the risk assessment for the site. The preliminary model comprises the potential sources of contamination, receptors that could be harmed and exposure pathways identified from the desk study and walkover survey. These potential linkages form the basis upon which the investigation is designed and reported.

9 Potential Sources of Contamination

The site has a history of agricultural use and is located at the edge of the residential village, with garden plots and agricultural land typically surrounding the site.

No significant potentially contaminative uses have been identified, both on site and in the locality.

However, it is conceivable that some made ground could be present and that pesticides could have been used on the site.

9.1 On Site Sources

Source	Potential Contaminants
Made Ground (potential shallow fill associated with the former churchyard)	Metals, asbestos containing materials (ACMs) and polycyclic aromatic hydrocarbons (PAHs).
Made Ground (potential shallow fill associated with the field access)	
Agricultural sources	Pesticides.

No significant areas of made ground are anticipated, with no industrial use or historical development known. Shallow areas of made ground might be encountered, following the churchyard landscaping and/or reinstatement of the field. In addition, the field access may also contain some shallow fill, if hardcore was placed to form an access track. If made ground is encountered it may contain a range of contaminants, arising from likely off-site sources. The risk is deemed to be moderate.

The site has been used for agricultural use up to quite recently, with the 2014 Google Earth aerial photo showing a tractor in the field. As such it is possible that pesticides applied to the land would not have sufficiently degraded and so may pose a moderate risk to human health risk.

9.2 Off Site Sources

The site may be impacted by contamination migrating from beyond the site boundary. The following potential off-site sources have been identified.

Source	Distance from Site Boundary	Direction	Potential Contaminants	Likely Hazard to Site
Electricity substation	2m	W	Polychlorinated biphenyls (PCBs)	Moderate
Above ground tank	5m	E	Petroleum Hydrocarbons	Moderate
Agricultural sources (from adjacent fields)	-	W + S	Pesticides.	Low

A potential source of contamination is from polychlorinated biphenyls (PCBs), associated with the electricity substation that is located 2m to west of the site. With the land sloping south-east towards the site, from the substation, and given the fact there is no impermeable cover to the aquifer, there is a potential for any high concentrations of PCBs to leach into the site. This contamination source is deemed to present a Low risk to the site.

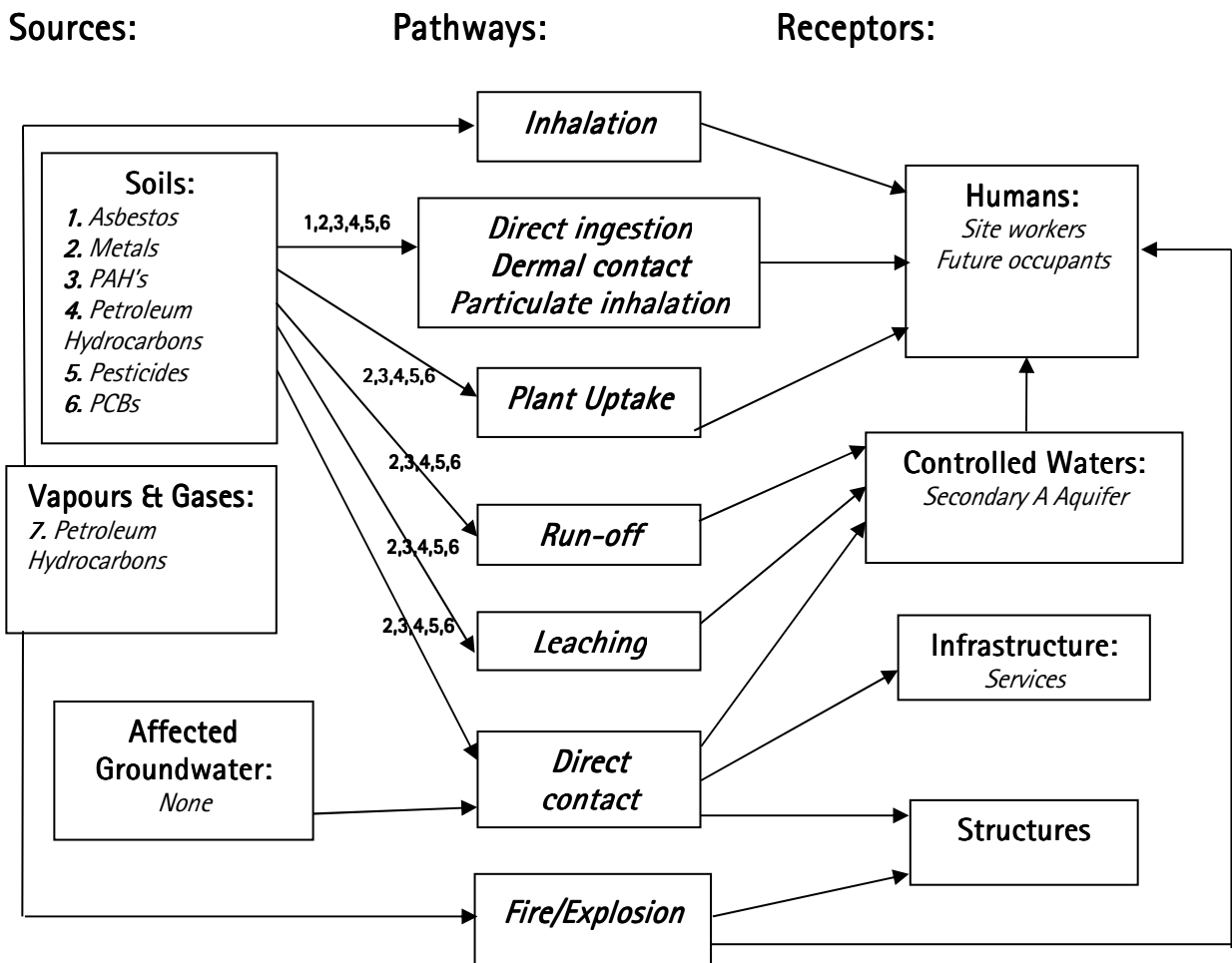
Another potential source of contamination is from petroleum hydrocarbons, associated with the above ground tank that is most likely to be used for storing heating oil; as discussed in Section 7.4. The Client has been informed that the tank was not installed by the previous landowner and is a new addition in the last 18 months. Considering the recent installation, with a modern tank

and concrete base, and with no oil observed dripping from the tank or ponding, the risk of petroleum hydrocarbons leaking from the tank and leaching into the ground is considered to be Low. As such this source is deemed to present a Moderate risk to the site.

The migration of pesticides from adjacent farm land is deemed to present a Low risk to the site. Rainwater run-off is likely to wash any contamination down slope, to the south or into the adjacent field ditch and not into the site.

10 Pollutant Linkages and Model Summary

The following diagram shows the potential pollutant linkages identified for the site and summarises the preliminary conceptual model:



D SITE INVESTIGATION

11 Method

The strategy adopted for the intrusive investigation comprised the following:

- A series of 9 no. trial pits was excavated using a hydraulic backhoe excavator.
- 9 no. in situ CBR tests were carried out adjacent to the each of the trial pits.
- Five no. soakage tests were carried out using the BRE365 method.
- One hand augured borehole was sunk, to supplement the trial pits.

Exploratory hole locations are shown in Figure 2 in Appendix A.

12 Weather Conditions

The fieldwork was carried out between 2nd and 3rd of July 2019, at which time the weather was generally warm and dry.

13 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A). Since the site is located on the side of a south-east facing hill slope, variability is to be expected due to the outcropping of the progressively older strata with lower elevations. For the purposes of this report the soil descriptions are split into two slope areas, as the broad geological sequences are theoretically followed down. The upper and lower slope areas are arbitrarily defined as north and south (respectively), of a SW-NE line just south of TP104. A summary is given in the tables below.

Table 13a – Generalised soil descriptions for the upper slope area

Depth	Thickness	Soil Type	Description
GL – 0.2/0.3m	0.2 to 0.3m	Topsoil	Light brown fine sandy silty TOPSOIL.
0.2/0.3 – 0.75/3.0+m	Variable (due to the presence/absence of sandstone)	Silt / Clay	Generally medium dense clayey SILT or stiff silty CLAY.
0.75/1.7 – 1.1/2.5+m (absent in HA101, TP108 and TP109)	0.1 to 0.8+m	Sandstone	Generally weak to strong, thickly laminated to thinly bedded SANDSTONE.

Depth	Thickness	Soil Type	Description
1.1/1.7 – 1.4/2.7*m (excluding TP108, as covered by the first silt/clay entry where sandstone is absent)	0.3 to 1.2*m	Silt / Clay	Generally medium dense sandy SILT or very stiff silty CLAY.
1.4/2.7 – 2.6+/3.0+m	0.1 to 1.6+m	Siltstone	Generally weak to medium strong, thinly laminated to thinly bedded SILTSTONE.

+ Denotes values for strata that were not fully penetrated in the exploratory holes.

* Refers to TP104 where an isolated thin (0.2m) mudstone is ignored, with the above silt and the below silty clay grouped as one layer. A deeper sandstone penetrated in TP104 (2.8m depth) was also encountered, although no other sandstone at this horizon was encountered elsewhere (including lower area).

Table 13b – Generalised soil descriptions for the lower slope area

Depth	Thickness	Soil Type	Description
GL – 0.2/0.25m	0.2 to 0.25m	Topsoil	Light brown fine sandy silty TOPSOIL.
0.2/0.25 – 0.8/2.2m	0.35 to 1.95m	Silt / Clay	Generally dense clayey SILT or stiff silty CLAY.
0.8 – 1.3+m (only present in TP106)	0.5+m	Sandstone	Medium strong, thinly becoming medium bedded SANDSTONE.
1.8/2.2 – 2.9+/3.0+m (absent in TP106)	0.8 to 1.1+m	Siltstone / Mudstone	Generally very weak, thinly bedded SILTSTONE or MUDSTONE.

+ Denotes values for strata that were not fully penetrated in the exploratory holes.

13.1 Visual and Olfactory Evidence of Contamination

No obvious evidence of possible contamination was noted during the investigation.

Refer to Section H for analysis of the environmental tests results.

14 Groundwater Strikes

No groundwater strikes or observations were made during our investigation.

E FIELD TESTING AND SAMPLING

The following in-situ tests and sampling methods were employed. Descriptions are given in Appendix B together with the test results.

- Hand Penetrometer Test
- Perth Penetrometer Test
- Dynamic Cone CBR Test
- BRE 365 soakage Test

F GEOTECHNICAL LABORATORY TESTS

The following tests were carried out on selected samples. Test method references and results are given in Appendix C.

- Moisture Content
- Atterberg Limits
- Particle Size Distribution (Sedimentation)
- Point Load Index Test

G DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

15 Soil Classification and Properties

Soil Type	Depth	Compressibility	VCP	Permeability	Frost Susceptible	CBR	Remarks
Topsoil	GL – 0.2/0.3m	-	-	-	-	-	Not suitable for foundations
Clayey Silt or Silty Clay	0.2 to 3.0m	Moderate	Low to Medium	Low	Yes	Poor	
Sandstone	0.75 to 2.5m	Low	Negligible	Low to high	Yes	Good	
Siltstone or Mudstone	1.4 to 3.0m	Low to Moderate	Low to Medium	Low	Potentially	n/a	

16 Swelling and Shrinkage

Eight Atterberg Limits Tests were undertaken on clay and silt samples, as part of this investigation. The Plasticity Indexes ranged from 10% to 30%, with a mean value of 19%. Accounting for the sample proportion passing the 425µm sieve, the modified Plasticity Indexes ranged from 10% to 29%, with a mean value of 17%. This equates to NHBC Low to Medium Volume Change Potential.

17 Groundwater Levels

Groundwater levels vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought. Long-term monitoring from boreholes or standpipes is required to assess the ground water regime and this was not possible during the course of this site investigation.

No groundwater strikes or observations were made during the investigation.

18 Soakaways

Soakage testing was undertaken based on the BRE 365 method at five locations. Without any proposed drainage layout, the soakage test locations transect the hillslope and were partly biased toward the lower slope. Refer to Appendix B for full test results.

A summary of the soakage tests is provided in the table.

Hole No.	Test No.	Pit Depth	Soakage Rate for Each Test	Soakage Rate for Each Hole		Water Level at Finish of Test	Remarks
		<i>m</i>	<i>litre/m²/min</i>	<i>litre/m²/min</i>	<i>m/sec</i>		
TP103	No 1	2.90	0.0082	0.0082	1.37E-7	Pit not emptied.	1 st Filling
TP104	No 1	3.00	0.0083	0.0083	1.39E-7	Pit not emptied.	1 st Filling
TP105	No 1	3.00	0.014	0.014	2.29E-7	Pit not emptied.	1 st Filling
TP106	No 1	1.30	0.067	0.067	1.11E-6	Pit not emptied.	1 st Filling
TP107	No 1	3.00	0.230	0.145	2.42E-6	Empty pit.	1 st Filling
TP107	No 2	3.00	0.145			Pit not emptied.	2 nd Filling

In general, low soakage rates were recorded. The highest soakage rate was recorded in TP107, where thinly bedded Mudstones and Siltstones were encountered at 2.2m below a Silt layer. Soakage maybe largely controlled by the occurrence and openness of joints or fissures within this strata. Although, the Sandstone contained some widely spaced joints, for instance as noted in TP106, poor test results were recorded at this location.

Based on low the soakage rates obtained, shallow soakaways are not considered to be appropriate as the main basis of the drainage strategy for this site. Deep bore soakaways might be more suitable and we would recommend undertaking borehole soakage tests, to determine the viability.

Borehole soakaways would require approval from the Environment Agency.

19 Sulphates and Acidity

The recorded pH values are in the range of 5.6 to 7.2.

The Design Sulphate Class is DS-1.

Groundwater should be assumed to be mobile, despite no water strikes being observed during the investigation. The ACEC site classification is AC-1.

20 Bearing Capacity

In-situ tests have been undertaken, as part of the trial pitting, to assess the in-situ density of granular strata and undrained shear strength of cohesive strata. Based on the results of these tests and considering a total settlement tolerance of 25mm, an allowable bearing pressure of 100kPa is considered to be appropriate for shallow foundations on competent natural strata; at a minimum 750mm below the existing ground level, or any organic subsoil.

Note the required foundation depth may need to be in excess of that stated for adequate bearing capacity, to meet the minimum NHBC foundation depths that depend on the VCP, proximity to vegetation and type. Refer to Section 16 for details on the VCP for the clayey soils encountered.

21 Floor Slabs

For the NHBC Medium Volume Change Potential (VCP) classification, buildings should have suspended floor slabs in accordance with NHBC requirements.

Although, no site layout or earthworks plan has been prepared at this current time, some filling might be required. Where this is the case, consideration should be given to the provision of suspended floor slabs where in excess of 600mm of fill is required.

22 Settlement

Foundation settlements of up to 25mm are the normally accepted limits for housing, as considered above, and are to be anticipated where dwellings are founded on natural ground.

23 Excavations and Trenching

Statutory support will be required in all excavations where personnel must work.

In general, trench stability in natural soils is expected to be fair, but unexpected collapses can occur in stiff fissured clay soils.

Point Load Index tests were undertaken on two rock samples, with the Unconfined Compressive Strengths (UCS) indicating the rock being extremely weak to weak. However, stronger rock could be present and the ease of excavation is largely controlled by joints and fissures. A cost allowance should be made for the excavation of hard ground.

24 Road Construction

Dynamic Cone CBR Tests were undertaken adjacent to each trial pit location. The results of these tests indicate in-situ CBR values range from 1.6% to 13%, for depths up to 600mm below ground level. Based on the low plasticity, silty nature of the soils and on the results achieved a CBR value of 2% could be assumed at the anticipated formation of 500–600mm below ground level.

Where roads are adopted, the Highway Authority may have specific requirements for testing of the soils and additional CBR tests. Silty soils soften rapidly on exposure to water and the formation should be protected until sub-base or capping layers are placed.

H LAND QUALITY

25 Analytical Framework

There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

The CLEA model⁴ provides a methodology for quantitative assessment of the long term risks posed to human health by exposure to contaminated soils. Toxicological data is used to calculate a Soil Guideline Value (SGV) for an individual contaminant, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.

In the absence of any published SGVs for certain substances, Southern Testing have derived or adopted Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH⁵ S4UL's and CL:AIRE⁶ generic assessment criteria. In addition, in March 2014, DEFRA⁷ published the results of a research programme to develop screening values to assist decision making under Part 2A of the Environmental Protection Act. Category 4 screening levels were published for 6 substances, with reference to human health risk only. This guidance includes revisions of the CLEA exposure parameters, presenting parameters for public open space land use scenarios, and also of the toxicological approach. The screening levels represent a low risk scenario, based on a 'Low Level of Toxicological Concern' rather than the 'Minimal Risk' of CLEA, and the analytical results of this investigation may be considered relative to these levels.

The values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based upon them. Their validity should be confirmed at the time of site development.

Site-specific assessments are undertaken wherever possible and/or applicable.

⁴ Environment Agency Publication SC050021/SR3 'Updated technical background to the CLEA Model' (2009).

⁵ The LQM/CIEH S4ULs for Human Health Risk Assessment. (2014).

⁶ The EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment (2009).

⁷ SP1010 Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. DEFRA, 2014.

CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.

The results of any groundwater analyses are compared to relevant quality criteria, eg EQS or DWS.

Ground gases are assessed in accordance with the guidance given in CIRIA report C665.

26 Site Investigation – Soil

26.1 Sampling Regime

The number of sample locations was limited and was partly targeted at potential sources of contamination and partly to provide general coverage.

26.2 Testing

The potential for contamination by asbestos, metals, PAHs, petroleum hydrocarbons, pesticides and PCBs were identified in the preliminary conceptual model and observations made on site and, therefore, the following tests were selected.

Test Suite	Number of Samples	Soil Tested
STL Key Contaminant Suite	7	Topsoil – 5 Natural Soil – 2
Asbestos Identification	7	Topsoil – 5 Natural Soil – 2
Total Petroleum Hydrocarbons with Aromatic/Aliphatic split	1	Natural Soil – 1
Pesticide Screen – semi-volatile organic compounds	1	Topsoil – 1
Polychlorinated Biphenyls	2	Topsoil – 1 Natural Soil – 1

The test results are presented in full in Appendix D. A summary and discussion of the significance of the results and identified contamination sources is given below.

26.3 Test Results and Identified Contamination Sources

26.3.1 General Contaminants

The results of the key contaminant tests have been analysed in accordance with the CLEA methodology. The samples have been grouped into two populations comprising of natural soil and topsoil. For each parameter in each population the sample mean is calculated and compared to a Tier 1 screening value. If the sample mean exceeds the screening value, the soil may be regarded as contaminated and further assessment may be required. If neither the sample mean nor any single value exceeds the screening value, the soil may be regarded as not contaminated, though further confirmatory assessment may be required. Where any single parameter value

exceeds the screening value but the sample mean does not, further statistical analysis may be applied to that parameter if the available data is suitable. Such analysis would include an assessment of the Normality of the distribution of the data, consideration of the presence of outliers, and the calculation of a UCL estimate of the mean.

Summary data is presented in the tables below and the laboratory analysis is included in Appendix D. The screening values and source notes are presented in Table 1 "Tier 1 Screening Values" at the front of Appendix D.

Soil Type: Topsoil

Contaminants	Units	No of Samples Tested	Range	Sample Mean	Residential with Homegrown Produce Consumption Tier 1 Screening Value
Arsenic (As)	mg/kg	5	3.9 - 5.6	6.0	37
Cadmium (Cd)	mg/kg	5	<0.2	0.20	11
Total Chromium (Cr)	mg/kg	5	<4	4.0	910
Hexavalent Chromium (CrVI)	mg/kg	5	\	\	6
Lead (Pb)	mg/kg	5	18 - 24	26	200
Mercury (Hg)	mg/kg	5	<0.3	0.30	7.6-11
Selenium (Se)	mg/kg	5	<1	1.0	250
Nickel (Ni)	mg/kg	5	6 - 9.9	10	130
Copper (Cu)	mg/kg	5	12 - 13	13	2400
Zinc (Zn)	mg/kg	5	34 - 58	62	3700
Phenol	mg/kg	5	<1	<1	120-380
Benzo[a]pyrene	mg/kg	5	<0.05	0.05	1.7-2.4
Naphthalene	mg/kg	5	<0.05	0.05	2.3-13
Total Cyanide (CN)	mg/kg	5	<1	1.0	\
Acidity (pH value)	Units	5	5.6-7.1	6.36	\
Soil Organic Matter	%	5	2.1-4.4		\

None of the tested soils contained contaminant concentrations in excess of the adopted screening value with respect to the parameters determined.

Soil Type: Natural Soil

Contaminants	Units	No of Samples Tested	Range	Sample Mean	Residential with Homegrown Produce Consumption Tier 1 Screening Value
Arsenic (As)	mg/kg	2	2.5 - 9.4	6.0	37
Cadmium (Cd)	mg/kg	2	<0.2	0.20	11
Total Chromium (Cr)	mg/kg	2	<4	4.0	910
Hexavalent Chromium (CrVI)	mg/kg	2			6
Lead (Pb)	mg/kg	2	9.5 - 13	11	200
Mercury (Hg)	mg/kg	2	<0.3	0.30	7.6-11
Selenium (Se)	mg/kg	2	<1	1.0	250
Nickel (Ni)	mg/kg	2	6 - 11	8.5	130
Copper (Cu)	mg/kg	2	7.9 - 12	10.0	2400
Zinc (Zn)	mg/kg	2	22 - 29	26	3700
Phenol	mg/kg	2			120-380
Benzo[a]pyrene	mg/kg	2	<0.05	0.05	1.7-2.4
Naphthalene	mg/kg	5	<0.05	0.05	2.3-13
Total Cyanide (CN)	mg/kg	5	<1	1.0	\
Acidity (pH value)	Units	5	6.2-7.2	6.7	\
Soil Organic Matter	%	5	0.9 - 0.9	0.90	\

None of the tested soils contained contaminant concentrations in excess of the adopted screening value with respect to the parameters determined.

26.3.2 Asbestos

No asbestos containing materials were detected in the samples analysed and none were observed in the exploratory holes. However, it should be noted that the exploratory holes are of limited area and the samples obtained may not reflect the full composition of the soils on the site. Therefore, there is always the potential for pockets of asbestos or for asbestos containing materials to be present, which have not been detected in the sampling.

26.3.3 Petroleum Hydrocarbons

One sample of natural soil taken from TP109, adjacent to an above ground fuel tank (assumed heating oil), situated approximately 5m beyond the site boundary was tested for Petroleum Hydrocarbons. All petroleum fractions were recorded less than detection limit.

26.3.4 PCBs

Two samples were taken from HA101 (a topsoil and natural soil sample), situated adjacent to an electricity sub-station situated just off site in the north west was tested for a range of PCBs. All congeners were recorded at less than detection limit.

26.3.5 Pesticides

One sample of topsoil taken from TP104, in the middle of the site, was tested for a range of semi-volatile organic compounds (SVOCs) including pesticides. All compounds tested for were recorded less than the detection limits.

27 Site Investigation – Waters

No on site or off site sources of potential groundwater contamination have been identified. Groundwater is anticipated to be at significant depth, given the elevated site position, and the contaminant concentrations identified in soil do not indicate any on-site contamination. Accordingly, groundwater testing or further risk assessment was not considered necessary.

28 Site Investigation – Gas

No suspect materials were noted on site, and the desk study information obtained to date does not indicate significant local on site or off site risks. On this basis, land gas issues are not expected to affect the proposed development.

29 Summary of Identified Contamination

No significant contamination has been identified.

30 Risk Evaluation

The object of the risk evaluation is to assess the pollution linkages for specific contaminant groups considered in the conceptual model, identify any unacceptable risks and, therefore establish whether there is a need for further investigation and/or remedial action.

The risks are considered in the context of the specific development proposals for the site and, therefore, the conclusions may not be appropriate for alternative schemes.

In this case, no significant risks have been identified.

30.1 Revised Conceptual Model

The preliminary site model has been refined in light of the findings of this investigation and is summarised below.

<i>Metals</i>	<i>Petroleum Hydrocarbons</i>	<i>PCBs/Pesticides</i>	<i>Landfill Gas</i>	<i>Asbestos</i>	PATHWAYS	RECEPTORS
N	N	N	n/a	Y	Ingestion and inhalation of contaminated soil and dust	Human Health
N	N	N	n/a	n/a	Dermal contact with contaminated soil and dust	
n/a	N	N	N	n/a	Inhalation of vapours or gases	
N	N	N	n/a	n/a	Uptake into edible fruit and vegetables	
N	N	N	n/a	n/a	Surface water run-off into surface water features	Water Environment
N	N	N	n/a	n/a	Migration through ground into surface water or groundwater	
N	N	N	n/a	n/a	Off-site migration of contaminated groundwater	
N	N	N	n/a	n/a	Vegetation on site growing in contaminated soil	Flora and Fauna
N	N	N	n/a	n/a	Aquatic life in affected waters	
N	N	N	n/a	n/a	Contact with contaminated soil	Building materials/ buried services
n/a	N	n/a	N	n/a	Fire or explosion	

Key:

Y	Pollutant linkage likely
N	Pollutant linkage not likely
P	Pollutant linkage possible
n/a	Pathway not applicable to contaminant

30.2 Relevant Pollutant Linkages

No Relevant Pollutant Linkages for which remedial action will be required have been identified in the revised conceptual model.

31 Discussion and Conclusions

Based on the results of this investigation, no remediation to deal with any on site contamination is considered necessary.

As with any site, areas of contamination not identified during site investigation works may come to light in the course of redevelopment. Accordingly, a discovery strategy must be in place during the redevelopment to ensure that any hitherto unknown contamination is identified and dealt with in an appropriate manner. Depending on the nature of any such contamination, it may prove necessary to reassess the remedial strategy for the site.

A formal remediation strategy and verification plan should be agreed with the regulatory authorities prior to commencement of any remedial works that might be necessary, should unforeseen contamination come to light.

32 General Guidance

Allowance should be made for experienced verification of any remedial works.

It may be that specific local requirements apply to this site, of which we are not aware at this time.

In general terms, the workforce and general public should be protected from contact with contaminated material. There is a range of relevant documents published by the Health and Safety Executive, and organisations such as CIRIA, and the BRE.

Some soils will require removal from site and disposal to suitably licensed landfills. Different guidelines and charges will apply to different waste classification. As waste producers, the Developer holds responsibilities under the various governing regulations. The chemical analyses appended to this report should be forwarded to tip operators for their own assessment, to confirm classification of the soils for offsite disposal, and whether they can accept the material. Waste Acceptance Criteria (WAC) testing may be requested for confirmation of the material's classification.

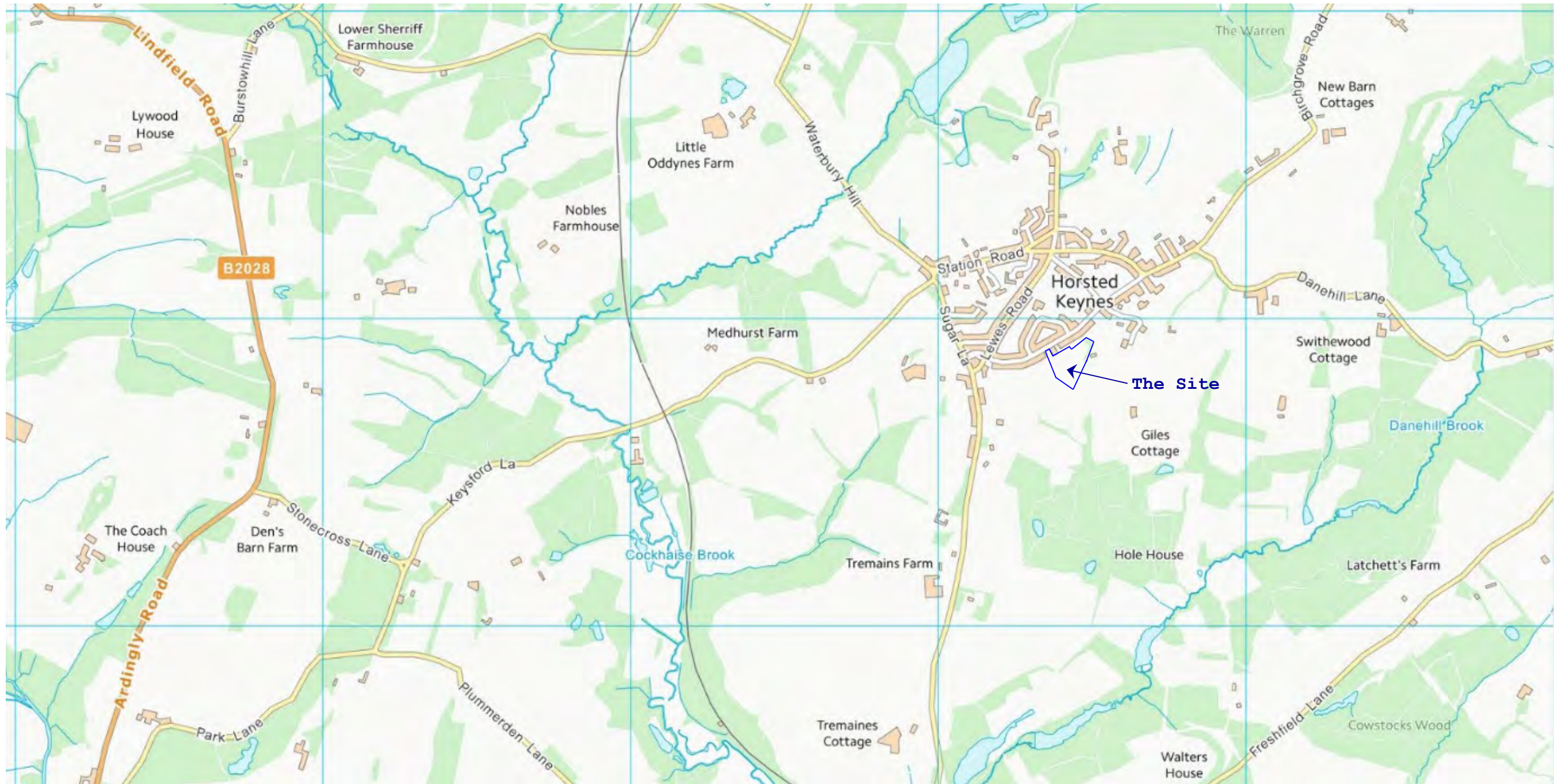
All hazardous and non-hazardous soils leaving site will need to be pre-treated. Waste minimisation by selective excavation is a recognised form of pre-treatment.

It should be noted that organic contaminants present in the soils could affect plastic underground service pipes (such as the types used by water and gas supply companies). Guidance should be sought from the relevant companies regarding any proposed plant in the affected area.

Many water supply companies now require higher specification pipe on contaminated sites, even following remediation.

APPENDIX A

Site Plans and Exploratory Hole Logs



Background map contains Ordnance Survey data © Crown copyright and database right 2018

Site: Hamsland, Horsted Keynes, Haywards Heath

STL: J14075

Fig No: 1

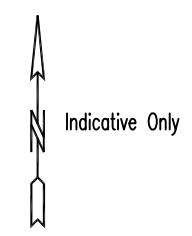
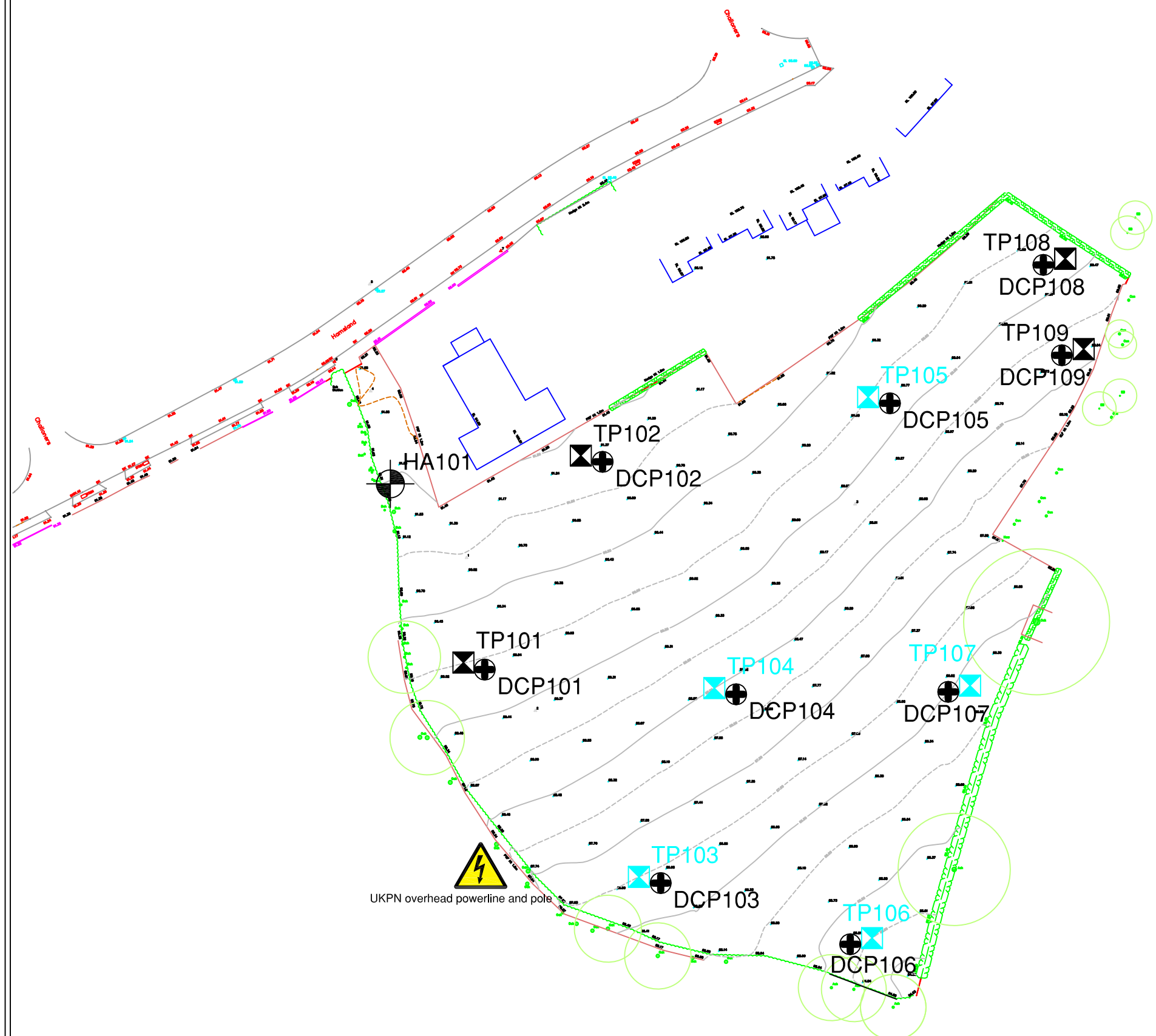
Date: 08 August 2019

Site Location Plan



Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN





- NOTES**
1. Base drawing supplied by others. Trial Pits and other Exploratory Hole locations added by Southern Testing.
 2. Positions of Exploratory Holes are only indicative unless dimensioned.

- KEY:**
- TP101 Trial Pits
 - TP103 Trial Pits for Soakage Tests
 - HA101 Hand Auger
 - DCP101 Dynamic Cone Penetrometer

 **SOUTHERN TESTING**
Environmental & Geotechnical

Keeble House, Stuart Way, East Grinstead,
West Sussex. RH19 4QA.

Tel: 01342 333100 Fax: 01342 410321
www.southerntesting.co.uk

Client:
Rydon Homes Ltd.

Job Title:
J14075 – Hamsland, Horsted Keynes

Description:
Site Survey with Exploratory Holes

Drawing No:
Figure 2

Scale: NTS	Paper Size: A3
-------------------	-----------------------

Drawn by: JL	Checked by:
---------------------	--------------------

Date: 11/07/19

Key to Exploratory Hole Logs

General

All soil & rock descriptions in general accordance with BS5930, BS EN ISO 14688 and BS EN ISO 14689
The Geology Code is only provided where positive identification of the sampled strata has been made.

Sampling

ES	Environmental Sample (taken in appropriate sampling container)
D	Disturbed Sample
B	Bulk Sample
LB	Large Bulk for Earthworks testing
C	Core Sample
U	Undisturbed Sample (number of blows indicated in results column)
SPTLS	SPT Liner Sampler
P	Piston Sample
W	Water Sample

In situ Tests

SPT	Standard Penetration Test in accordance with BS EN ISO 22476-3
SPT (C)	Cone Penetration Test in accordance with BS EN ISO 22476-3
PT	Penetration Test - STL documented equivalent SPT N Value
PPT	Perth Penetration Test - STL in house documented method (N Value)
UCS (—)	Unconfined Compressive Strength measure by hand penetrometer (kN/m ²)
IVN	Hand Vane (kPa)
PID	Photo Ionisation Detector Results (ppm)
MEXE	Mexecone CBR Result

Drilling Records

Depth to standing water level	
Depth to water strike	
TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Index (%)
FI	Fracture Index

Backfill Symbols

Arisings	
Concrete	
Blacktop	
Bentonite Seal	
Gravel Filter	
Sand Filter	

Pipe Symbols

Plain Pipe	
Slotted Pipe	
Filter Tip	

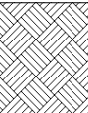
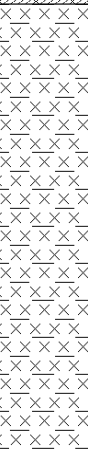
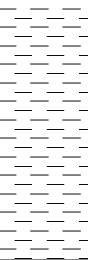
Principal Soil Types

Topsoil	
Made Ground	
Clay	
Silt	
Sand	
Gravel	
Peat	

Principal Rock Types

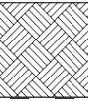
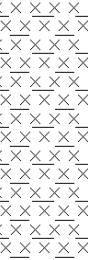
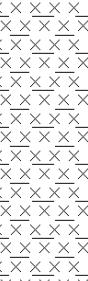
Mudstone/Claystone	
Siltstone	
Sandstone	
Limestone	
Chalk	

				Start - End Date: 02/07/2019		Project ID: J14075		Machine Type: JCB		TP101 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538372 - N 127843		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.10	ES	N=27(450)		(0.30)		0.30	Light brown fine sandy silty TOPSOIL with occasional small rootlets.	1
0.30	ES						Medium dense pale grey and orange brown mottled, slightly gravelly, slightly sandy, clayey SILT.	
1.00	D PPT			(1.20)				
1.50	D			(0.20)		1.50	Weak SANDSTONE. Recovered as gravelly fine sand.	
1.80	D			(0.70)		1.70	Very stiff mauvish mid brown with grey veining, very thinly to thinly bedded silty CLAY.	2
				(0.20)		2.40	Medium strong light grey and orange brown mottled, sandy SILTONE.	3
					2.60	Pit terminated at 2.600m.		
								4

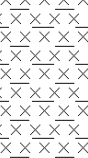
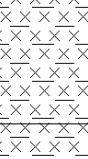
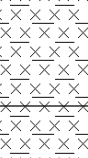
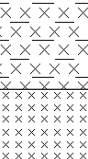
Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pit sides dry on completion.	
Length:					
Depth:	2.60				

				Start - End Date: 02/07/2019		Project ID: J14075		Machine Type: JCB		TP102 Sheet 1 of 1	
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020				Project Name: Hamsland, Horsted Keynes		Remarks: Co-ordinates: E 538393 - N 127880		Level (m AOD): 		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.15	ES	UCS(kPa)=400		(0.25)		0.25	Light brown fine sandy silty TOPSOIL with occasional rootlets.	1
0.50	ES				Medium dense pale grey and orange brown mottled, slightly sandy, clayey SILT or silty CLAY.			
0.75	D HP							
1.00	PPT	N=24(450)		(1.45)		1.70	At 1.2m lens of gravel comprising of black ironstone concretion.	2
1.70	D				Medium weak to strong, very thinly to thinly bedded iron-stained SANDSTONE.			
					At 1.9m sandstone becoming finer with depth, with thinly interbedded siltstones.			
2.50	D			(0.80)		2.50	Pit terminated at 2.500m.	3
								4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pit sides dry on completion.	
Length:					
Depth:	2.50				

				Start - End Date: 02/07/2019		Project ID: J14075		Machine Type: JCB		TP103 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538404 - N 127805		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.10	ES	UCS(kPa)=280		(0.20)		0.20	Light brown fine sandy silty TOPSOIL with frequent roots and very occasional fine sandstone gravel.	
0.30	ES			(0.80)		1.00	Stiff dry slightly topsoily, light brown silty CLAY with occasional fine sandstone gravel.	
1.00	D ES HP	N=25(300)		(0.40)		1.00	Stiff brown orange and pale grey mottled, silty CLAY with occasional sub-angular iron-stained sandstone gravel.	1
1.50	D PPT			(0.40)		1.40	Dense pale grey and yellowish orange mottled, clayey SILT. Becoming thickly laminated silt with depth.	
				(1.10)		1.80	Very weak pale grey and orange brown mottled SILTSTONE.	2
						2.90	At 2.6m becoming weak , thinly bedded SILTSTONE.	
							Pit terminated at 2.900m.	3
								4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pit sides dry on completion.	
Length:					
Depth:	2.90				

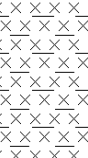
3.00

				Start - End Date: 02/07/2019		Project ID: J14075		Machine Type: JCB		TP106 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538446 - N 127794		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.10	ES	UCS(kPa)=450		(0.25)		0.25	Light brown fine sandy silty TOPSOIL with occasional rootlets.	1
0.50	HP			(0.35)		0.25	Stiff dry pale grey and orange brown mottled, very silty CLAY.	
				(0.20)		0.60	Medium dense pale grey and orange brown mottled, SILT with occasional iron-stained sandstone gravel.	
				(0.50)		0.80	Medium strong pale grey orange iron-stained thinly, becoming medium bedded SANDSTONE with widely spaced joints.	
1.30	D	N=10(200)				1.30	Refusal and hard dig at 1.3m Pit terminated at 1.300m.	4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pits side dry on completion.	
Length:					
Depth:	1.30				

				Start - End Date: 02/07/2019		Project ID: J14075		Machine Type: JCB		TP107 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538463 - N 127839		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.10	ES	UCS(kPa)=250		(0.25)		0.25	Light brown fine sandy silty TOPSOIL with occasional rootlets.	
0.30	ES			(0.75)			Stiff pale grey and orange brown mottled, very silty CLAY with iron-stained Sandstone gravel	
0.80	HP			Between 0.7m and 1m lens of orange of orange brown and grey silty CLAY with lenses of light grey fine sand and thin to thick laminations of ironstone.				
1.20	D	N=37(400)		(1.20)		1.00	Dense pale grey and orange brown SILT with black fibrous roots.	1
1.50	PPT							
1.60	D							
2.00	D HP	UCS(kPa)=600		(0.40)		2.20	Pale grey thinly bedded MUDSTONE.	2
2.60	D					2.60	Pale grey and orange brown iron-stained thinly bedded SILTSTONE.	
						3.00	Pit terminated at 3.000m.	3
								4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pit sides dry on completion.	
Length:					
Depth:	3.00				

				Start - End Date: 03/07/2019		Project ID: J14075		Machine Type: JCB		TP108 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538480 - N 127916		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.10	ES	UCS(kPa)=200		(0.25)			Light brown fine sandy silty TOPSOIL with occasional small rootlets.	
0.30	ES			(0.15)		0.25	Light brown topsoily sandy SILT (subsoil).	
0.50	HP			(0.25)		0.40	Stiff mid brown and pale yellow sandy silty CLAY with occasional iron-stained fine sandstone gravel and cobbles.	
0.65	D			(0.60)		0.65	Medium dense grey and orange mottled , with iron-stained patches, slightly gravelly, fine sandy clayey SILT.	1
0.85	D							
1.00	PPT	N=30(450)						
				(1.75)		1.25	At 1.1m becoming more gravelly with depth. Gravel comprises of pale grey iron-stained SILTSTONE.	
							Pale grey and orange gravelly sandy SILT. Gravel is fine to coarse sub-angular siltstone and fine sandstone.	2
								
								
								
								
								
								
								
								
								
								
								
								
								
2.40	D						At 2.4m becoming very weak, very thinly to thinly bedded pale grey and orange, with iron-staining, silt and siltstone.	

				Start - End Date: 03/07/2019		Project ID: J14075		Machine Type: JCB		TP109 Sheet 1 of 1	
Project Name: Hamsland, Horsted Keynes				Remarks:		Co-ordinates: E 538484 - N 127899		Level (m AOD):		Logger: JL	
Location: Land adjacent to St Stephen's Church, Hamsland, Horsted Keynes, RH17 7DS											
Client: Rydon Homes											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.15	ES			(0.25)			Light brown sandy silty TOPSOIL with occasional small rootlets.	
0.30	ES			(0.20)		0.25	Mid brown topsoily fine sandy clayey SILT (subsoil).	
						0.45	Pale grey and orange brown mottled, very clayey SILT with occasional sandstone gravel.	
0.90	ES			(0.50)		0.95	Pit terminated at 0.950m.	1
								2
								3
								4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:		Pit sides stable.		Pit sides dry on completion.	
Length:					
Depth:	0.95				

APPENDIX B

Field Sampling and in-situ Test Methods & Results

Field Sampling and in-situ Test Methods

Disturbed Samples

Disturbed samples were taken from the trial holes at intervals and stored in sealed glass jars and polythene bags, as appropriate.

Undisturbed U100 Samples

Undisturbed U100 samples were taken in the clay soils at appropriate intervals. These samples are taken in a 100 mm diameter, 450 mm long, thin-walled steel tube, and are sealed with paraffin wax and tightly fitting end caps for transporting to the laboratory.

Standard Penetration Test

The Standard Penetration (SPT) Test is specified in BS EN ISO 22476-3:2005+A1:2011. In this test, a 51mm diameter open-ended tube is driven into the ground by a 63.5 kg hammer falling freely through 760 mm. The tube is seated by driving to a penetration of 150mm, or by 25 standard blows, whichever occurs first. It is then driven for a maximum of a further 300mm and the number of blows is termed the penetration resistance (N). If 300mm penetration cannot be achieved in 50 blows (100 blows in soft rock), the test drive is terminated.

When testing in gravels, a conical end piece is attached to the tube. The test is then called an SPT(C).

This test provides an indirect method of assessing the properties of cohesionless soils, and the following table (after Terzaghi and Peck) gives the approximate condition:-

Number Blows (N)	Density
0 – 4	Very Loose
4 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Over 50	Very Dense

Clay

An approximate value for the shear strength of clay may be obtained using Stroud (1974), which paper indicates that the cohesive strength is a function of plasticity and SPT 'N' value. The relation is:

$$C_u = f_i \times N \text{ kPa}$$

$$C_u = \text{undrained shear strength}$$

$$f_i = \text{factor related to plasticity index and ranging from 4 to more than 6}$$

The SPT test is not generally accepted as giving a reliable indication of the strength of cohesive soils but it does give a guide; often the following table:-

Number Blows (N)	Soil Strength
Less than 2	Very Soft (Very Low Strength)
2 – 5	Soft (Low Strength)
5 – 10	Firm (Medium Strength)
10 – 15	Stiff (High Strength)
15 – 30	Very Stiff (Very High Strength)

Perth Penetrometer Test

Perth Penetrometer tests were carried out. The Perth Penetrometer is a device used for measuring the relative density of sands. It consists of a 16 mm diameter hardened steel probe, which is driven into the soil by successive blows of a 9 kg weight, which freely falls over a distance of 600 mm. The number of blows required for each 50 mm of penetration is recorded, and the test is continued for a depth of 450 mm, according to soil type. Useful information can be obtained by carrying the test past the standard depth, and 2,000 mm and 3,000 mm extensions are used to probe the depth of loose fill or other soil, or to make an estimate of the strength of soils or rock in an auger hole or in the base of an unsupported test pit.

The energy input per square metre is roughly the same as the energy input from the Standard Penetration Test (SPT), and the blow counts recorded in sand are roughly the same as SPT blow counts (but this relationship does not hold for coarse soils). The SPT test is a similar type of test except that much heavier driving weights (63.5 kg) are used. The relative density relationship given for the SPT test is:

Number of Blows (N)	Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
Over 50	Very Dense

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP101

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

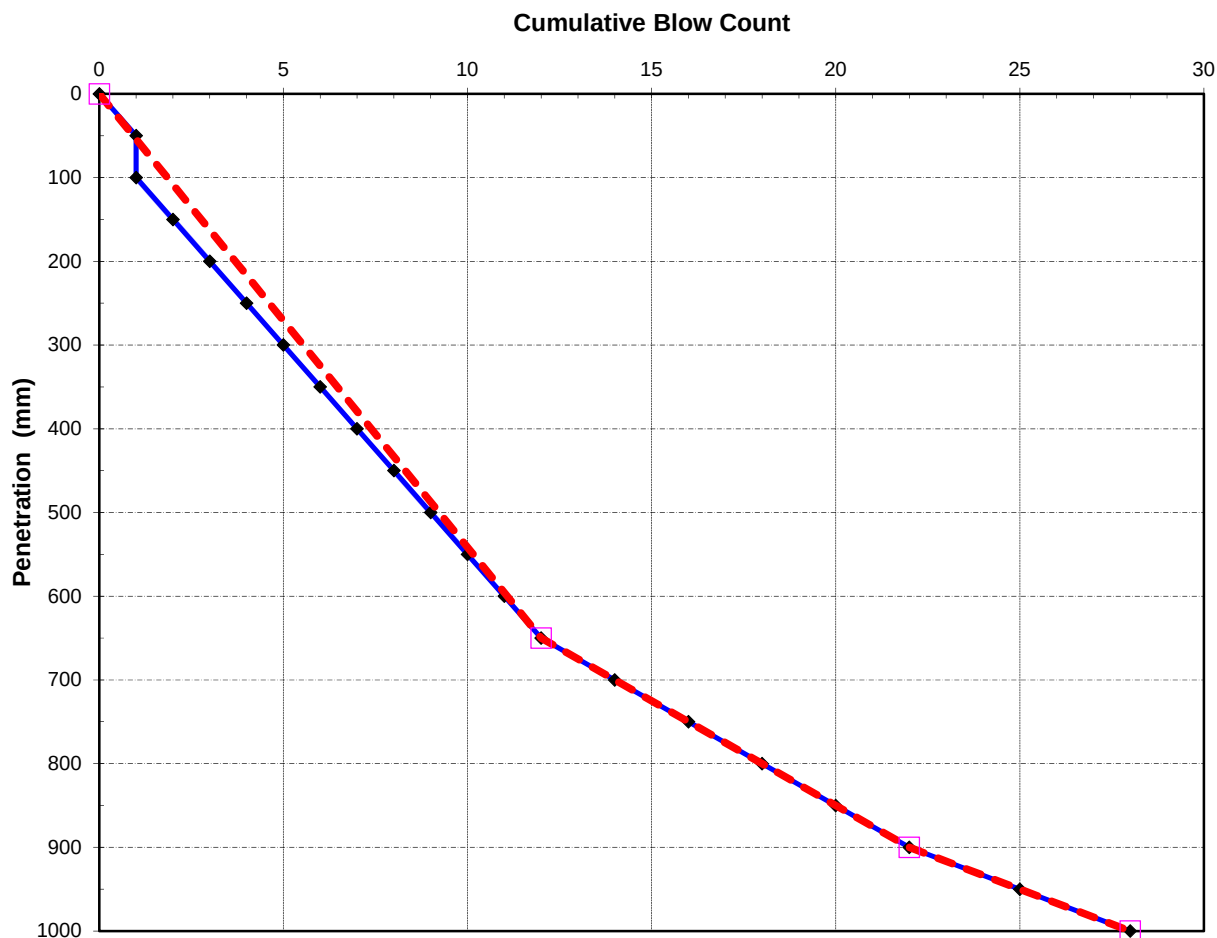
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	650	650	12	12	54.2	2.6		
2	650	900	250	22	10	25.0	7.0		
3	900	1000	100	28	6	16.7	12		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP101

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP102

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

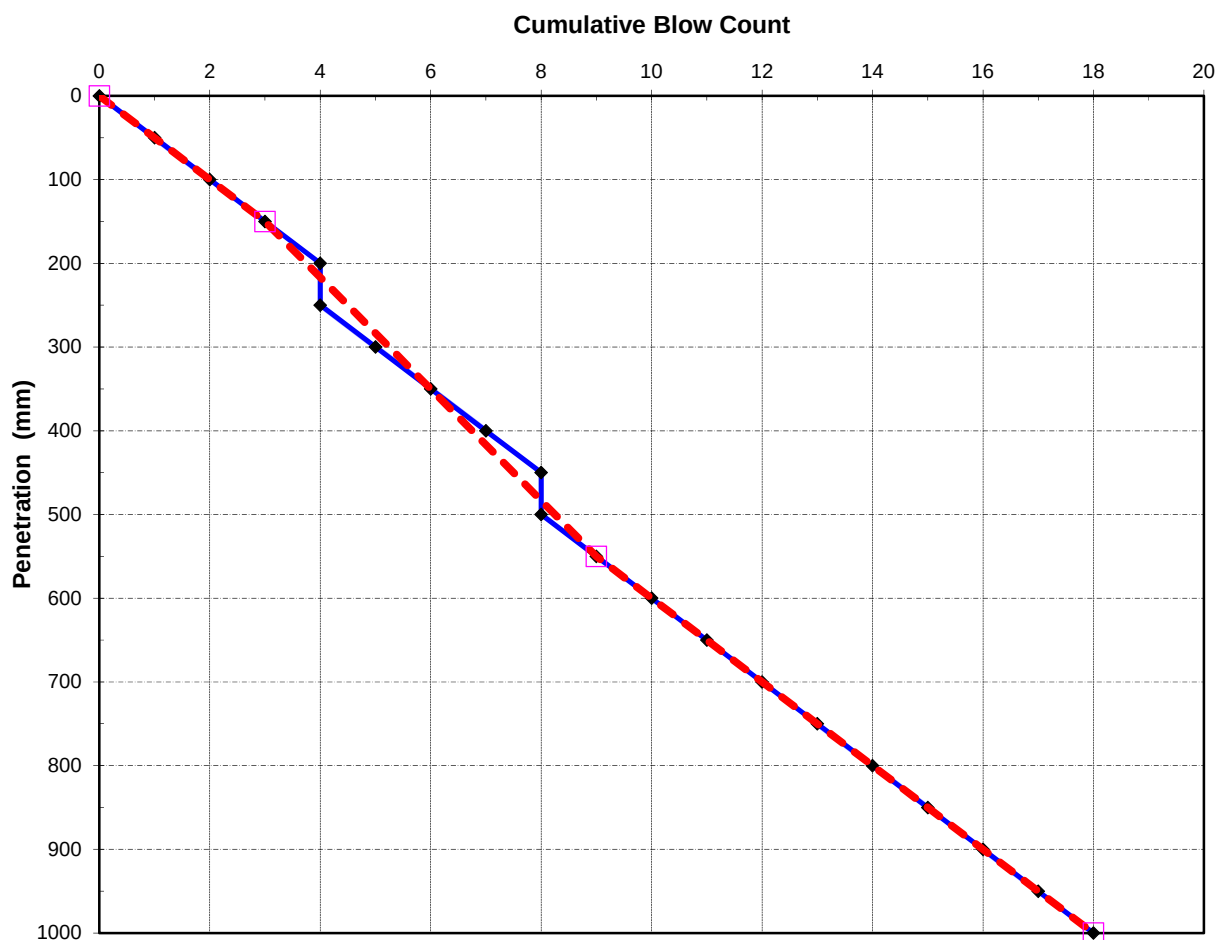
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	150	150	3	3	50.0	2.9		
2	150	550	400	9	6	66.7	2.0		
3	550	1000	450	18	9	50.0	2.9		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP102

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP103

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

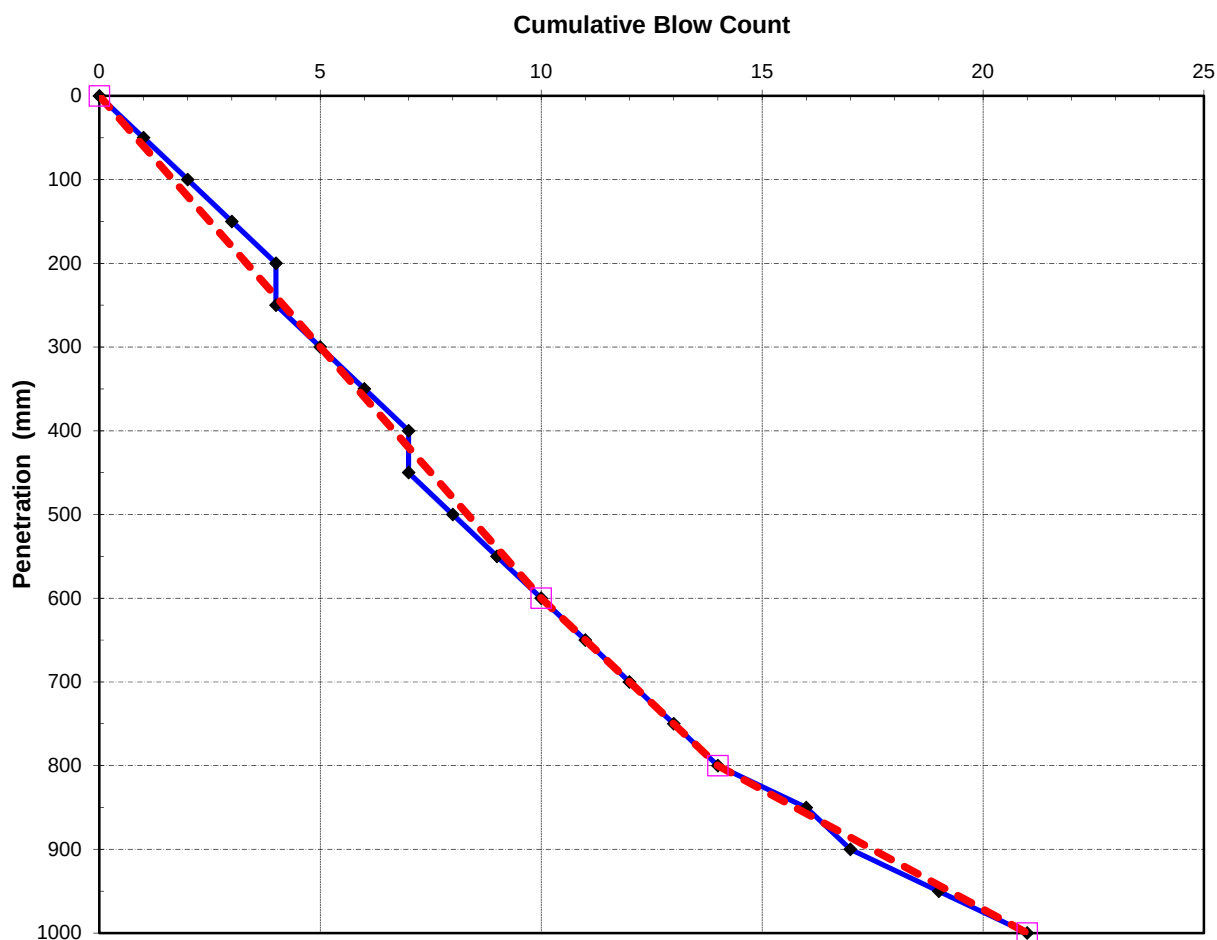
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	600	600	10	10	60.0	2.3		
2	600	800	200	14	4	50.0	2.9		
3	800	1000	200	21	7	28.6	5.9		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP103

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP104

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

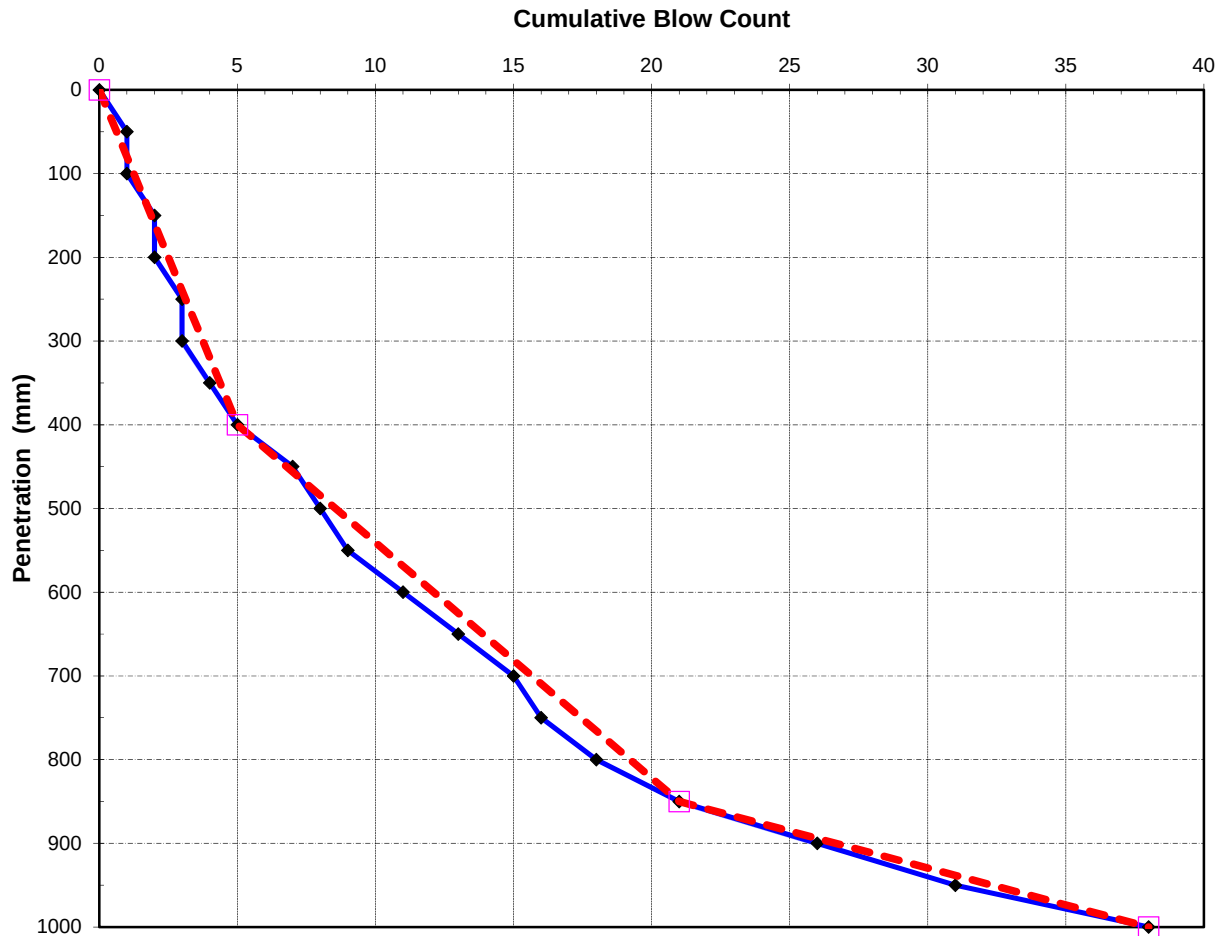
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	400	400	5	5	80.0	1.6		
2	400	850	450	21	16	28.1	6.0		
3	850	1000	150	38	17	8.8	26		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP104

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP105

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

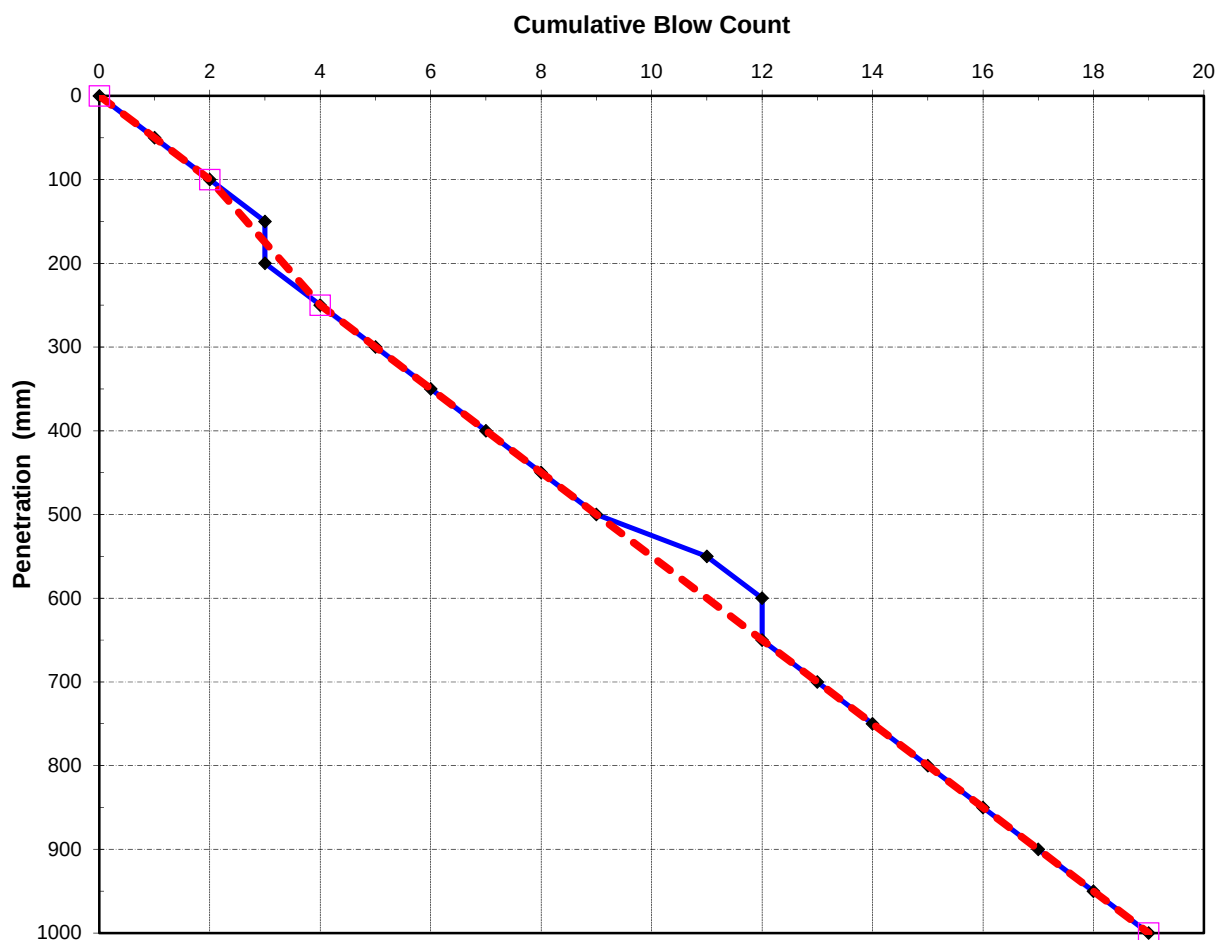
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	100	100	2	2	50.0	2.9		
2	100	250	150	4	2	75.0	1.7		
3	250	1000	750	19	15	50.0	2.9		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP105

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP106

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

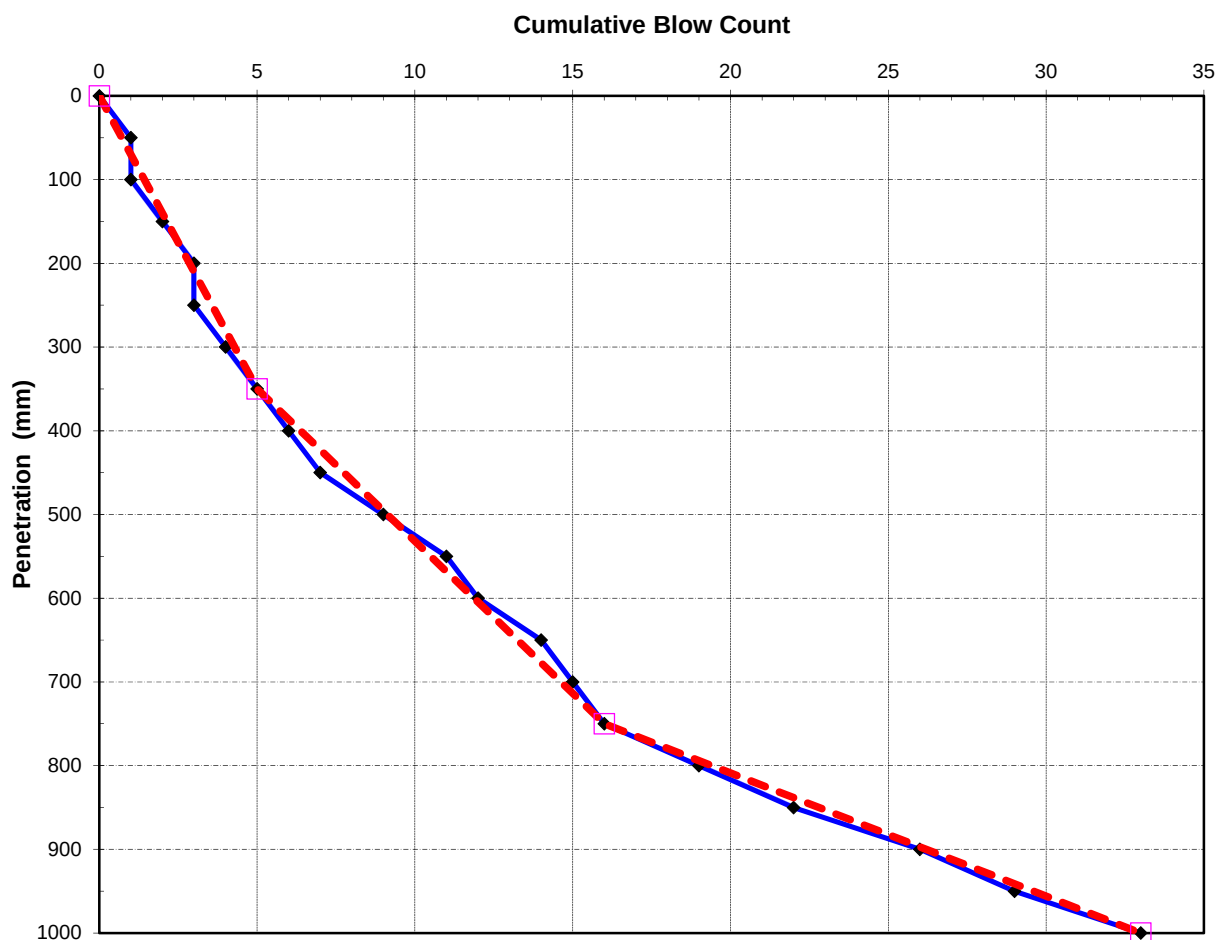
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	350	350	5	5	70.0	1.9		
2	350	750	400	16	11	36.4	4.3		
3	750	1000	250	33	17	14.7	14		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP106

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP107

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

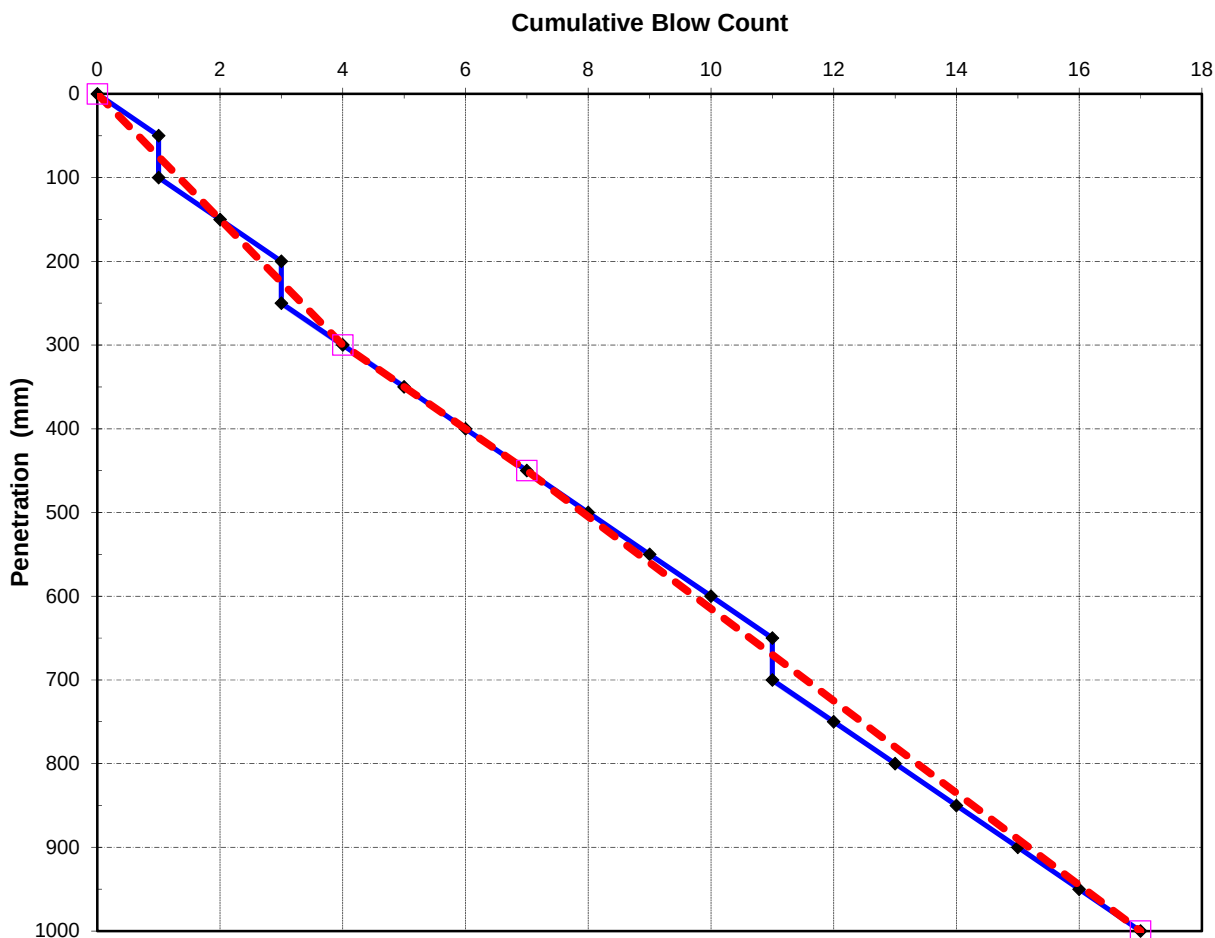
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	300	300	4	4	75.0	1.7		
2	300	450	150	7	3	50.0	2.9		
3	450	1000	550	17	10	55.0	2.5		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP107

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP108

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

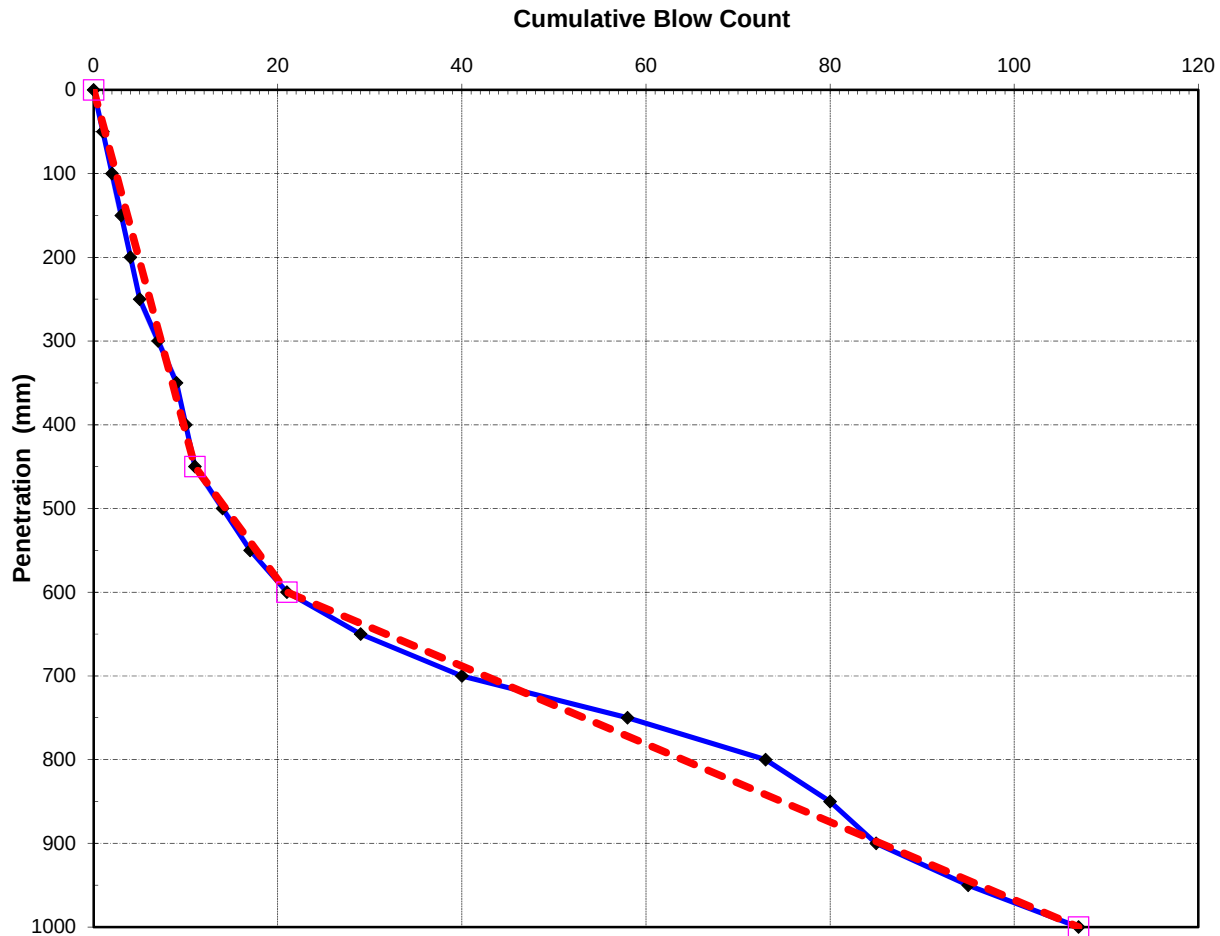
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	450	450	11	11	40.9	3.7		
2	450	600	150	21	10	15.0	13		
3	600	1000	400	107	86	4.7	59		

Client: Rydon Homes Limited

Job No: J14075

Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP108

Dynamic Cone Penetrometer (DCP) Test Results

Test No: DCP109

Chainage: N/A

Tested By: RA

Start Layer: Topsoil

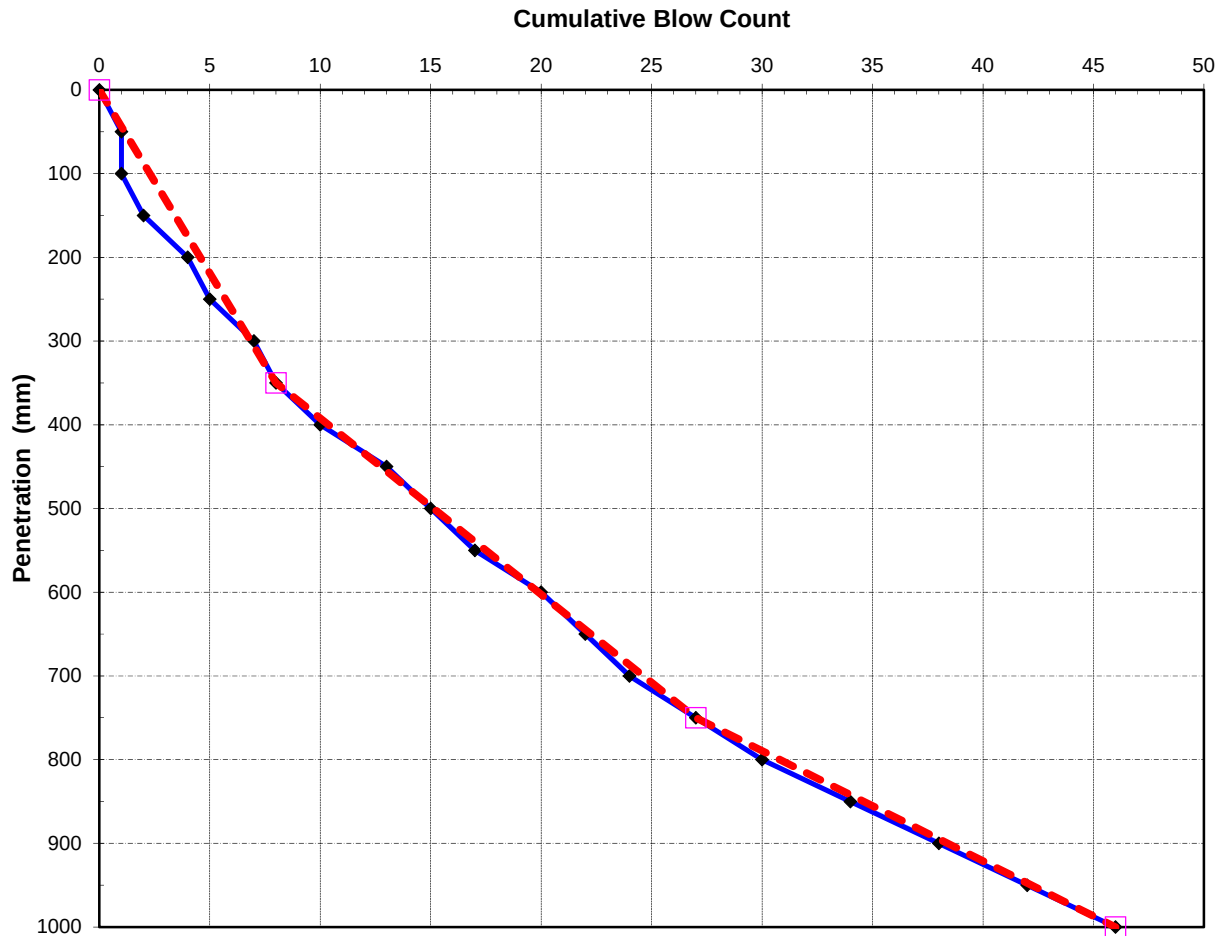
Checked By: JL

Soil Condition:

Test Date: 03-Jul-19

Notes:

Perth Cone CBR Penetration vs Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From (mm)	To (mm)	Depth (mm)	Blow Count	No. of Blows	DCP mm/blow	CBR %	Soil Type	Remarks
1	0	350	350	8	8	43.8	3.4		
2	350	750	400	27	19	21.1	8.7		
3	750	1000	250	46	19	13.2	16		

Client: Rydon Homes Limited

Job No: J14075

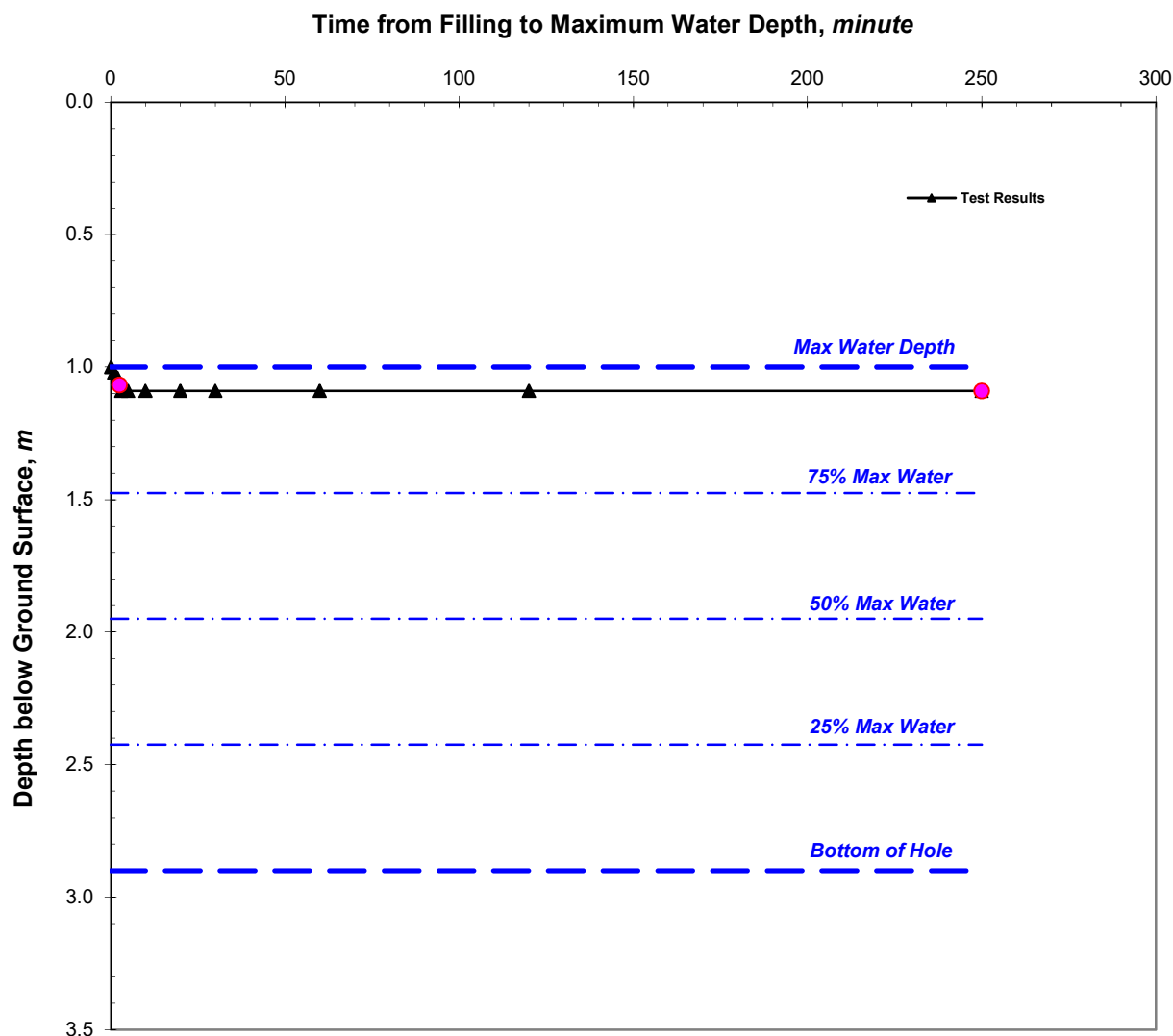
Site: Hamsland, Horsted Keynes, Haywards Heath

Date: 18/07/2019

Fig. DCP109

BRE Digest DG365 Soakage Test

Test Hole No: TP103
Test No: Test No 1 (Initial)



Pit Length, <i>m</i>	1.300	Depth to Water at Start of Test, <i>m</i>	1.000
Pit Width, <i>m</i>	0.500	Max Water Dropdown during Test, <i>m</i>	0.090
Depth to Pit Base, <i>m</i>	2.900	Total Soakage Test Time, <i>min</i>	250.0
Depth to Top of Permeable Soils, <i>m</i>		Mean Internal Discharge Area, <i>m</i> ²	7.207
Depth to Groundwater Surface, <i>m</i>		Discharge Rate, <i>litre/min</i>	0.059
Depth to Top of Granular Fill, <i>m</i>		Soakage Rate, <i>litre/m</i> ² / <i>min</i>	0.0082
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, <i>m/sec</i>	1.37E-07

Comments: *Clayey SILT & SILTSTONE*

Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.

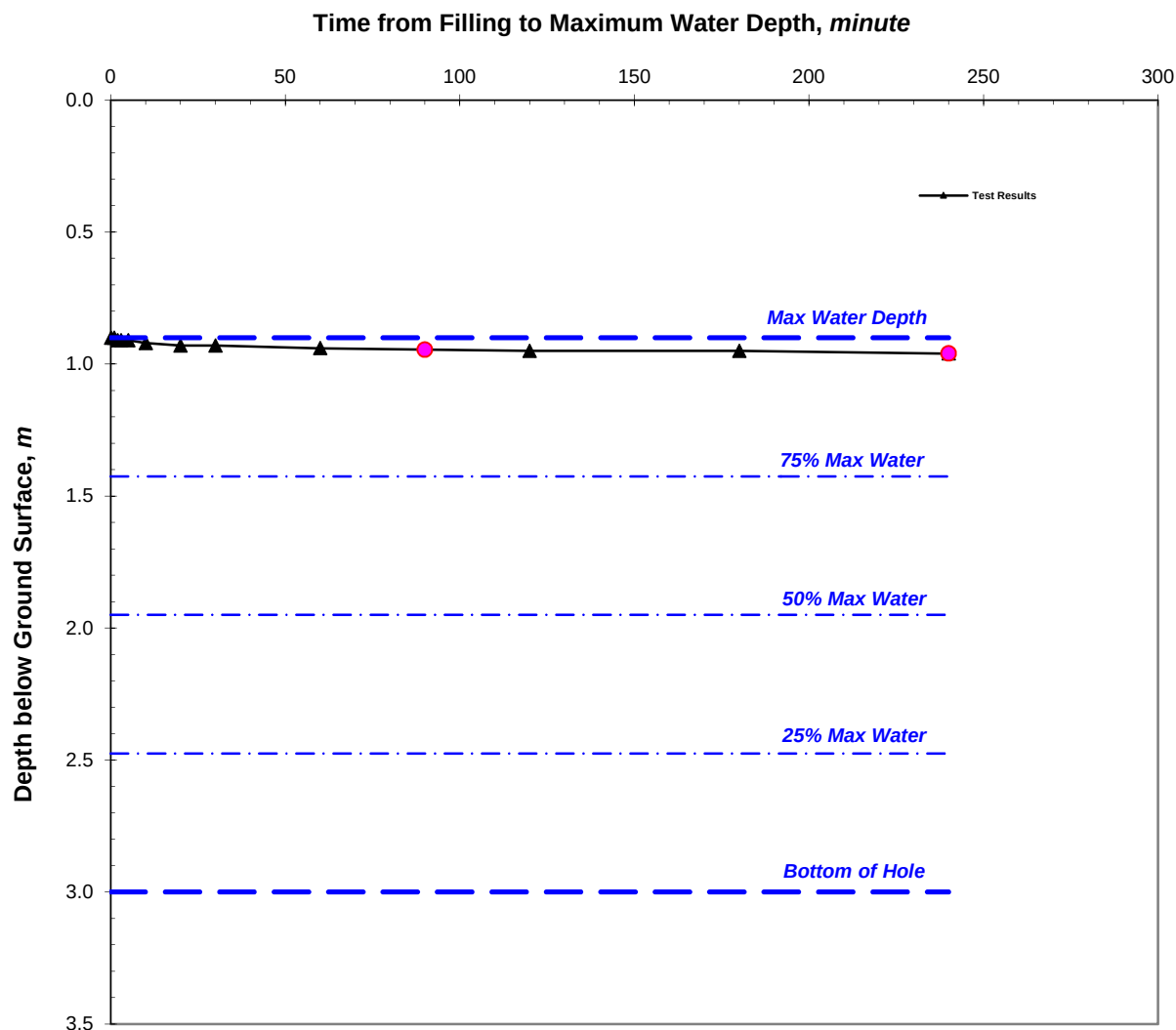
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 02/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL Fig. S1

BRE Digest DG365 Soakage Test

Test Hole No: TP104

Test No: Test No 1 (Initial)



Pit Length, m	1.450	Depth to Water at Start of Test, m	0.900
Pit Width, m	0.500	Max Water Dropdown during Test, m	0.060
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	240.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	8.710
Depth to Groundwater Surface, m		Discharge Rate, litre/min	0.073
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.0083
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	1.39E-07

Comments: Silty CLAY & silty fine SANDSTONE

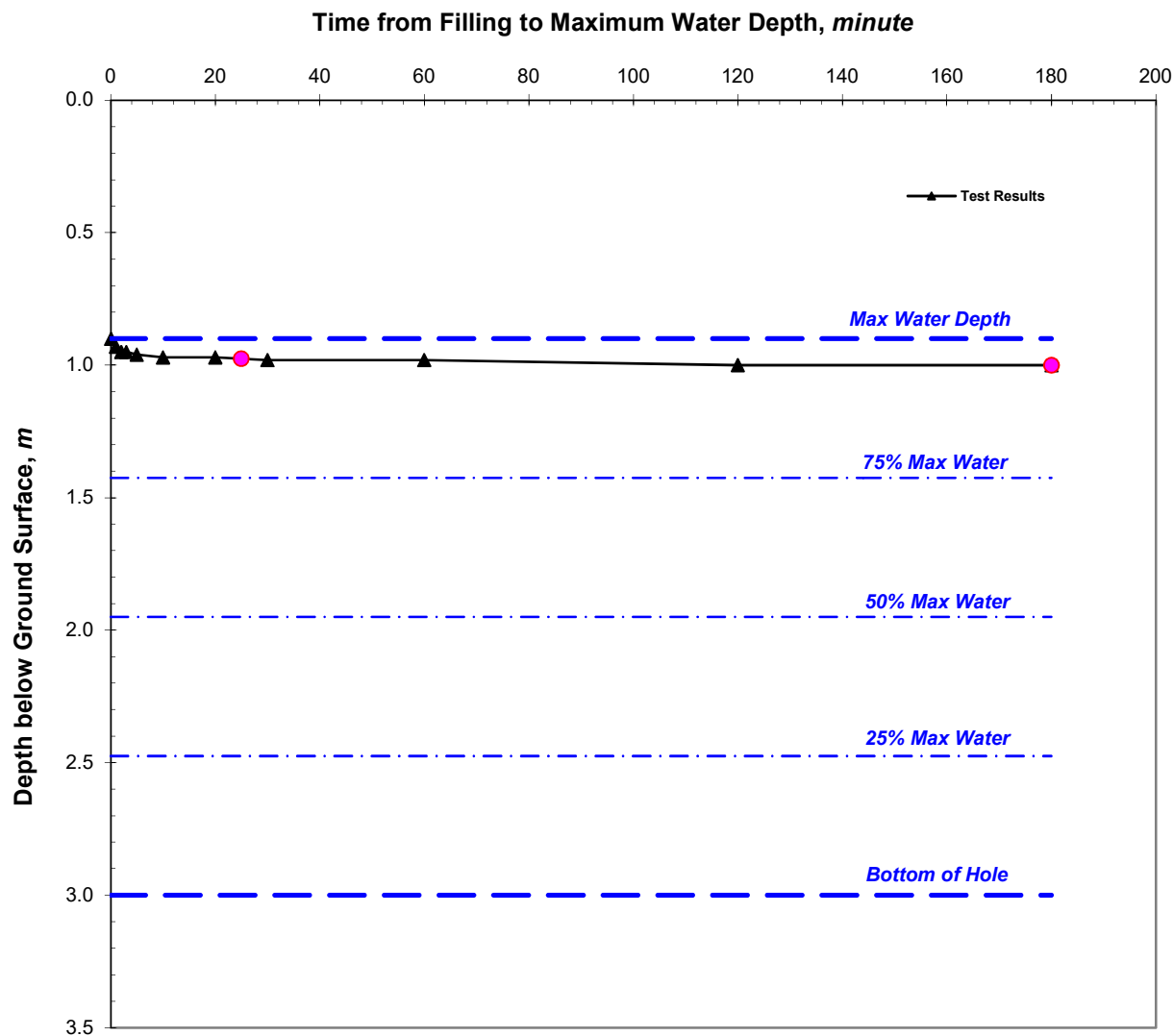
Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.

Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 03/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL
		Fig. S2

BRE Digest DG365 Soakage Test

Test Hole No: TP105
Test No: Test No 1 (Initial)



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.900
Pit Width, m	0.500	Max Water Dropdown during Test, m	0.100
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	180.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	8.800
Depth to Groundwater Surface, m		Discharge Rate, litre/min	0.121
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.014
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	2.29E-07

Comments: Sandy SILT & SILTSTONE

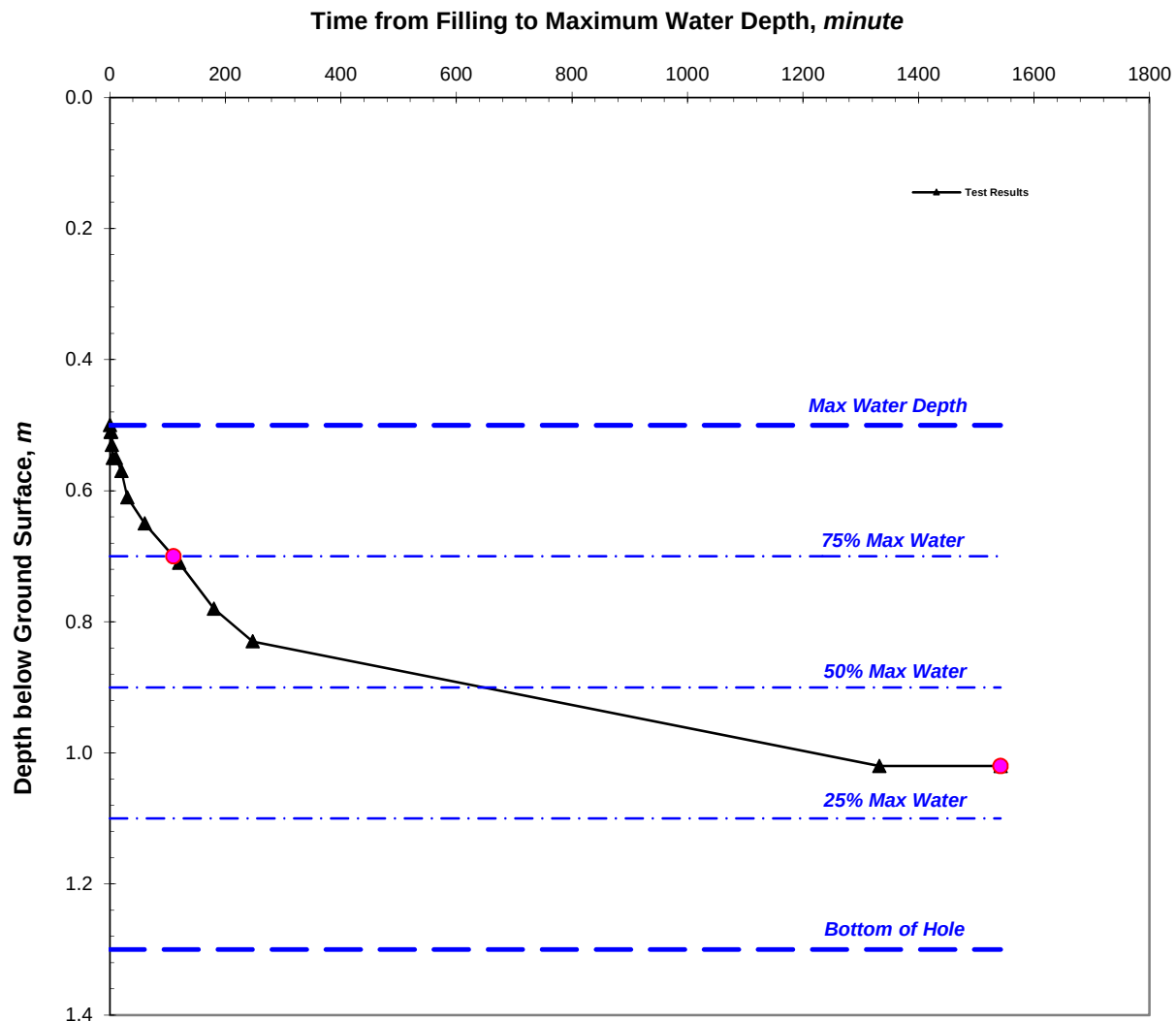
Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.

Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 02/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL Fig. S3

BRE Digest DG365 Soakage Test

Test Hole No: TP106
Test No: Test No 1 (Initial)



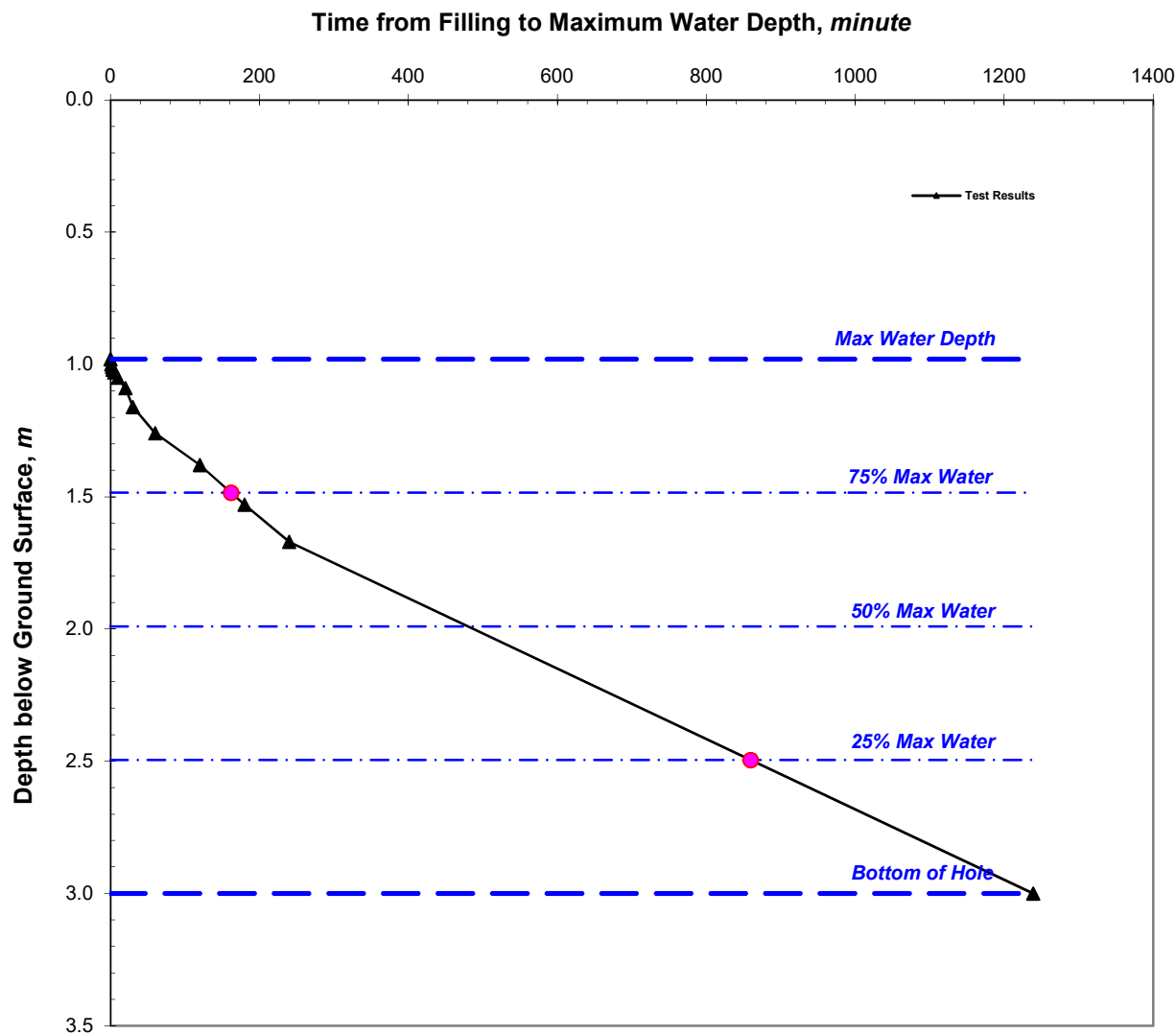
Pit Length, m	1.500	Depth to Water at Start of Test, m	0.500
Pit Width, m	0.500	Max Water Dropdown during Test, m	0.520
Depth to Pit Base, m	1.300	Total Soakage Test Time, min	1542.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	2.510
Depth to Groundwater Surface, m		Discharge Rate, litre/min	0.168
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.067
Void Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	1.11E-06

Comments: Silty CLAYs, SILTs & Sandstone band
Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 02/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL Fig. S4

BRE Digest DG365 Soakage Test

Test Hole No: TP107
Test No: Test No 1 (Initial)



Pit Length, m	1.600	Depth to Water at Start of Test, m	0.980
Pit Width, m	0.500	Max Water Dropdown during Test, m	2.020
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	1239.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	5.042
Depth to Groundwater Surface, m		Discharge Rate, litre/min	1.158
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.230
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	3.83E-06

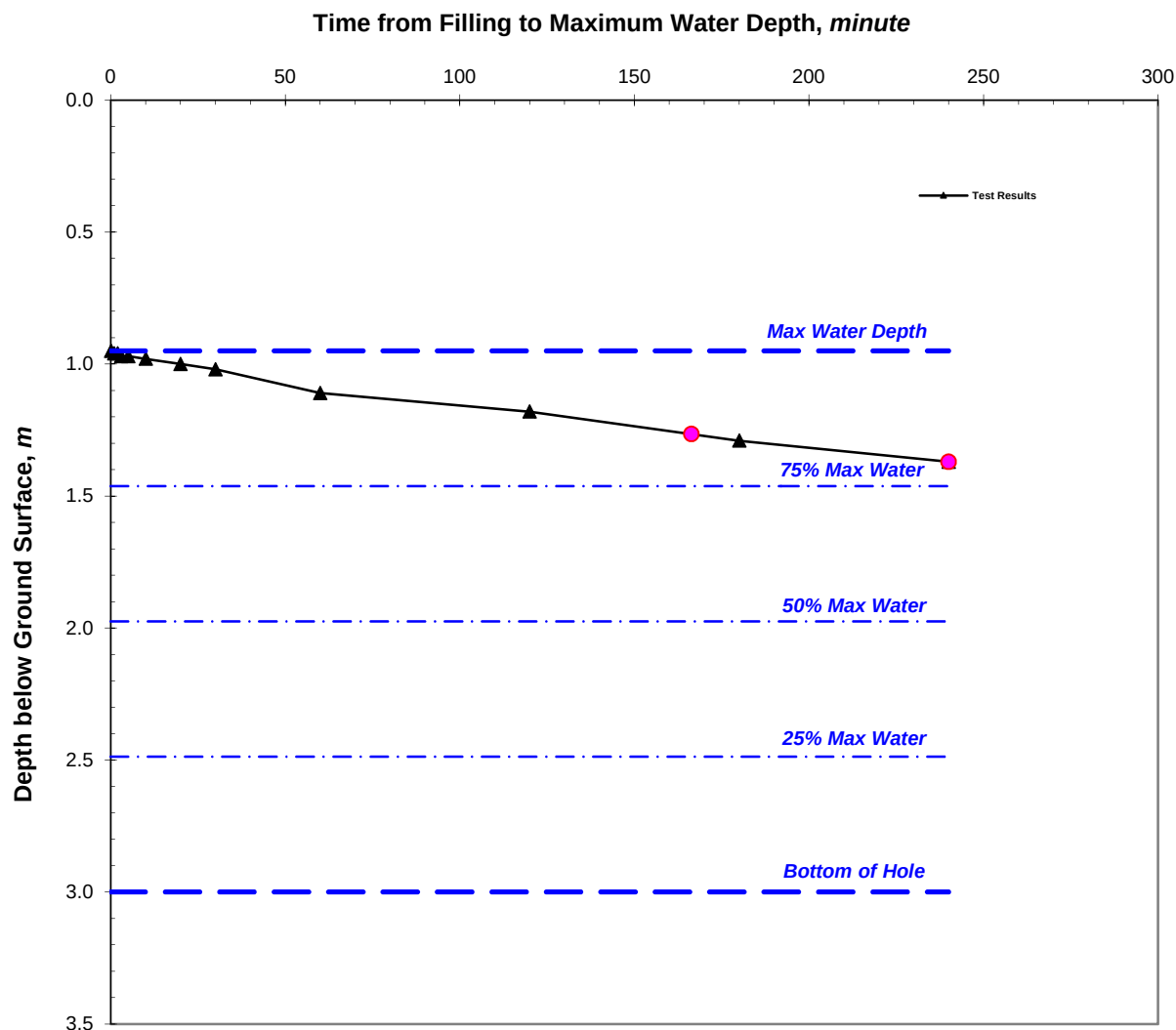
Comments: Clay/Silt+Sandstone. Dry at 8:30 (3/7/19)
Pit was emptied at finish of test.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 02/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL Fig. S5

BRE Digest DG365 Soakage Test

Test Hole No: TP107

Test No: Test No 2 (Repeated)



Pit Length, m	1.600	Depth to Water at Start of Test, m	0.950
Pit Width, m	0.500	Max Water Dropdown during Test, m	0.420
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	240.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	7.867
Depth to Groundwater Surface, m		Discharge Rate, litre/min	1.141
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.145
Void Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	2.42E-06

Comments: Clay/Silt+Sandstone.

Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.

Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Rydon Homes Ltd	Job No: J14075	Test Date: 03/Jul/2019
Site: Hamsland, Horsted Keynes	Tested By: RA/GC	Engineer: JL Fig. S6

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site : Hamsland, Horsted Keynes					Job No : J14075		
Client : Rydon Homes Ltd					O S Reference :		
Tested By : RA/GC				Engineer: JL		Test Date : 02/Jul/2019	
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
TP103	No 1	2.90	0.0082	0.0082	1.37E-7	Pit was not emptied; Non compliant value was calculated.	Clayey SILT & SILTSTONE
TP104	No 1	3.00	0.0083	0.0083	1.39E-7	Pit was not emptied; Non compliant value was calculated.	Silty CLAY & silty fine SANDSTONE
TP105	No 1	3.00	0.014	0.014	2.29E-7	Pit was not emptied; Non compliant value was calculated.	Sandy SILT & SILTSTONE
TP106	No 1	1.30	0.067	0.067	1.11E-6	Pit was not emptied; Non compliant value was calculated.	Silty CLAYs, SILTs & Sandstone band
TP107	No 1	3.00	0.230	0.145	2.42E-6	Empty pit.	Clay/Silt+Sandstone. Dry at 8:30 (3/7/19)
TP107	No 2	3.00	0.145			Pit was not emptied; Non compliant value was calculated.	Clay/Silt+Sandstone.
Mean Value of All Calculated Soakage Rates :				0.048 <i>litre/m²/min</i>	8.07E-7 <i>m/sec</i>		

APPENDIX C

Geotechnical Laboratory Test References & Results

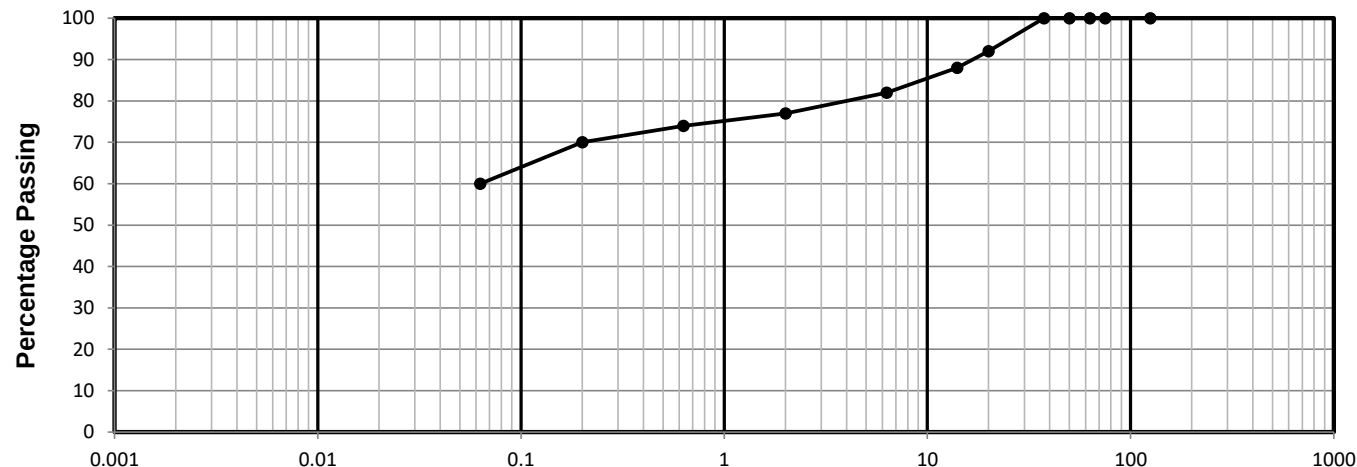
PARTICLE SIZE DISTRIBUTION REPORT

To BS1377-2 cl. 9.2-9.5

Project Name	Hamsland, Horsted Keynes			Project Number	J14075
Client Name	Rydon Homes Limited	PE	JL	Date Issued	17-Jul-19

Particle Size Distribution Chart

Particle Size	% Passing
125mm	100
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	92
14mm	88
6.3mm	82
2mm	77
630µm	74
200µm	70
63µm	60



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			
60				17			23			0

Visual Description of Sample:

Buff slightly sandy slightly gravelly SILT. Gravel consists of fine to coarse subangular sandstone.

Particle Density (Assumed) Mg/m³

N/A

Coefficient of Uniformity

Test Methods:

Wet & Dry Grading BS1377-2
cl.9.2 & 9.3 & BS EN ISO 17892-4

Location

TP104

Depth (m)

1.50

Sample Type

D

Comments:

Tested By

STL Lab

Checked By

GeorginaB

Atterberg and Moisture Content Summary

BS1377-2 cl.3.2, 3.3, 4.2, 4.3 & BS EN ISO 17892-1

Project Name		Hamsland, Horsted Keynes					Project Number		J14075	
Client		Rydon Homes Limited				PE	JL	Date Issued		17-Jul-19
Location	Depth m	Sample Type	Visual Description	Comments	Natural MC %	Liquid Limit %	Plastic Limit %	Plasticity Index	Classi- fication	Passing 425 micron %
TP101	1.00	D	Stiff yellow ochre mottled yellow brown sandy CLAY.		19	33	19	14	CL	100
TP101	1.80	D	Very stiff brown grey CLAY.		16	53	24	29	CH	100
TP102	0.75	D	Very stiff yellow brown gravelly SILT. Gravel consists of fine and medium angular siltstone.	Sample passed through 425µm sieve	17	36	20	16	CI	86
TP103	1.00	D	Stiff light grey mottled orange brown speckled black CLAY.		23	47	25	22	CI	100
TP103	1.50	D	Very stiff pale grey mottled pale brown SILT.		16	41	25	16	CI	100
TP105	0.90	D	Stiff light brown mottled grey brown and orange brown slightly gravelly CLAY. Gravel consists of fine and subangular sandstone.	Sample passed through 425µm sieve	24	49	19	30	CI	65
TP107	2.00	D	Stiff light grey mottled light brown speckled black slightly gravelly CLAY. Gravel consists of fine and medium subangular sandstone.	Sample passed through 425µm sieve	15	37	22	15	CI	64
TP108	0.85	D	Stiff light brown mottled light grey sandy SILT.		19	30	20	10	CL	100

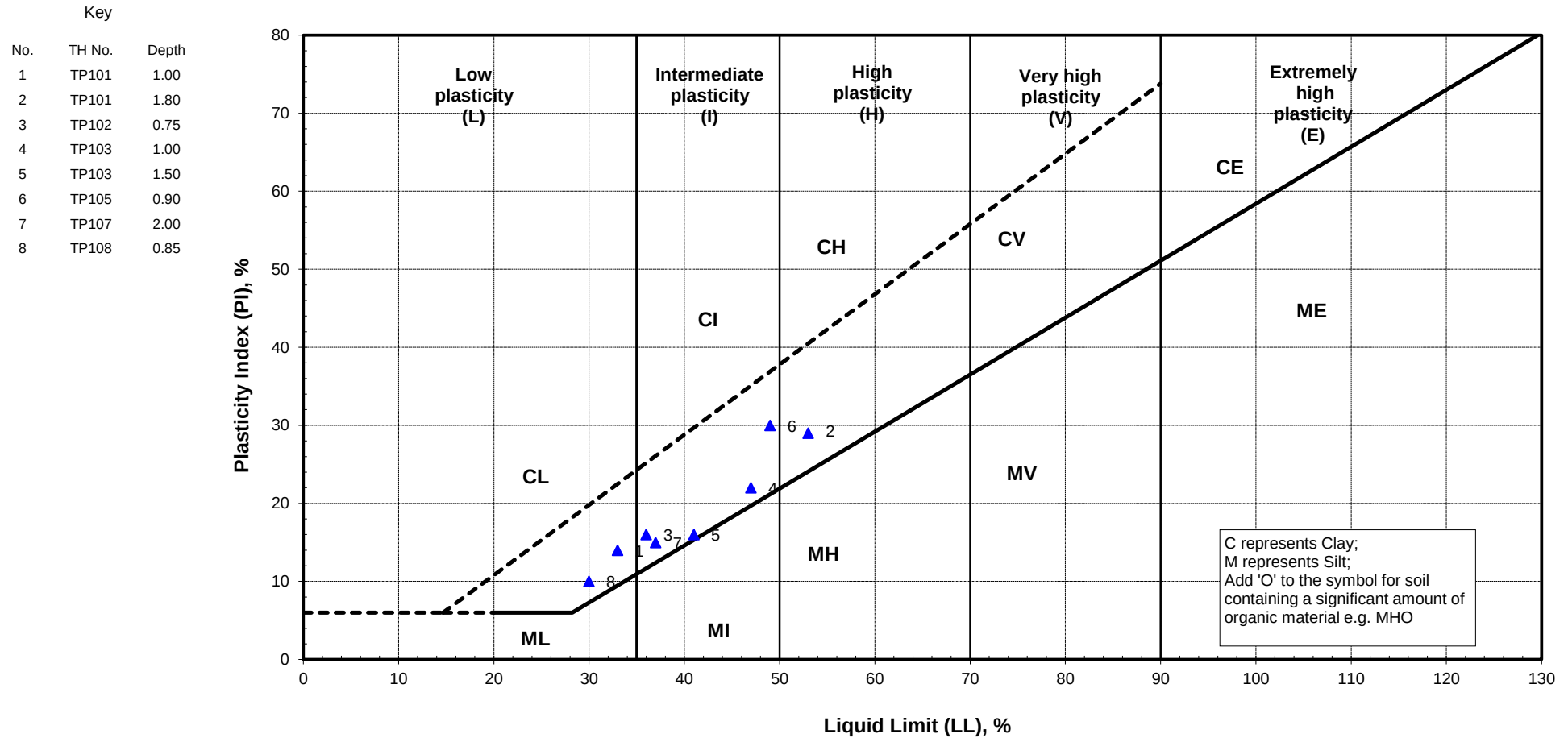
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Plasticity Chart for Atterberg Limit Tests



Project Name	Hamsland, Horsted Keynes			Project Number	J14075
Client Name	Rydon Homes Limited	PE	JL	Date Issued	17-Jul-19



Liquid Limit

Maximum Value	53
Minimum Value	30
Average Value	41

Plastic Limit

Maximum Value	25
Minimum Value	19
Average Value	22

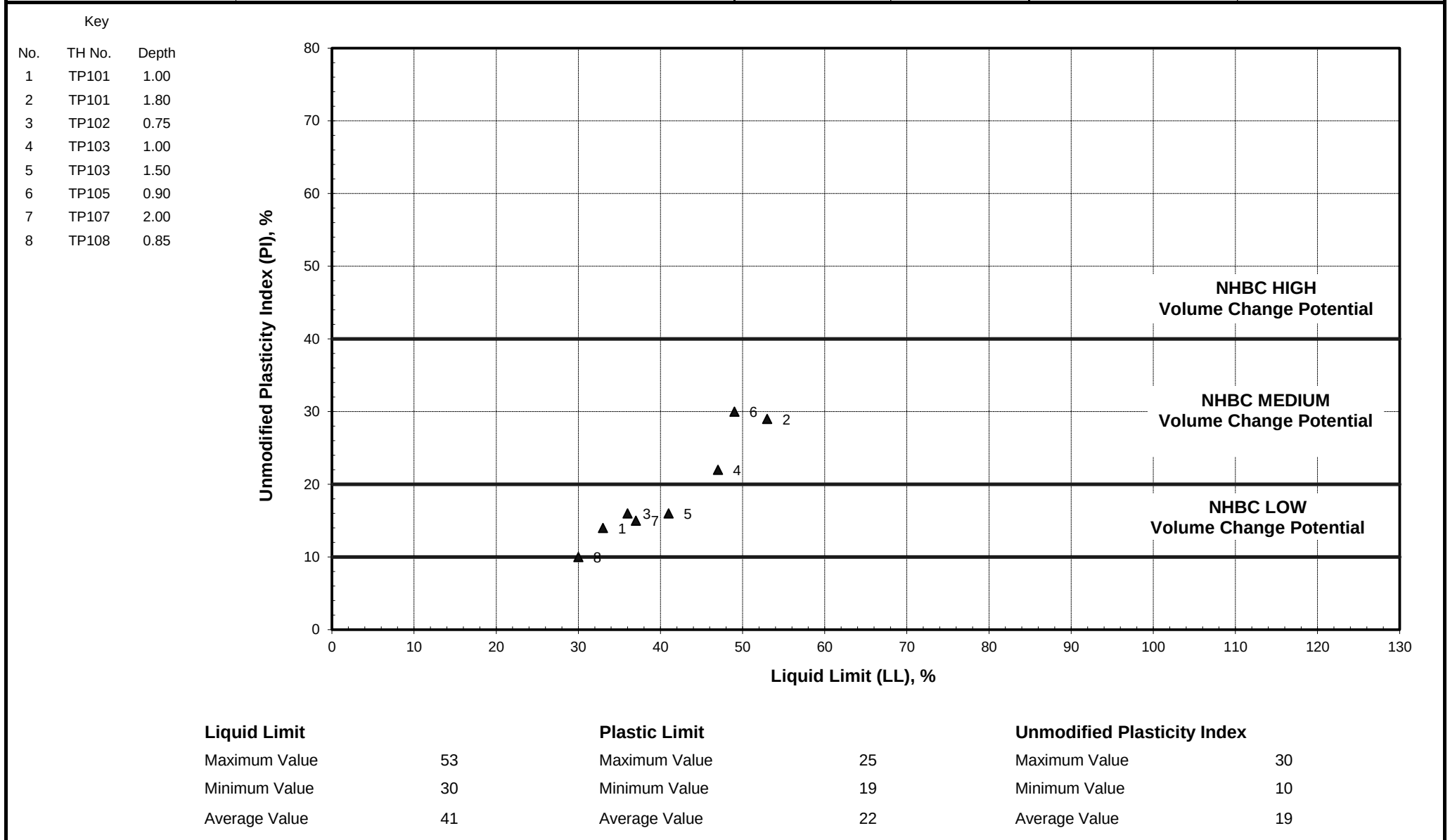
Plasticity Index

Maximum Value	30
Minimum Value	10
Average Value	19

NHBC Classification for Volume Change Potential



Project Name	Hamsland, Horsted Keynes			Project Number	J14075
Client Name	Rydon Homes Limited	PE	JL	Date Issued	17-Jul-19



Project Name		Hamsland, Horsted Keynes								Project Number		J14075		
Client		Rydon Homes Limited						PE	JL	Date Issued		17-Jul-19		
Location	Depth	Sample Type	Visual Description	Comments	Direction of test in relation to planes of weakness	Natural MC	Bulk Density	Width	Height	Width to Height Ratio	Unconfined Compressive Strength	Type of Failure	Point Load Test Type	Point Load Index I _{S(50)}
	m					%	Mg/m³	mm	mm		MPa			MPa
TP102	1.70	D	Pale grey brown SANDSTONE.		Perpendicular - Pd			82	50				Irregular Lump - L	0.82
TP106	1.30	D	Pale orange brown and light grey SANDSTONE.		Perpendicular - Pd			65	42				Irregular Lump - L	0.29

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APPENDIX D

Contamination Laboratory Test Results

Table 1 – Tier 1 Screening Values

Contaminant	Units	Proposed Land Use					
		Residential with homegrown produce consumption	Residential without homegrown produce consumption	Open Space* (Residential)	Open Space* (Park)	Allotments	Commercial / Industrial
Arsenic (As) [2]	mg/kg	37	40	79	170	43	640
Cadmium (Cd) [2]	mg/kg	11	85	120	555	1.9	190
Trivalent Chromium (CrIII) [2]	mg/kg	910	910	1,500	33,000	18,000	8600
Hexavalent Chromium (CrVI) [2]	mg/kg	6	6	7.7	220	1.8	33
Lead (Pb) [3]	mg/kg	200	310	630	1300	80	2330
Mercury (Hg) [1,2,7]	mg/kg	7.6-11	9.2-15	40	68-71	6.0	29-320
Selenium (Se) [2]	mg/kg	250	430	1,100	1,800	88	12,000
Nickel (Ni) [2,4]	mg/kg	130	180	230	800	53	980
Copper (Cu) [2,4]	mg/kg	2,400	7,100	12,000	44,000	520	68,000
Zinc (Zn) [2,4]	mg/kg	3,700	40,000	81,000	170,000	620	730,000
Phenol [1,2]	mg/kg	120-380	440-1200	440-1300	440-1300	23-83	440-1300
Benzo[a]pyrene [1,5]	mg/kg	1.7-2.4	2.6	4.9	10	0.67-2.7	36
Naphthalene [1,2]	mg/kg	2.3-13	2.3-13	77-430 ⁺	77-430 ⁺	4.1-24	77-430 ⁺
Total Cyanide (CN) [6]	mg/kg	/	/	/	/	/	/
Free Cyanide [6]	mg/kg	/	/	/	/	/	/
Complex Cyanides [6]	mg/kg	/	/	/	/	/	/
Thiocyanate [6]	mg/kg	/	/	/	/	/	/

Notes:

* Open Space levels calculated on the basis of the exposure modelling developed in the C4SL research.

+ Screening values constrained to saturation limit. Higher values may be acceptable on a site specific basis.

[1] Where ranges of values are given for organic contaminants the screening value is dependant on the Soil +Organic Matter.

[2] LQM/CIEH S4UL (2014). Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4UL 3116. All rights reserved.

[3] C4SL (DEFRA 2014).

[4] Copper, Zinc and Nickel may have phototoxic effects at the given concentrations. Alternative criteria should be adopted for importation of Topsoil or other soils for cultivation. BS3882:2015 and BS8601:2013 suggest values of 200 to 300mg/kg for Zn, 100 to 200mg/kg for Cu, and 60 to 110mg/kg for Ni, for topsoil and subsoil, depending on pH.

[5] Based on the Surrogate Marker approach and modelled using the modified exposure parameters of C4SL but retaining 'minimal risk' HCV.

[6] Screening criteria derived on a site specific basis if test results indicate.

[7] S4UL for Methyl Mercury, higher concentrations may be tolerable if inorganic mercury is the only species present. Lower concentrations apply for elemental Mercury.

These screening values are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.



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Analytical Report Number : 19-48719

Project / Site name:	Hamsland, Horsted Keynes	Samples received on:	05/07/2019
Your job number:	J14075	Samples instructed on:	05/07/2019
Your order number:	J14075-ES	Analysis completed by:	16/07/2019
Report Issue Number:	1	Report issued on:	16/07/2019
Samples Analysed:	12 soil samples		

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260755	1260756	1260757	1260758	1260759
Sample Reference				HA101	HA101	TP101	TP102	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.30	0.15	0.50
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				1200	1200	1530	1400	1400
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	N/A	NONE	11	7.6
Total mass of sample received				kg	0.001	NONE	0.49	0.47

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.2	6.9	6.2	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.021	0.0094	0.0069	0.0078
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	-
Sulphide	mg/kg	1	MCERTS	1.2	1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	%	0.005	MCERTS	-	-	-	-	-
Organic Matter	%	0.1	MCERTS	4.4	0.9	0.9	2.1	0.9

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260755	1260756	1260757	1260758	1260759
Sample Reference				HA101	HA101	TP101	TP102	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.30	0.15	0.50
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				1200	1200	1530	1400	1400
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.3	2.5	5.5	3.9	9.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	13	12	13	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	7.9	8.6	13	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	23	9.5	12	18	13
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.4	6.0	5.4	6.0	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	58	22	30	45	29

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260755	1260756	1260757	1260758	1260759
Sample Reference				HA101	HA101	TP101	TP102	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.30	0.15	0.50
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				1200	1200	1530	1400	1400
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-



Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260755	1260756	1260757	1260758	1260759
Sample Reference				HA101	HA101	TP101	TP102	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.30	0.15	0.50
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				1200	1200	1530	1400	1400
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs TICs

SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260755	1260756	1260757	1260758	1260759
Sample Reference				HA101	HA101	TP101	TP102	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.30	0.15	0.50
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				1200	1200	1530	1400	1400
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	-	-	-
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Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260760	1260761	1260762	1260763	1260764
Sample Reference				TP103	TP104	TP104	TP106	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50	0.10	0.90
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				0900	0900	0900	1000	1000
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	17	14	15	19	17
Total mass of sample received	kg	0.001	NONE	0.93	0.52	0.53	0.45	0.63
Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	Not-detected	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.9	-	7.2	6.0	6.6
Total Cyanide	mg/kg	1	MCERTS	-	-	-	< 1	-
Total Sulphate as SO ₄	%	0.005	MCERTS	0.018	-	0.020	-	0.018
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.010	-	0.012	0.010	0.0087
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	10.2	-	12.4	-	8.7
Sulphide	mg/kg	1	MCERTS	-	-	-	< 1.0	-
Total Sulphur	%	0.005	MCERTS	0.007	-	0.029	-	0.013
Organic Matter	%	0.1	MCERTS	-	-	-	3.7	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	-	< 0.80	-
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Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260760	1260761	1260762	1260763	1260764
Sample Reference				TP103	TP104	TP104	TP106	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50	0.10	0.90
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				0900	0900	0900	1000	1000
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	5.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	22	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	12	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	24	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	9.3	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	34	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260760	1260761	1260762	1260763	1260764
Sample Reference				TP103	TP104	TP104	TP106	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50	0.10	0.90
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				0900	0900	0900	1000	1000
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260760	1260761	1260762	1260763	1260764
Sample Reference				TP103	TP104	TP104	TP106	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50	0.10	0.90
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				0900	0900	0900	1000	1000
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs TICs

SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	0	-	-	-
SVOC % Match	%	N/A	NONE	-	0	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260760	1260761	1260762	1260763	1260764
Sample Reference				TP103	TP104	TP104	TP106	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50	0.10	0.90
Date Sampled				02/07/2019	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Time Taken				0900	0900	0900	1000	1000
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260765	1260766			
Sample Reference				TP109	TP109			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.15	0.90			
Date Sampled				02/07/2019	03/07/2019			
Time Taken				1230	1230			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	14	11			
Total mass of sample received	kg	0.001	NONE	0.47	0.53			
Asbestos in Soil				Type	N/A	ISO 17025	Not-detected	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.6	-			
Total Cyanide	mg/kg	1	MCERTS	< 1	-			
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0065	-			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-			
Sulphide	mg/kg	1	MCERTS	1.2	-			
Total Sulphur	%	0.005	MCERTS	-	-			
Organic Matter	%	0.1	MCERTS	2.6	-			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-			
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Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260765	1260766			
Sample Reference				TP109	TP109			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.15	0.90			
Date Sampled				02/07/2019	03/07/2019			
Time Taken				1230	1230			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)				mg/kg	1	MCERTS	5.6	-
Cadmium (aqua regia extractable)				mg/kg	0.2	MCERTS	< 0.2	-
Chromium (hexavalent)				mg/kg	4	MCERTS	< 4.0	-
Chromium (aqua regia extractable)				mg/kg	1	MCERTS	16	-
Copper (aqua regia extractable)				mg/kg	1	MCERTS	13	-
Lead (aqua regia extractable)				mg/kg	1	MCERTS	24	-
Mercury (aqua regia extractable)				mg/kg	0.3	MCERTS	< 0.3	-
Nickel (aqua regia extractable)				mg/kg	1	MCERTS	9.9	-
Selenium (aqua regia extractable)				mg/kg	1	MCERTS	< 1.0	-
Zinc (aqua regia extractable)				mg/kg	1	MCERTS	58	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10			

Analytical Report Number: 19-48719

Project / Site name: Hamsland, Horsted Keynes

Your Order No: J14075-ES

Lab Sample Number				1260765	1260766			
Sample Reference				TP109	TP109			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.15	0.90			
Date Sampled				02/07/2019	03/07/2019			
Time Taken				1230	1230			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-			
Phenol	mg/kg	0.2	ISO 17025	-	-			
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-			
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-			
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-			
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-			
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-			
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-			
2-Methylphenol	mg/kg	0.3	MCERTS	-	-			
Hexachloroethane	mg/kg	0.05	MCERTS	-	-			
Nitrobenzene	mg/kg	0.3	MCERTS	-	-			
4-Methylphenol	mg/kg	0.2	NONE	-	-			
Isophorone	mg/kg	0.2	MCERTS	-	-			
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-			
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-			
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-			
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-			
Naphthalene	mg/kg	0.05	MCERTS	-	-			
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-			
4-Chloroaniline	mg/kg	0.1	NONE	-	-			
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-			
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-			
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-			
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-			
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-			
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-			
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-			
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-			
Acenaphthylene	mg/kg	0.05	MCERTS	-	-			
Acenaphthene	mg/kg	0.05	MCERTS	-	-			
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-			
Dibenzofuran	mg/kg	0.2	MCERTS	-	-			
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-			
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-			
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-			
Fluorene	mg/kg	0.05	MCERTS	-	-			
Azobenzene	mg/kg	0.3	MCERTS	-	-			
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-			
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-			
Phenanthrene	mg/kg	0.05	MCERTS	-	-			
Anthracene	mg/kg	0.05	MCERTS	-	-			
Carbazole	mg/kg	0.3	MCERTS	-	-			
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-			
Anthraquinone	mg/kg	0.3	MCERTS	-	-			
Fluoranthene	mg/kg	0.05	MCERTS	-	-			
Pyrene	mg/kg	0.05	MCERTS	-	-			
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-			
Chrysene	mg/kg	0.05	MCERTS	-	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-			



Analytical Report Number: 19-48719
Project / Site name: Hamsland, Horsted Keynes
Your Order No: J14075-ES

Lab Sample Number				1260765	1260766			
Sample Reference				TP109	TP109			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.15	0.90			
Date Sampled				02/07/2019	03/07/2019			
Time Taken				1230	1230			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs TICs

SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			



Analytical Report Number: 19-48719
Project / Site name: Hamsland, Horsted Keynes
Your Order No: J14075-ES

Lab Sample Number				1260765	1260766			
Sample Reference				TP109	TP109			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.15	0.90			
Date Sampled				02/07/2019	03/07/2019			
Time Taken				1230	1230			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-			
PCB Congener 52	mg/kg	0.001	MCERTS	-	-			
PCB Congener 101	mg/kg	0.001	MCERTS	-	-			
PCB Congener 118	mg/kg	0.001	MCERTS	-	-			
PCB Congener 138	mg/kg	0.001	MCERTS	-	-			
PCB Congener 153	mg/kg	0.001	MCERTS	-	-			
PCB Congener 180	mg/kg	0.001	MCERTS	-	-			
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-			



Analytical Report Number : 19-48719

Project / Site name: Hamsland, Horsted Keynes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1260755	HA101	None Supplied	0.10	Light brown sandy clay with gravel and vegetation.
1260756	HA101	None Supplied	0.50	Light brown sand.
1260757	TP101	None Supplied	0.30	Brown clay and sand with gravel and vegetation.
1260758	TP102	None Supplied	0.15	Brown clay and sand with gravel and vegetation.
1260759	TP102	None Supplied	0.50	Brown sandy clay with vegetation.
1260760	TP103	None Supplied	1.00	Brown clay with vegetation.
1260761	TP104	None Supplied	0.15	Brown clay and sand with vegetation and gravel
1260762	TP104	None Supplied	0.50	Brown sandy clay with vegetation.
1260763	TP106	None Supplied	0.10	Brown clay and loam with vegetation and gravel
1260764	TP106	None Supplied	0.90	Light brown sandy clay with vegetation.
1260765	TP109	None Supplied	0.15	Brown clay and sand with gravel and vegetation.
1260766	TP109	None Supplied	0.90	Light brown clay and sand with gravel and vegetation.

Analytical Report Number : 19-48719

Project / Site name: Hamsland, Horsted Keynes

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Tentatively identified compounds (SVOC) in soil	Determination of semi-volatile organic compounds total ion count in soil by extraction with dichloromethane and hexane followed by GC-MS followed by a full library scan.	In-house method based on USEPA 8270	L064-PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-48719

Project / Site name: Hamsland, Horsted Keynes

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX E

Photographs



Plate 1 – General view of the site looking north (18/06/2019)



Plate 2 – Above ground storage tank within north-east parcel of adjoining land (18/06/19)



Plate 3 – Typical Trial Pit (TP105) with arisings (02/07/19)

APPENDIX F

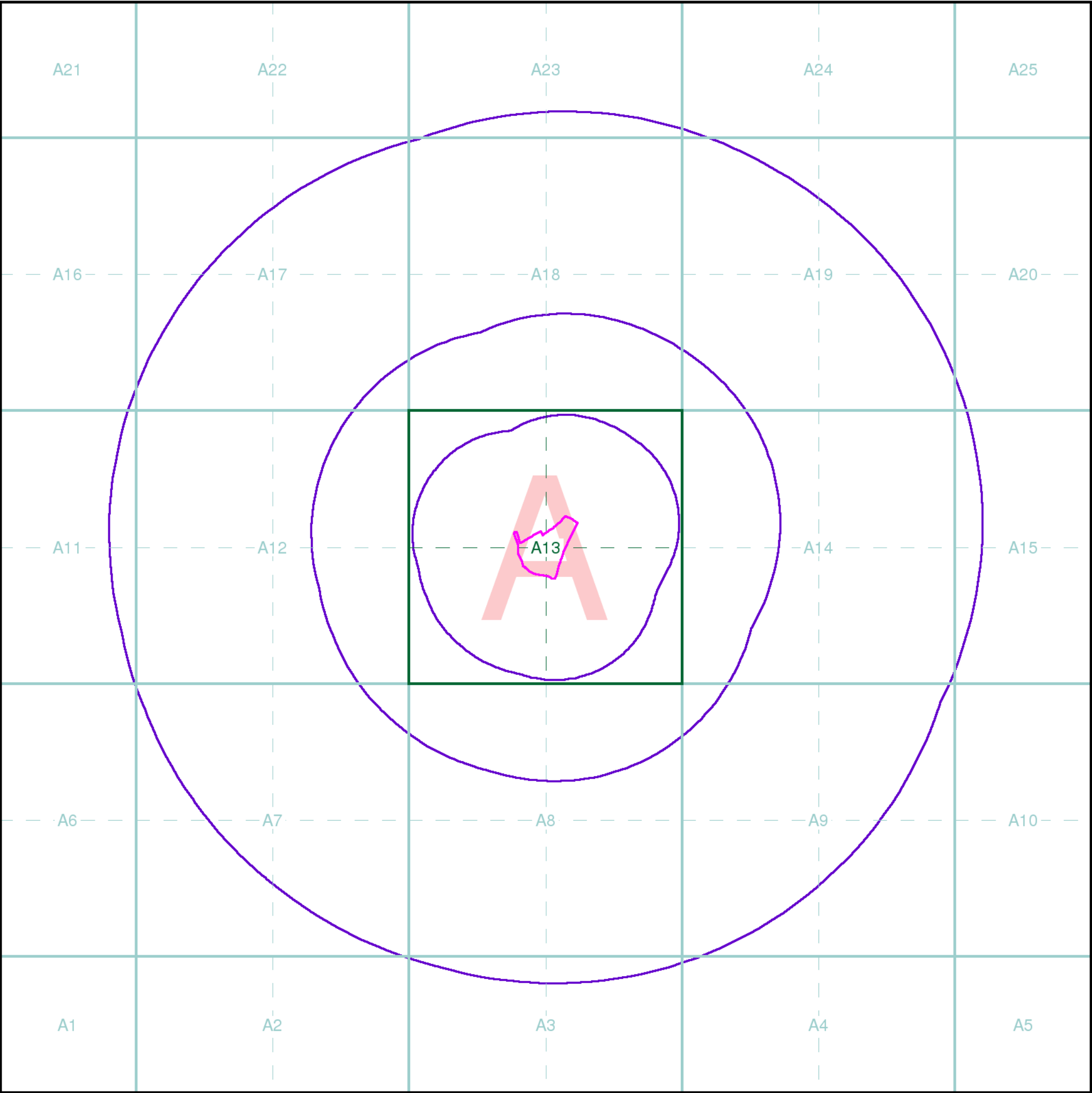
Desk Study Results

Historical Ordnance Survey Map Interpretation				
Map Date	Scale	Features on site	Features in surrounding area	Significant Potential Contamination Sources
1875	1:2,500	The site is part of an open field, with the north-west tip partly located within a smaller field that has a couple of trees shown.	The field has isolated trees along the eastern and southern boundaries of the site. A track/path leads from the north-west tip of the site to a pair dwellings (100m to the north-east of the site, including Burghurst Lodge labelled on the 1952-1982 map edition). There are a couple of buildings shown 30-40m to the north of site adjacent to this track (including Burghurst Cottage, labelled on 1975 map edition). The surrounding area comprises of a mixture of agricultural fields and small woods.	
1897-1899	1:2,500	No significant changes.	North of the cross-roads, near Burghurst Lodge, shown are further dwellings with wells. Also, the isolated trees along the field boundaries and in field at north-west tip of the site are not shown on this map edition.	
1910	1:2,500	No significant changes.	New buildings are shown at Hamsland Farm (150m to south-west of the site).	
1956	1:2,500	No significant changes.	Buildings associated with Milford Place (labelled on 1975 map edition) are shown within 10m to the east of the site. A 100m north-east residential properties (including the Orchard as labelled on 1975 map edition) are shown and reference to "Buckhurst Nurseries and Piggeries". Along Lewes Road (100m north-west of the site) a number of residential properties have been built. Hamsland Road west is under construction with new dwellings on north side. A playground is shown, within the recreational ground, 75m to the north of the site.	

Historical Ordnance Survey Map Interpretation				
Map Date	Scale	Features on site	Features in surrounding area	Significant Potential Contamination Sources
1956-1982	1:2,500	No significant changes.	No significant changes.	
1975	1:2,500	At the north western edge of the site a new church (St. Stephen's) has been built, with the church-yard shown extending within the site. The north-west tip of land looks to form part of an access track from Hamsland Road.	Adjacent to the access, at the north-west tip of the site, an electricity substation is shown. Hamsland Road has been extended east, with residential properties shown on the north of Hamsland Road and new properties on the south side (15m north and 25m west of the site, respectively). Further north a new residential development is also shown around an estate road called the Challoners. Burghurst Cottage garden is shown extended further south, now within 10m of the site. 15m north-east of the site are new residential properties, with a garden bordering the original land boundary. At Milford Place an outbuilding adjacent to the site (5m to north-east) has been extended.	Possible made ground – shallow fill (associated with the churchyard and field access). Possible PCBs (from the adjacent electricity substation).
1976	1:10,000	No significant changes.	A number of industrial sites are noted in the surrounding area. 425m south of the site is Sand Pit Wood; 750m NW of the site is a Sewage Works; 1000m WNW and SW is a "Chalk Pit" and "Allen's Pit" (respectively); 1000m NNW is former ironworks with a Pond Bay (labelled on 2000 map edition).	
1977	1:2,500	No significant changes.	No significant changes.	
1984	1:2,500	At the north western edge of the site, adjacent to the church, the southern boundary of the churchyard is shown located further north along the present day position.	On the west side of the access track (from 10m of the site), are couple of new residential properties are shown. Along the northern side of site are several new residential properties (within 20m of the site) are shown, with gardens bordering the site.	Possible made ground (associated with the any reinstatement of field from the former churchyard).

Historical Ordnance Survey Map Interpretation				
Map Date	Scale	Features on site	Features in surrounding area	Significant Potential Contamination Sources
1993	1:2,500	No significant changes.	Along the northern side of site is residential properties (within 20m of the site) are now shown with gardens subdivided. There is also a new residential property 10m north-east corner of the site, with the garden bordering the site.	
1999	Aerial photography	At the north eastern corner of the original land extents is an area of exposed soil is visible that might be part of a vegetable plot.	No significant changes.	
2000	1:10,000	At the north eastern corner of the site a new field boundary is shown, creating a separate parcel of land within the main field, which includes the vegetable plot field. Note the client's topographic survey drawing (dated 2018) shows the northern part of this field boundary, bordering the vegetable plot, as a hedge and the eastern part of this boundary, bordering a small wooded area, is shown as a fence.	No significant changes.	
2006	1:10,000	No significant changes.	No significant changes.	
2019	1:10,000	This Raster map edition shows the north-east parcel of land (part of the original land extents) with green shading, indicating an area of wooded vegetation.	No significant changes.	

NOTE: Additional maps at 1:10,560 and 1:10000 scale of similar age have been obtained. These maps are appended but do not provide much additional information.



Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details
MR D Spearman, Southern Testing, Keeble House, Stuart Way, East Grinstead, West Sussex, RH19 4QA

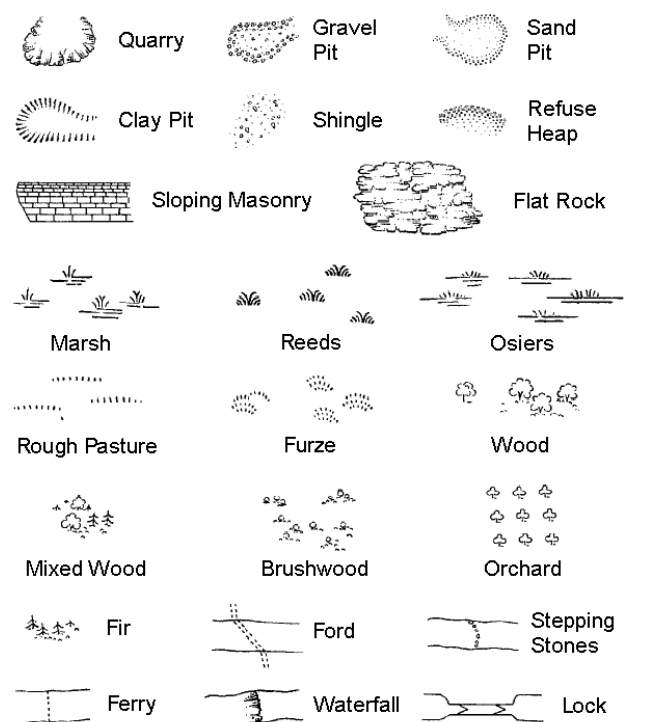
Order Details
Order Number: 203968904_1_1
Customer Ref: J14075 JL Horsted Keynes
National Grid Reference: 538430, 127860
Site Area (Ha): 1.24
Search Buffer (m): 1000

Site Details
33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS

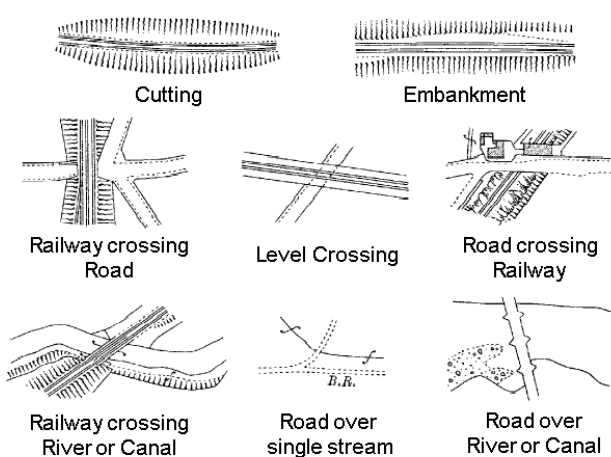
Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>

Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



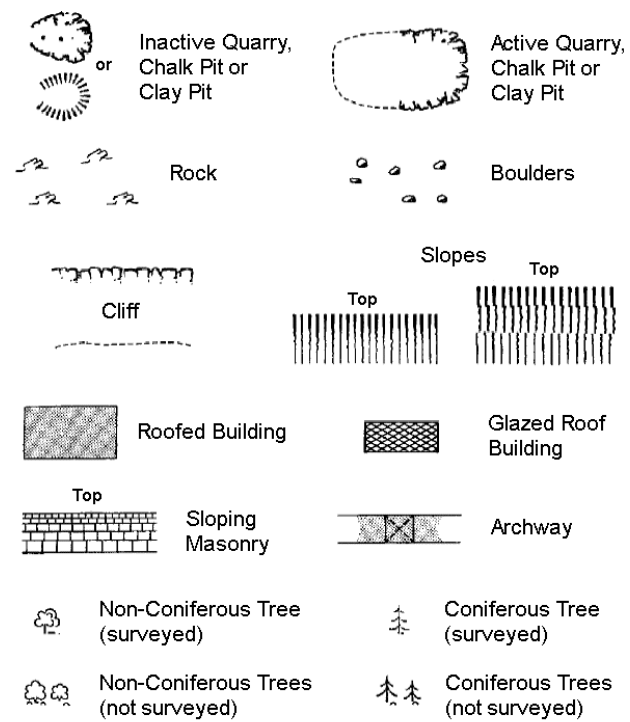
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	Arrow denotes flow of water		Antiquities (site of)



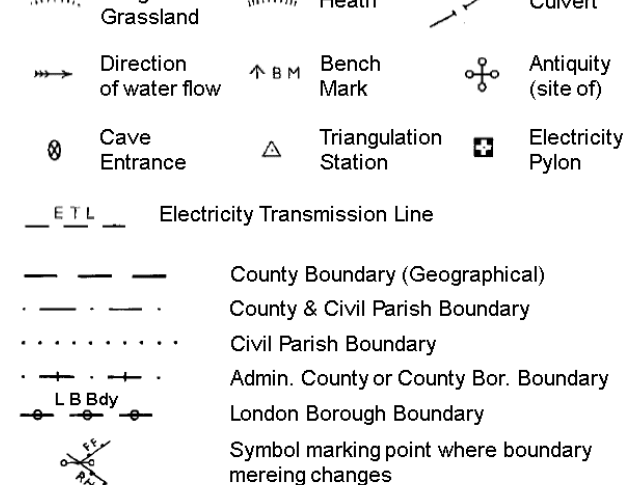
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- . - . - .	County & Civil Parish Boundary
+ . + . + .	Administrative County & Civil Parish Boundary
-----	County Borough Boundary (England)
Co. Boro. Bdy.	
-----	County Burgh Boundary (Scotland)
Co. Burgh Bdy.	

<i>B.P.B.S.</i>	Boundary Post or Stone	<i>P.C.B.</i>	Police Call Box
<i>B.R.</i>	Bridle Road	<i>P.</i>	Pump
<i>E.P.</i>	Electricity Pylon	<i>S.P.</i>	Signal Post
<i>F.B.</i>	Foot Bridge	<i>Sl.</i>	Sluice
<i>F.P.</i>	Foot Path	<i>Sp.</i>	Spring
<i>G.P.</i>	Guide Post or Board	<i>T.C.B.</i>	Telephone Call Box
<i>M.S.</i>	Mile Stone	<i>Tr.</i>	Trough
<i>M.P.M.R.</i>	Mooring Post or Ring	<i>W.</i>	Well

Ordinance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information

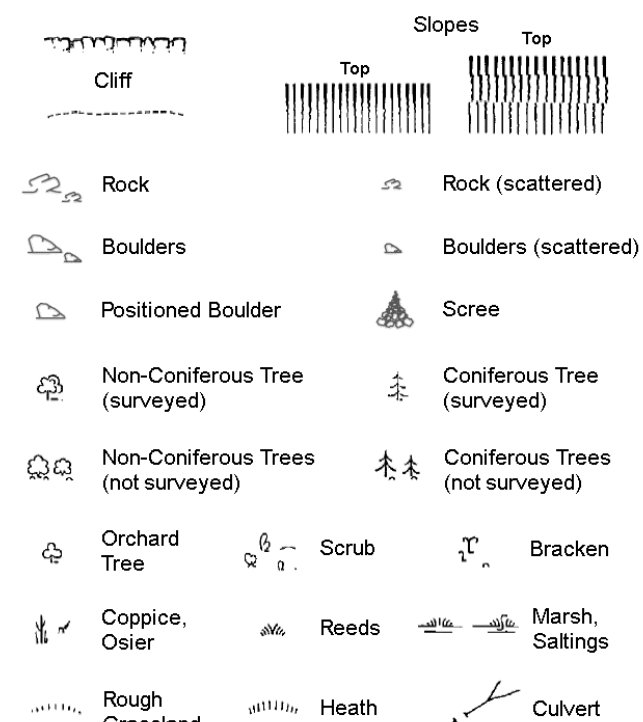


	Orchard Tree		Scrub		Bracken
	Coppice, Osier		Reeds		Marsh, Saltings



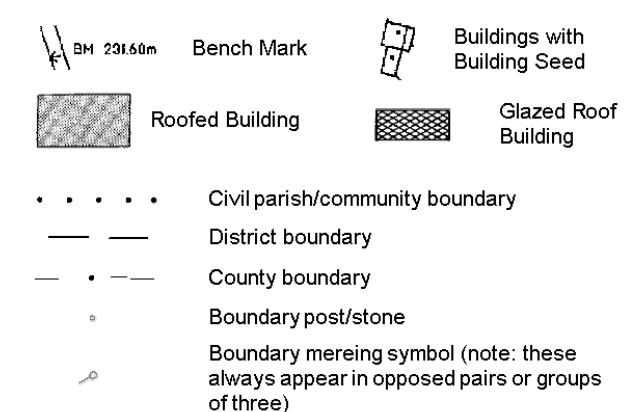
BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
EI P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



 Direction of water flow
  Triangulation Station
  Antiquity (site of)

E T L Electricity Transmission Line
  Electricity



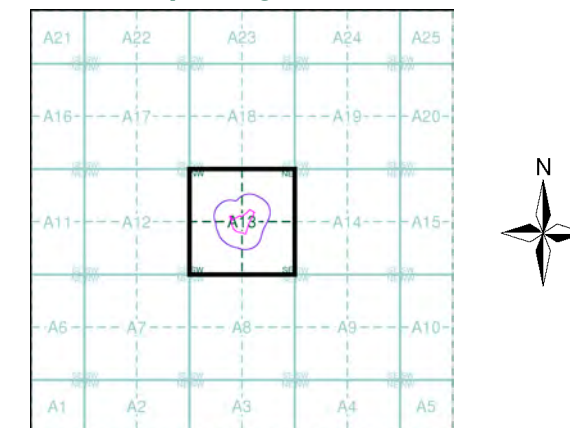
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governor	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Sussex	1:2,500	1875	2
Sussex	1:2,500	1897 - 1899	3
Sussex	1:2,500	1910	4
Sussex	1:2,500	1938	5
Ordnance Survey Plan	1:2,500	1956	6
Additional SIMs	1:2,500	1956 - 1982	7
Supply of Unpublished Survey Information	1:2,500	1975	8
Supply of Unpublished Survey Information	1:2,500	1975	9
Ordnance Survey Plan	1:2,500	1977	10
Additional SIMs	1:2,500	1977	11
Additional SIMs	1:2,500	1984	12
Large-Scale National Grid Data	1:2,500	1993	13
Historical Aerial Photography	1:2,500	1999	14

Historical Map - Segment A13



Order Details

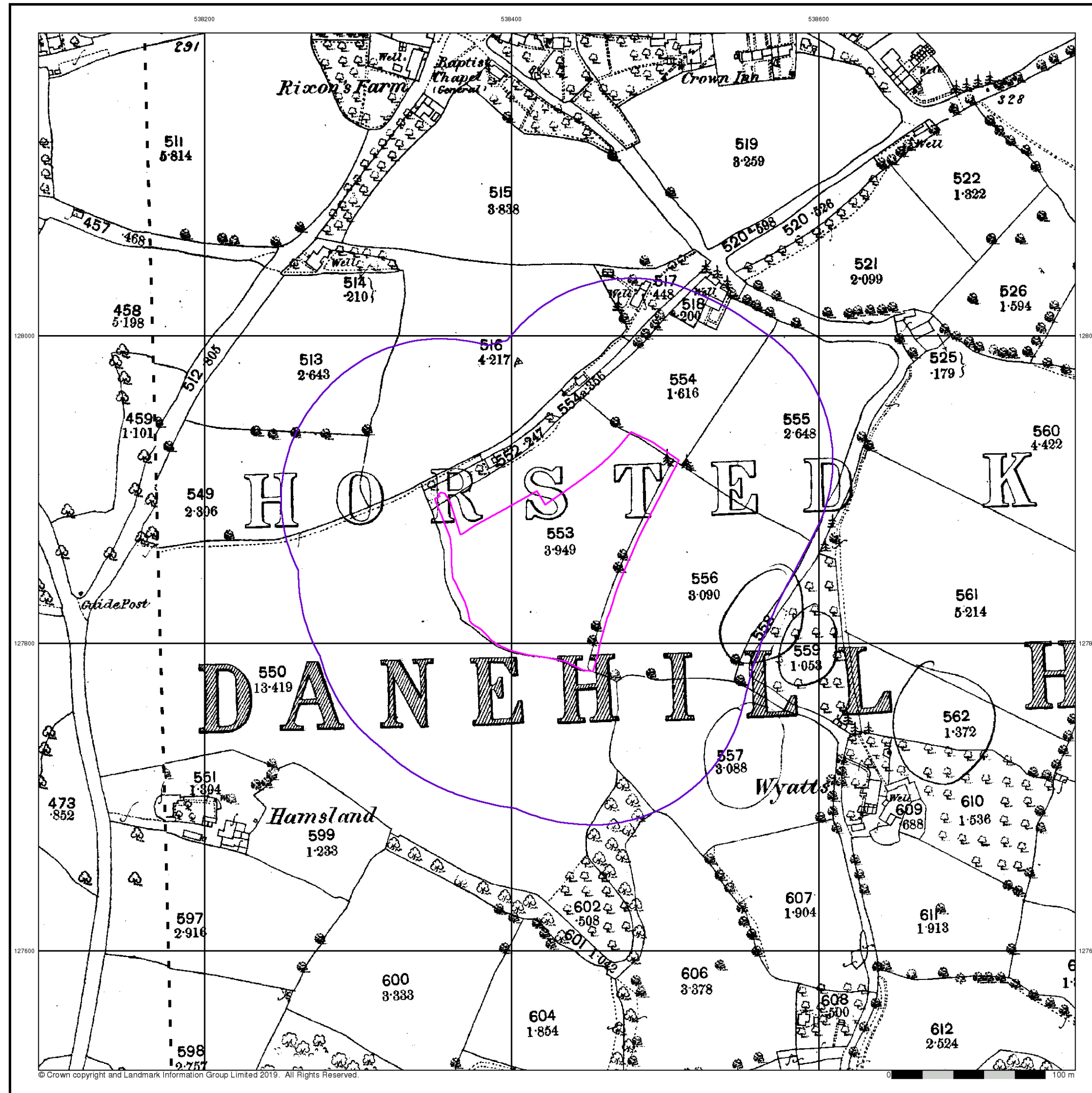
Order Number: 203968904_1_1
Customer Ref: J14075 JL Horsted Keynes
National Grid Reference: 538430, 127870
Slice: A
Site Area (Ha): 1.24
Search Buffer (m): 100

Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17
7DS

Landmark
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



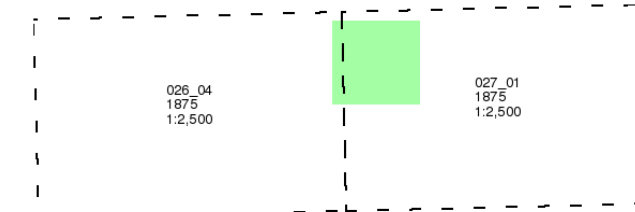
Sussex

Published 1875

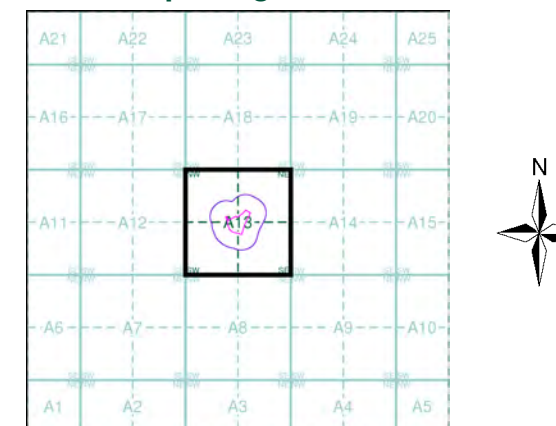
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

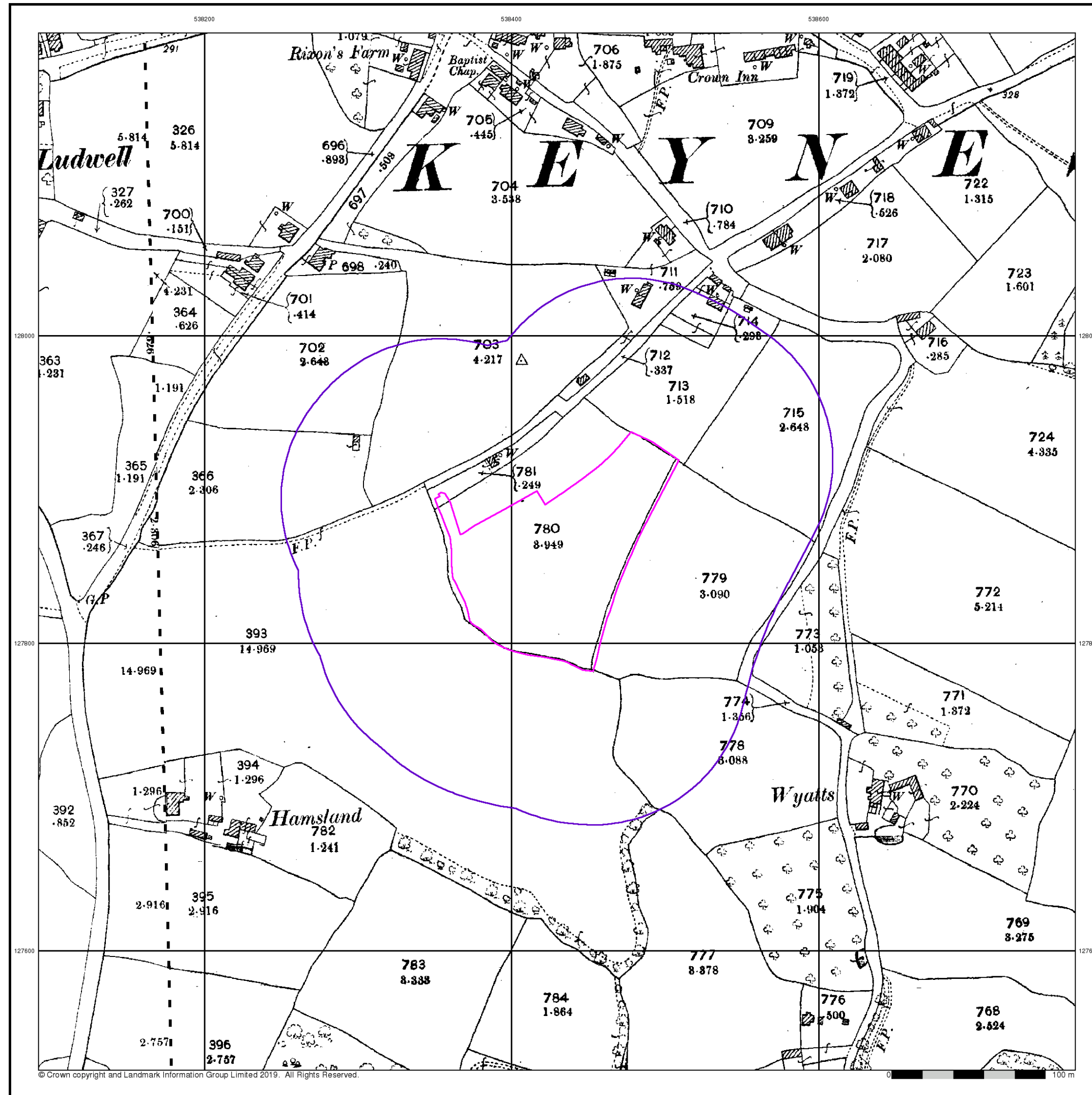


Order Details

Order Number: 203968904_1_1
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National Grid Reference: 538430, 127870
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Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS



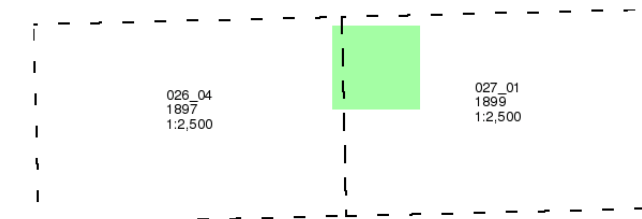
Sussex

Published 1897 - 1899

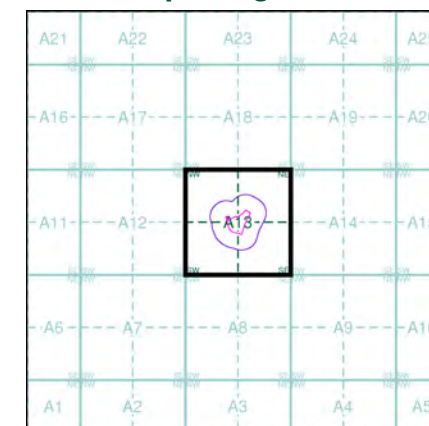
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

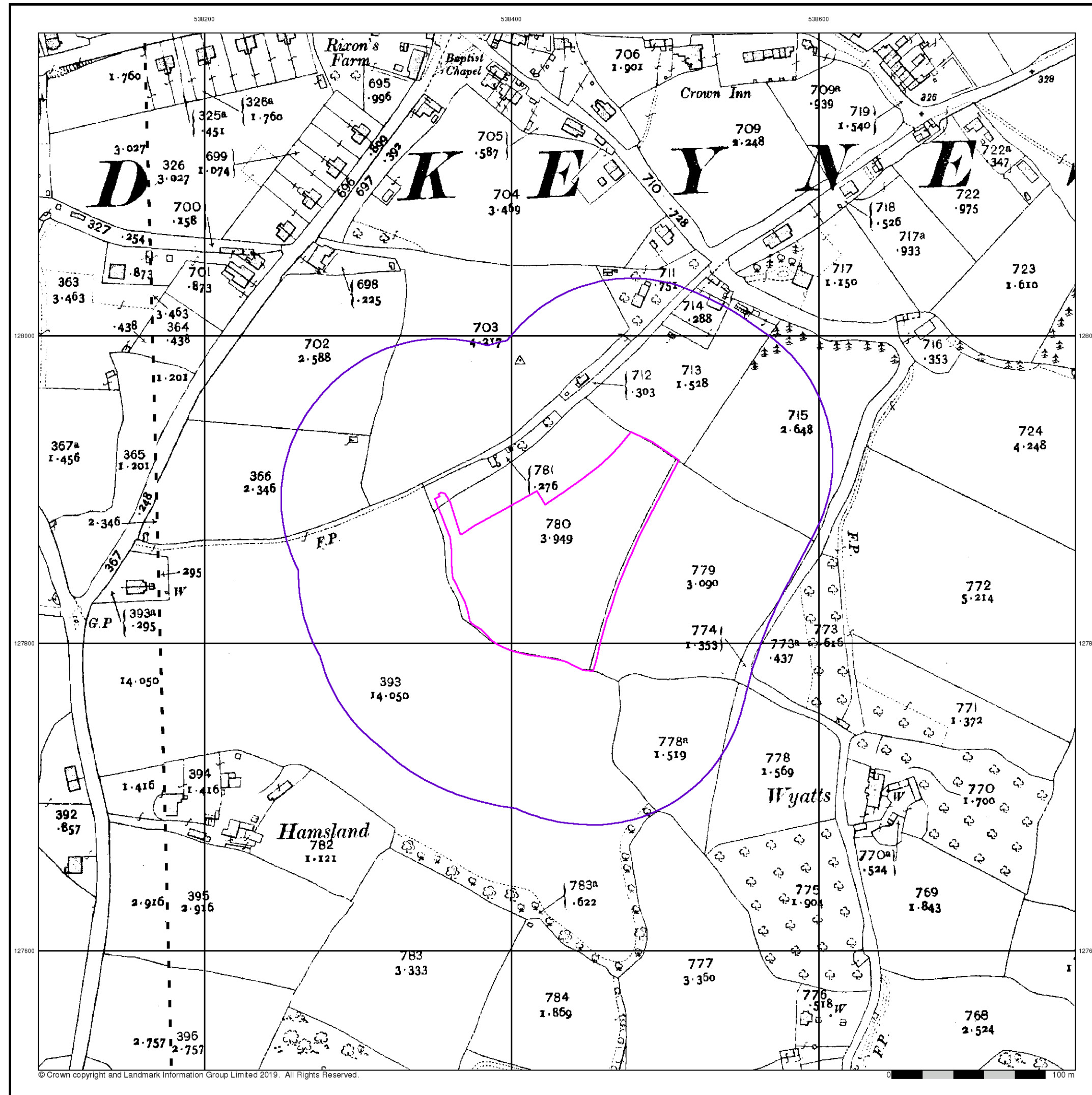


Order Details

Order Number: 203968904_1_1
Customer Ref: J14075 JL Horsted Keynes
National Grid Reference: 538430, 127870
Slice: A
Site Area (Ha): 1.24
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Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS



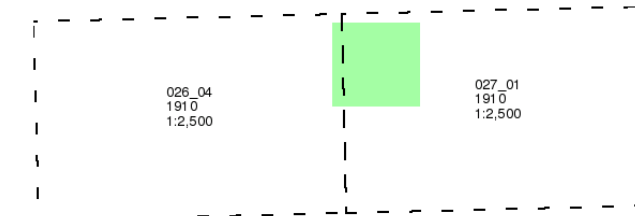
Sussex

Published 1910

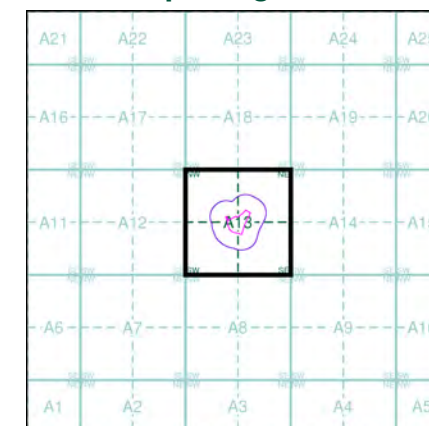
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS



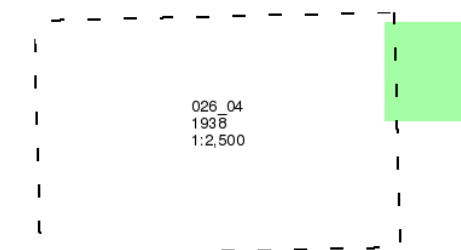
Sussex

Published 1938

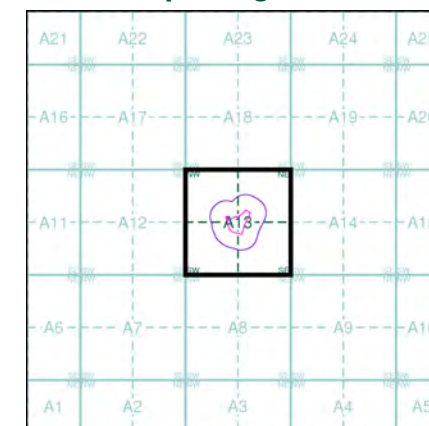
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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Historical Map - Segment A13



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Site Area (Ha): 1.24
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Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS

Ordnance Survey Plan

Published 1956

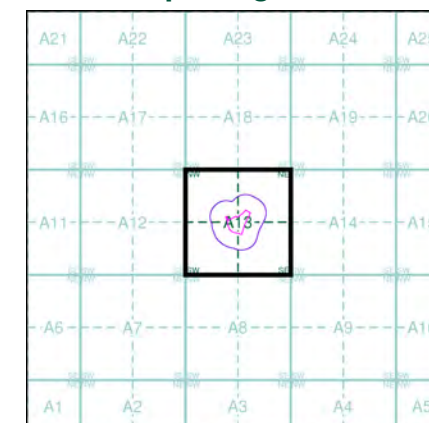
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

TQ3828	1956	1:2,500
TQ3827	1956	1:2,500

Historical Map - Segment A13

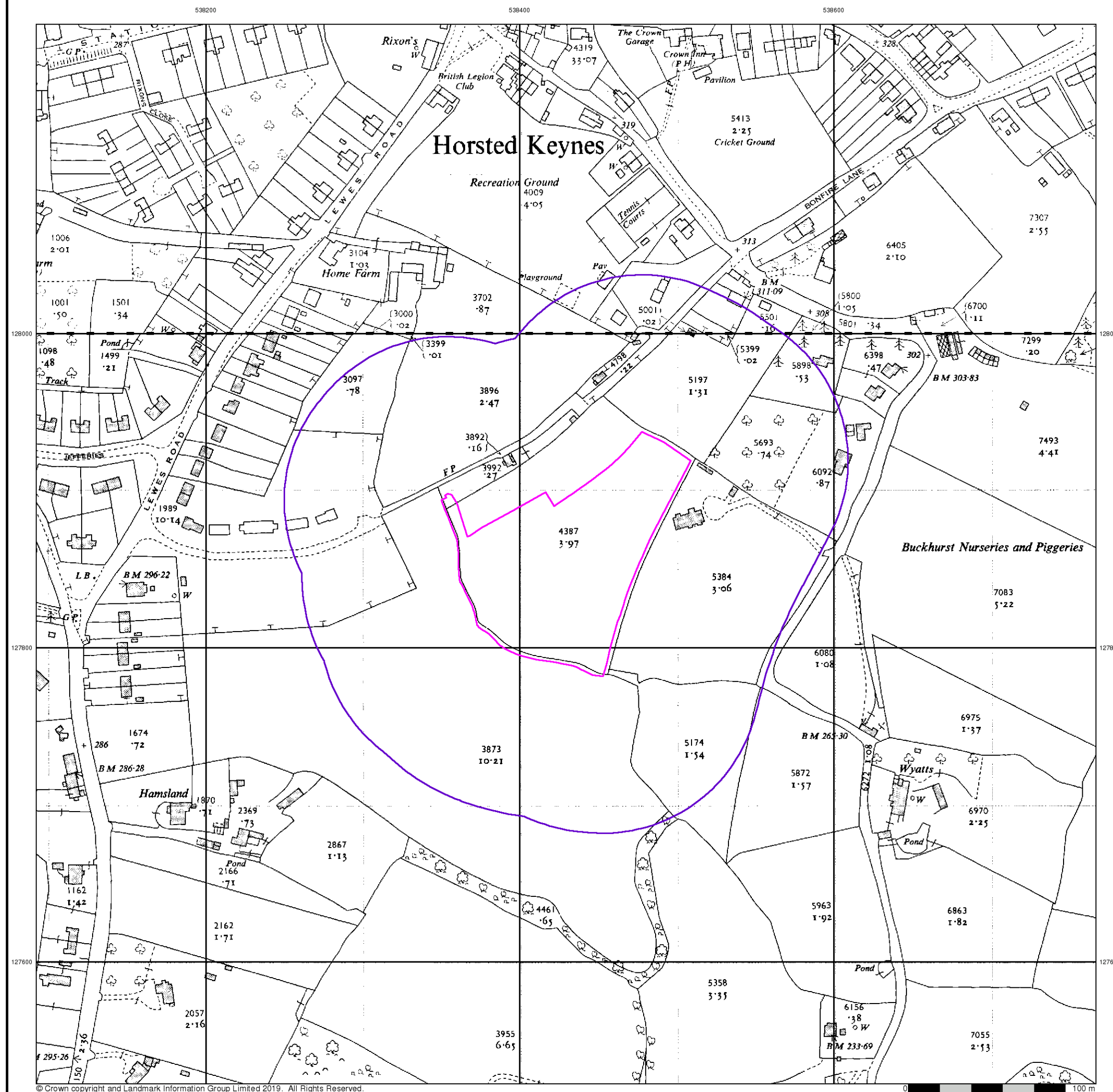


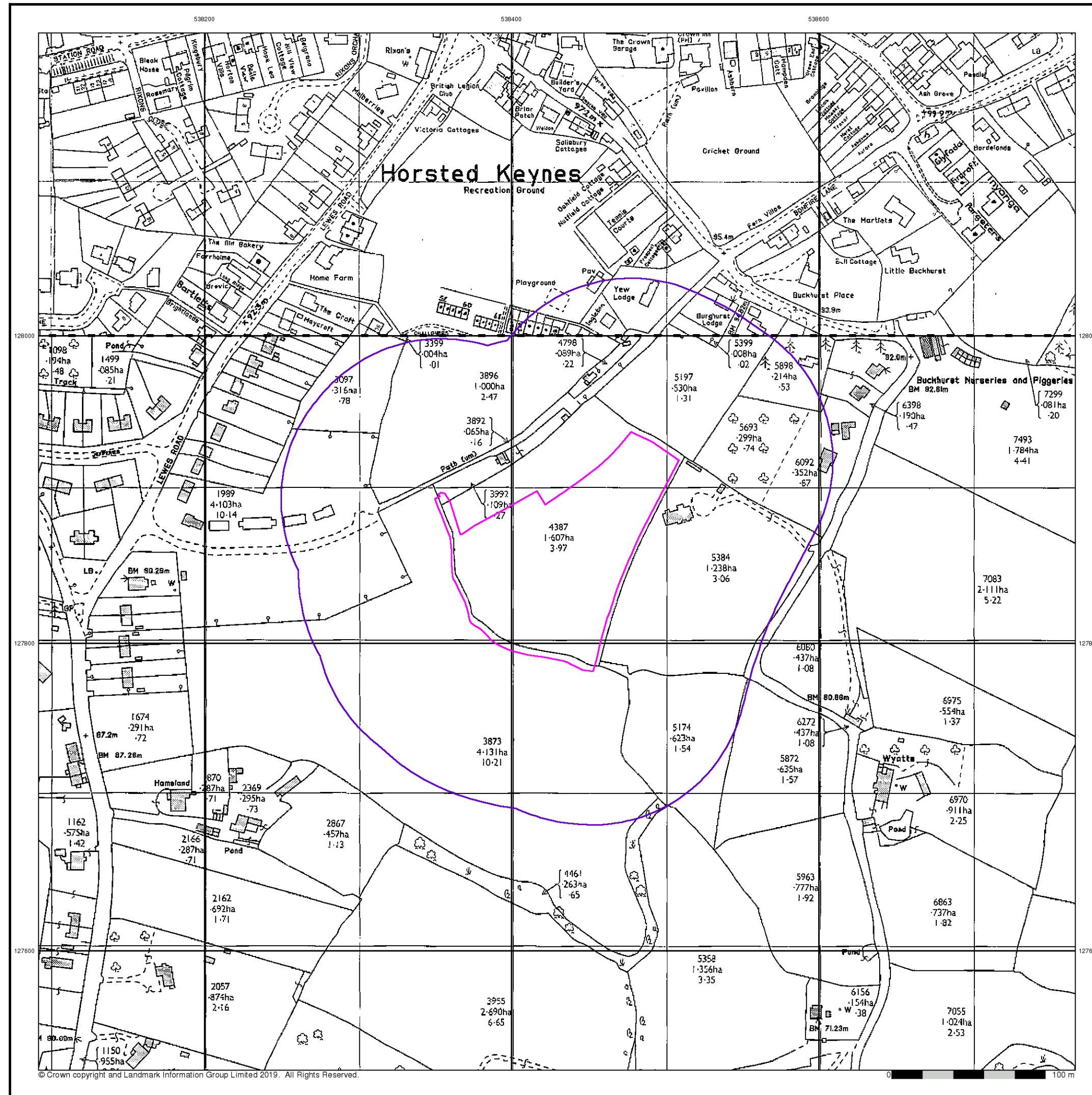
Order Details

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Slice: A
Site Area (Ha): 1.24
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Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS





Additional SIMs

Published 1956 - 1982

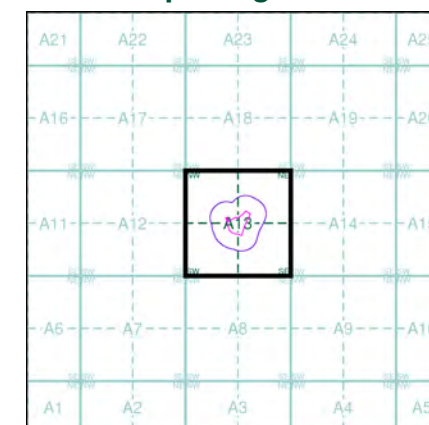
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

TQ3828	1982	1:2,500
TQ3827	1956	1:2,500

Historical Map - Segment A13

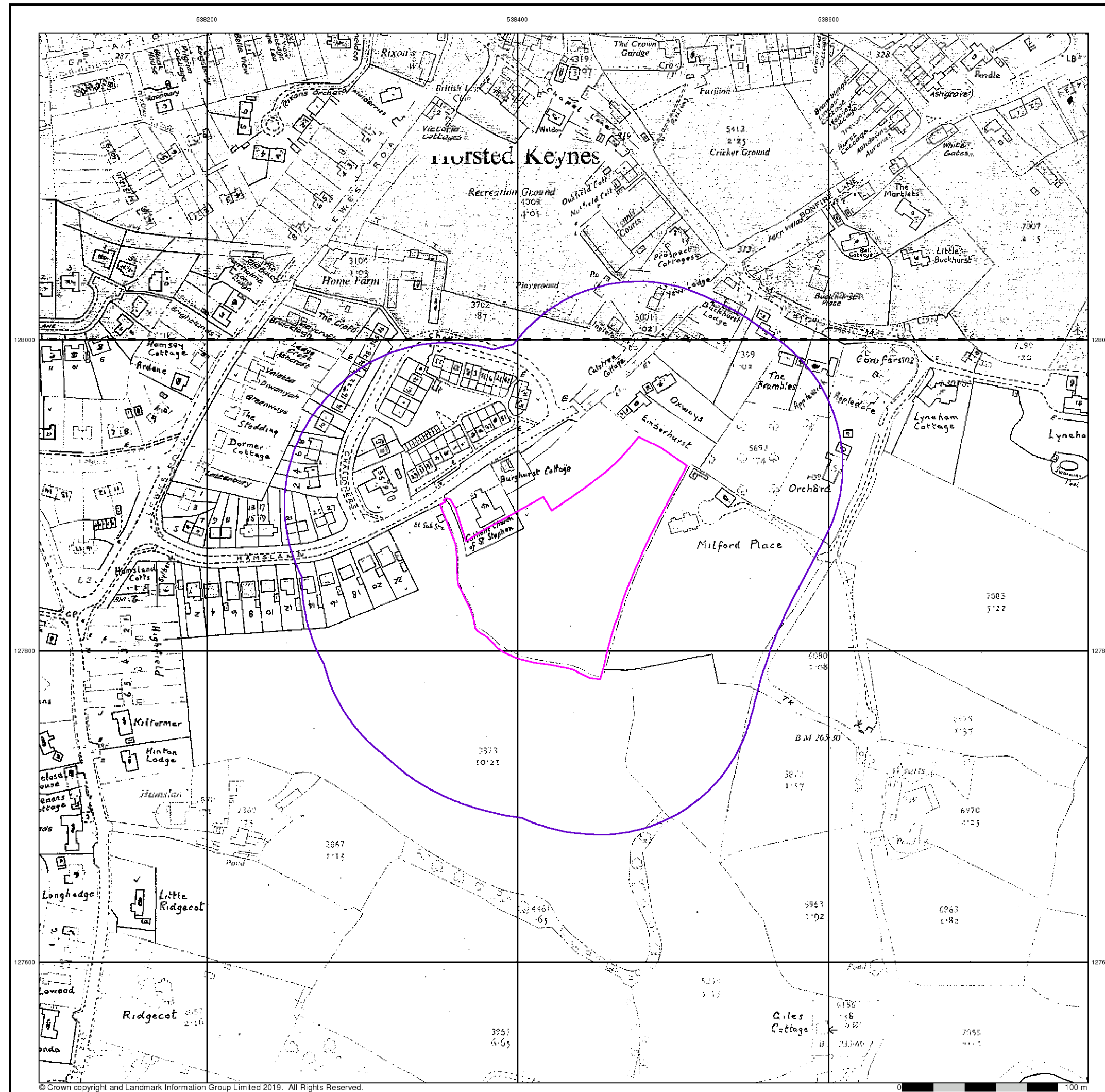


Order Details

Order Number: 203968904_1_1
Customer Ref: J14075 JL Horsted Keynes
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Slice: A
Site Area (Ha): 1.24
Search Buffer (m): 100

Site Details

33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS



Supply of Unpublished Survey Information

Published 1975

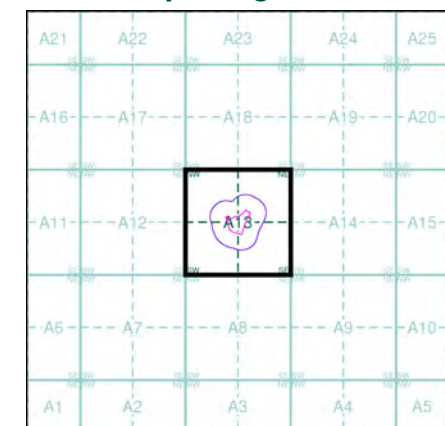
Source map scale - 1:2,500

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

TQ3828	1975	1:2,500
TQ3827	1975	1:2,500

Historical Map - Segment A13

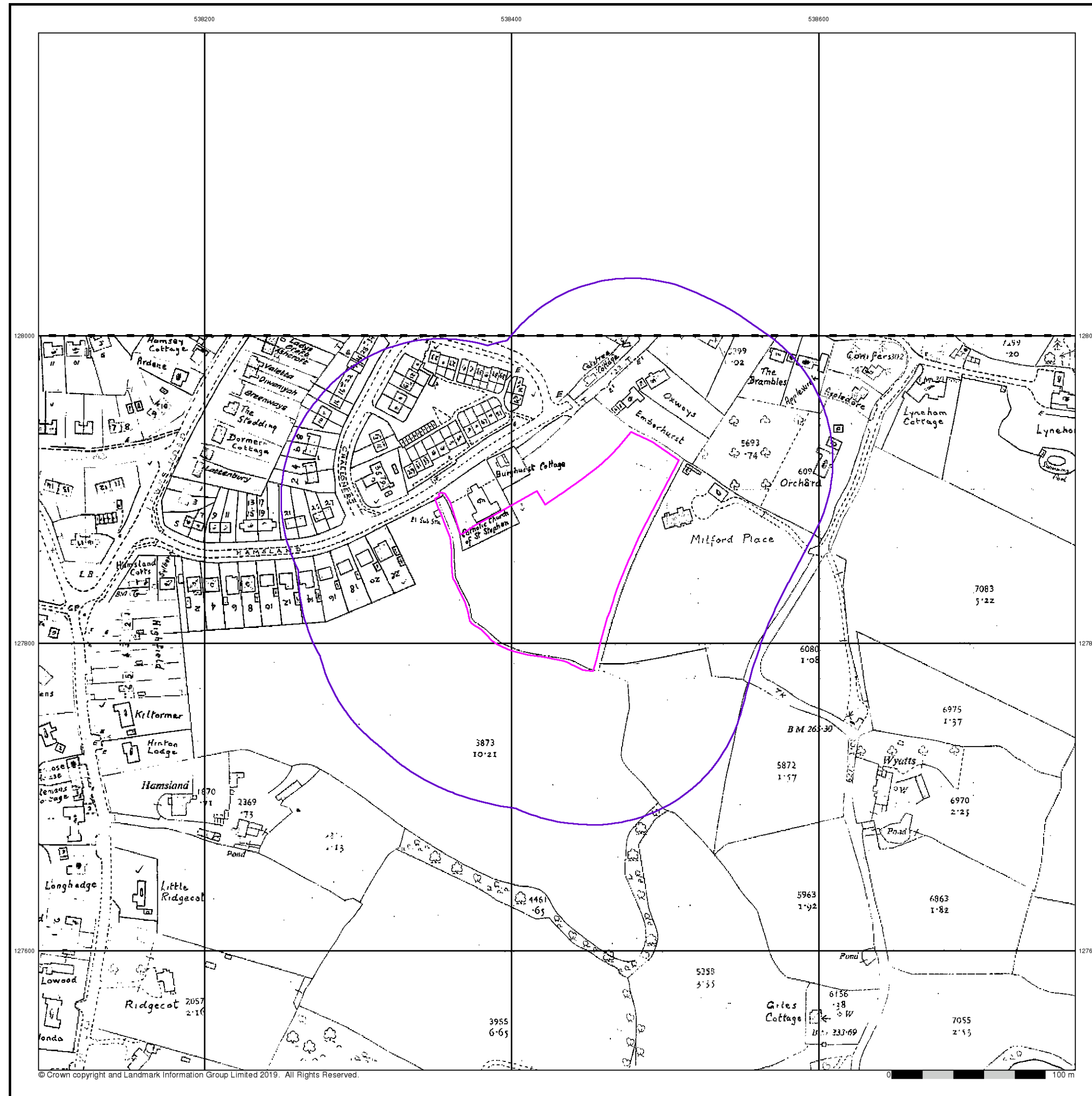


Order Details

Order Number: 203968904_1_1
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National Grid Reference: 538430, 127870
Slice: A
Site Area (Ha): 1.24
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Site Details

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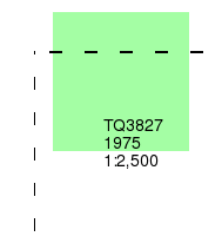
Supply of Unpublished Survey Information

Published 1975

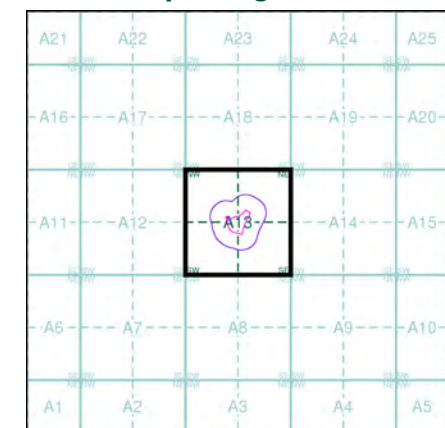
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



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Site Details

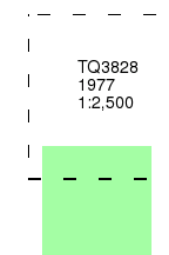
33, Hamsland, Horsted Keynes, HAYWARDS HEATH, RH17 7DS



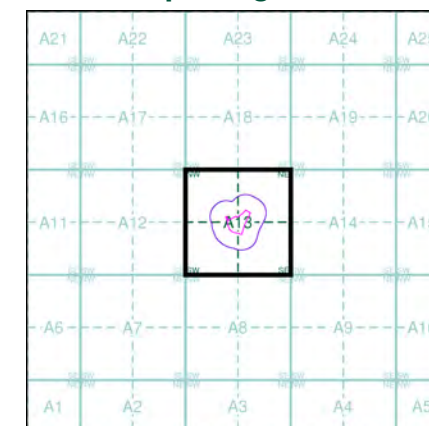
Ordnance Survey Plan
Published 1977
Source map scale - 1:2,500

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