



IN SITU PERCOLATION TEST REPORT

**PLUMMERDEN LODGE
LINDFIELD
WEST SUSSEX**

PROJECT REFERENCE: P16924

REPORT REFERENCE: R16496

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1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ percolation testing to assist others in the design of a drainage field to serve a new sewage treatment plant at Plummerden Lodge, Lindfield, West Sussex.

The specific objectives of the works were to:

- a) Establish the expected geology and hydrogeology at the site;
- b) Investigate the shallow ground and groundwater conditions at the test locations; and
- c) Undertaken in situ percolation testing and provide calculated percolation values for the soils tested.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q14713, dated 15th November 2024. The instruction to proceed was received on behalf of the client, from H T Partnership.

2. SITE CONTEXT

2.1 Site Location

The site is located at Plummerden Lodge, Lindfield, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 536211, 126874. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological Setting

2.2.1 *Expected Geology and Aquifer Designation*

The stratigraphic succession that may be expected to underlie the site has been established by reference to British Geological Survey (BGS) mapping and the BGS Lexicon of Named Rock Units. The expected stratigraphy is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Bedrock	Cuckfield Stone Bed	Secondary A Aquifer
	Grinstead Clay Member	Unproductive Stratum

Both the Cuckfield Stone Bed and Grinstead Clay Member form part of the Tunbridge Wells Sand Formation which in turn forms part of the Wealden Group. The formation is of Valanginian age (133.9 to 139.4 million years old; Early Cretaceous). The Tunbridge Wells Sand Formation predominantly comprises repeating sequences of fine to medium grained sandstone, siltstone and silty sand with finely-bedded mudstones and thin limestones. In the western High Weald (between Haywards Heath and Tunbridge Wells) the formation can be divided into three, the informally named Lower and Upper Tunbridge Wells Sand and the intervening Grinstead Clay Member. The succession commences with rhythmically bedded sandstones, siltstones and mudstones of the lower part of the Lower Tunbridge Wells Sand which pass up into the massive sandstones of the Ardingly Sandstone Member. These are overlain by the finely bedded mudstones, mudstones and silty mudstones with subordinate clay ironstones and shelly limestones of the Grinstead Clay Member. This clay member is itself locally divided into upper and lower parts by the cross-bedded fine sandstone of the Cuckfield Stone Bed. Above the Grinstead Clay Member, the Upper Tunbridge Wells Sand comprises a generally more argillaceous rhythmic succession, including mudstones, siltstones and silty sandstones. Outside the western High Weald the Grinstead Clay Member is not recognisable and the succession is mapped as undivided Tunbridge Wells Sand Formation. The formation is recorded by the BGS to range in thickness up to 122m.

2.2.2 *Groundwater Source Protection Zones (SPZ)*

The Environment Agency defines SPZs as those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption.

The site does not lie within a SPZ.

3. SITE WORKS

The intrusive site works comprised the excavation of a series of hand dug trial pits to enable in-situ percolation testing¹ to be carried out in the proposed drainage field area. The intrusive work was carried out on 26th and 27th November 2024. The exploratory hole locations are shown on Figure 2.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the appended exploratory hole records, together with explanatory notes to assist in their interpretation.

It is noted that initially it was proposed to excavate two trial pits, TP01 and TP02, to carry out in situ percolation testing. However, during the first two tests the water levels within the pits were noted to rise due to the ingress of water from the surrounding soils during the saturation test period. Further pits were therefore excavated, with trial pits TP03, TP05 and TP06 excavated to attempt further percolation testing and pits TP04 and TP07 dug to monitor the rise of the water ingress into the trial pits.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 *Surface Covering*

Each of the exploratory holes was excavated through a surface cover of topsoil over subsoil, some 350mm to 400mm in thickness.

4.1.2 *Tunbridge Wells Sand Formation*

Underlying the topsoil/subsoil, the investigation progressed into undisturbed slightly sandy silty clay deposits which continued to the full depth of excavation.

It can be difficult to distinguish between the individual members and beds which form the Tunbridge Wells Sand Formation, and therefore, particularly given the shallow depth of the investigation, the natural soils have been denoted as being part of the Tunbridge Wells Sand Formation deposits for the purposes of this report.

4.2 Stability

Each of the shallow exploratory holes was recorded to remain stable during the course of excavation.

4.3 Groundwater Conditions

Ingress of water was noted at various depths within the shallow trial pits, in general noted to be filling the pits while they remained open.

¹ Conducted in general accordance with the requirements of BS6297:2007 + A1:2008, Code of practice for the design and installation of drainage fields for use in wastewater treatment.

5. IN SITU PERCOLATION TESTING

In-situ percolation testing² was carried out in trial pits TP01 to TP07. The trial pits were excavated to depths of between 0.40m and 0.80m below ground level and were 300mm by 300mm in plan to form the test cell.

For the saturation part of the test a 300mm cube test cell should be filled with water and left to completely seep away. However, during this part of the test, water levels within the majority of the pits were noted to be rising due to ingress of water into the pits. Trial pits TP04 and TP07 were not filled with water and were instead left to observe the groundwater ingress into the pits over the same period.

Table 2. Summary of Saturation Testing

Exploratory Hole	Trial Pit Test Depth (m bgl)	Water Filled to Depth (m bgl)	Water Depth at End of Saturation Period (m bgl)	Length of Saturation Period (mins)	Time Taken for Water to Fully Drain Was Less than 6 Hours
TP01	0.80	0.50	0.02	1430.00	No
TP02	0.80	0.50	0.00	1455.00	No
TP03	0.40	0.10	0.40	60	Yes
TP04	0.60	n/a - Observation of Ingress of Groundwater	Rose from base of pit to 0.09	1380.00	No
TP05	0.80	0.50	0.04	1295.00	No
TP06	0.40	0.10	0.00	1195.00	No
TP07	0.70	n/a - Observation of Ingress of Groundwater	Rose from base of pit to 0.00	1211.00	No

The guidance indicates that if during the saturation test period the water does not seep away in less than 6 hours the soils should be deemed as being unsuitable for drainage fields. The only test pit that fully drained in less than 6 hours was trial pit TP03. The remaining trial pits all filled with water and when left overnight filled to close to ground level.

Whilst it is possible that significant precipitation overnight may have exacerbated the rise in water levels in the pits, it is noted that during the first day of the works the weather was dry and water levels were still noted to be rising due to ingress of water from the surrounding soils.

² Conducted in general accordance with the requirements of BS6297:2007 + A1:2008, Code of practice for the design and installation of drainage fields for use in wastewater treatment.

Following the saturation stage in trial pit TP03, the pit was filled a further three times to enable the percolation Vp value to be calculated. The Vp is calculated by dividing the time in seconds for the water to fall between 75% and 25% of the initial test depth by the depth of water in millimetres between 75% and 25% of the initial test depth. Typically for a test that is filled with 300mm of water, the latter depth would be 150mm.

The calculated Vp figures derived from the tests are summarised in the following table.

Table 3. Calculated Vp Figures

Exploratory Hole	Time to reach 75% empty (secs)	Time to reach 25% empty (secs)	Time taken for water to fall between 75% and 25% (secs)	Total Depth of Water between 75% and 25% full (mm)	Vp
TP03 Test 1	310.5	1806	1495.5	150	10
TP03 Test 2	281.25	2070	1788.75	150	11.9
TP03 Test 3	202.5	1800	1597.5	150	10.7

The overall average Vp result for trial pit TP03 is indicated to be 10.9. However, it is noted that the testing carried out within this trial pit was conducted at a relatively shallow depth, with the pit kept shallow to minimise the ingress of any groundwater. The relatively high groundwater observed within the remaining pits should be taken into account by the designers.

The results from the percolation testing should be provided to engineers responsible for the design of the drainage system.

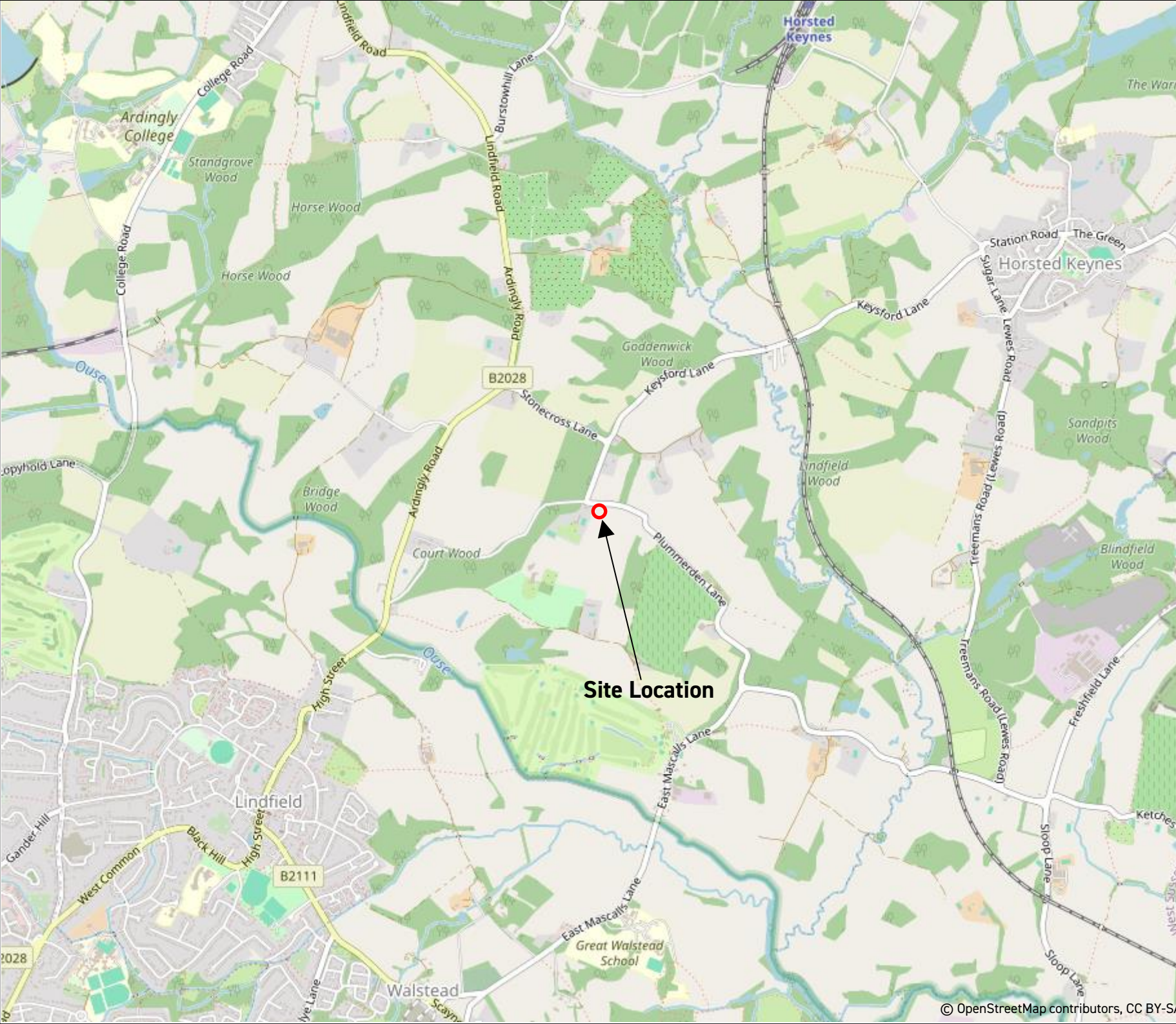
FIGURES AND APPENDICES

Figure 1 Site Location Plan

Figure 2 Site Plan

Explanatory Notes

Exploratory Hole Records



ASHDOWN
SITE INVESTIGATION

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Site

Plummden Lode
Lindfield
West Sussex

Project Ref

P16924

Figure No

1

Drawing Title

Site Location Plan

Scale

Not To Scale

Park Lane

+

+

LODGE

TP03

TP06

TP04

TP07

TP01

TP05

TP02



Head Office

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Site

Plummerden Lodge
Lindfield
West Sussex

Project Ref.

P16924

Figure No.

2

Drawing Title

Site Plan

Scale

Not To Scale

PLUMMERDEN
HOUSE

EXPLANATORY NOTES

Symbols and abbreviations on Exploratory Hole Records

Samples

U	'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample
R	Root Sample
B	Bulk Disturbed Sample
W	Water Sample
ES	Environmental Suite (on older records may be referenced J T)

In Situ Testing

S	Standard penetration test (SPT): Using the split spoon sampler.
C	Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

CP	Cable Percussion Borehole
RC	Rotary Cored Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HDP	Trial Pit excavated using hand tools

Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

In Situ Strength Testing

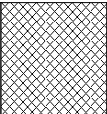
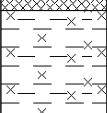
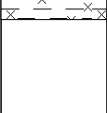
Standard penetration testing (SPT) carried out in accordance with BS EN ISO 22476-3:2005.

Continuous dynamic probe testing conducted using a super heavy DPSH-B (As defined by BS EN ISO 22476-2:2005) probing geometry. The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

Perth penetrometer tests carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained shear strength determinations made in-situ using a Geonor hand shear vane or a hand penetrometer.

Testing to determine the in-situ California Bearing Ratio (CBR) of soils conducted at shallow depths using a hand-held Transport Research Laboratory (TRL) cone penetrometer.

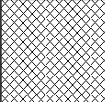
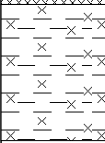
ASHDOWN SITE INVESTIGATION E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119		Site Name: Plummerden Lodge, Lindfield, West Sussex Job Number: P16924 Start Date: 26/11/2024 End Date: 27/11/2024				Trial Pit Number: TP01 Sheet 1 of 1	
Samples and In Situ Testing						Stratum Description	
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth/ Reduced Level		
D	0.60				0.00	Topsoil over,	
					0.40	SUBSOIL: Grey brown and orange brown slightly sandy silty clay with rare gravel of subangular to subrounded fine to coarse ash-like material and organic matter.	
					0.80	Orange brown and grey brown mottled slightly sandy silty CLAY with occasional gravel of sandstone. (Tunbridge Wells Sand Formation)	
						End of trial pit at 0.80m	
Remarks							
Groundwater: Water ingress from shallow soils, recorded at 0.80m depth on completion of trial pit.						Excavation Method: HDP	
Stability: Trial pit stable on completion.						Pit Length: 0.30m	
Notes: n/a						Pit Width: 0.30m	
						Made By: TM	

Site Name: Plummerden Lodge, Lindfield, West Sussex

Start Date: 26/11/2024

End Date: 27/11/2024

Sheet 1 of 1

Samples and In Situ Testing				Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	
D	0.20				0.00 Topsoil over, SUBSOIL: Grey brown and orange brown slightly sandy silty clay with rare gravel of ash-like material and organic matter.
D	0.70				0.35 Orange brown and grey brown mottled slightly sandy silty CLAY with occasional gravel of sandstone. (Tunbridge Wells Sand Formation)
					0.80 End of trial pit at 0.80m

Remarks

Groundwater: Water ingress from shallow soils, recorded at 0.79m depth on completion of trial pit.

Excavation Method: HDP

Stability: Trial pit stable on completion.

Pit Length: 0.30m

Pit Width: 0.30m

Notes: n/a

Made By: TM

Site Name: Plummerden Lodge, Lindfield, West Sussex

Job Number: P16924

Start Date: 26/11/2024

End Date: 26/11/2024

Trial Pit Number: **TP03**

Sheet 1 of 1

Remarks Groundwater: Water ingress noted at base of pit on completion. Stability: Trial pit stable on completion. Notes: n/a	Excavation Method: HDP
	Pit Length: 0.30m
	Pit Width: 0.30m
	Made By: TM

Job Number: P16924

Start Date: 26/11/2024

End Date: 27/11/2024

Sheet 1 of 1

Remarks Groundwater: Water ingress noted at base of pit on completion. Stability: Trial pit stable on completion. Notes: n/a	Excavation Method: HDP
	Pit Length: 0.30m
	Pit Width: 0.30m
	Made By: TM

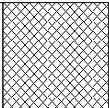
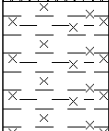
**Job Number:** P16924

Start Date: 26/11/2024

End Date: 27/11/2024

Trial Pit Number: **TP05**

Sheet 1 of 1

Samples and In Situ Testing				Stratum Description	
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth/ Reduced Level
					0.00
					0.35
					0.80
Topsoil over, SUBSOIL: Grey brown and orange brown slightly sandy silty clay.					
Orange brown and grey brown mottled slightly sandy silty CLAY with occasional gravel of sandstone. (Tunbridge Wells Sand Formation)					
End of trial pit at 0.80m					

Remarks	

Groundwater: Water ingress from shallow soils, recorded at 0.63m depth on completion of trial pit.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method: HDP

Pit Length: 0.30m

Pit Width: 0.30m

Made By: TM

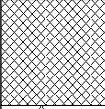
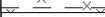
**Job Number:** P16924

Start Date: 26/11/2024

End Date: 27/11/2024

Trial Pit Number: **TP06**

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil over, SUBSOIL: Grey brown and orange brown slightly sandy silty clay.
					0.35	Orange brown and grey brown mottled slightly sandy silty CLAY with occasional gravel of sandstone. (Tunbridge Wells Sand Formation) End of trial pit at 0.40m
					0.40	

Remarks	

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method: HDP

Pit Length: 0.30m

Pit Width: 0.30m

Made By: TM

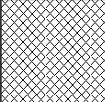
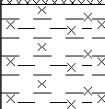
Site Name: Plummerden Lodge, Lindfield, West Sussex

Start Date: 26/11/2024

End Date: 27/11/2024

Trial Pit Number: **TP07**

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil over, SUBSOIL: Grey brown and orange brown slightly sandy silty clay.
					0.35	Orange brown and grey brown mottled slightly sandy silty CLAY with occasional gravel of sandstone. (Tunbridge Wells Sand Formation)
					0.70	End of trial pit at 0.70m

Remarks	

Groundwater: Water ingress recorded at 0.45m depth on completion of trial pit.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method: HDP

Pit Length: 0.30m

Pit Width: 0.30m

Made By: TM