

Frontier Estates

Infiltration Test Report

**The Cowplain School
Hart Plain Avenue
Waterlooville
Hampshire
PO8 8RY**

**Report No: 21.02.014a
August 2021**

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DOCUMENT RECORD

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Development	New Residential and Adult Care Home Development
Project Address	The Cowplain School, Hart Plain Avenue, Waterlooville, Hampshire, PO8 8RY
Project Number	21.02.014a
Client	Frontier Estates

	<u>Signature</u>	<u>Name and Qualifications</u>
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For and on behalf of ListersGeo, trading name of Listers Geotechnical Consultants Ltd

Issue No	Date	Status
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EXECUTIVE SUMMARY

Project Reference	21.02.014a
Site Location	The Cowplain School, Hart Plain Avenue, Waterlooville, Hampshire, PO8 8RY
OS Grid Reference	468345, 110565
Development Proposal	As part of proposed development of the school plot, it is proposed to adopt infiltration measures within an area towards the south-western corner of the existing playing fields
Current Site Usage	Woodland marginal to school playing field
Topography	Slopes gently down to the south-west
Vegetation	Dense cover
Published Geology	Head deposits above the bedrock London Clay
Hydrology	The anticipated direction of hydraulic flow is to the south-west and the drainage ditch along the western site boundary. The anticipated rate of flow is very low
Hydrogeology	The Head deposits are a Superficial Secondary Aquifer and the London Clay in Unproductive Strata. The site is above a Source Protection Zone 1 for subsurface activity: protective of the deep, confined, Principal Chalk Aquifer beneath the site
Site History	The site remained part of a larger agricultural field until the 1950s and has been peripheral to the school playing field since then
Unexploded Ordnance	Low recorded risk
Ground Conditions Encountered	A thin cover of Topsoil (0.05m) above localised Head deposits to 0.75m depth (absent from the depressed area of the site) and the anticipated bedrock London Clay Formation. The Head and London Clay were present as predominantly fine soils.
Groundwater	Not encountered
Infiltration Measures	Traditional soakaways and not considered appropriate at this site due to the predominantly impermeable nature of the underlying clay soils
Recommendations for Further Work	It may be beneficial to undertake further investigation of the suspected soakaway installation within the site

This executive summary should be read in conjunction with the main report.

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INFILTRATION TEST REPORT

INTRODUCTION

A Supplementary Ground (Infiltration Test) Investigation has been undertaken in an area of proposed infiltration measures associated with the proposed Care Home development at The Cowplain School, Hart Plain Avenue, Waterlooville, Hampshire, PO8 8RY. A Site Location Plan is provided in Appendix A. The Ordnance Survey National Grid reference for the approximate centre of the site investigated is 468345, 110565.

Instructions to undertake the investigation were received from the client's Project Managers, Fed3 Projects Ltd, on behalf of the client, Frontier Estates, in their Letter of Appointment (reference FE/LOA/LG/RT) dated 22nd July 2021.

This report describes the intrusive site investigation activities carried out by ListersGeo in order to provide an evaluation of the ground conditions and to provide comment on the suitability of the ground to receive infiltration measures for surface water disposal.

This report supplements a previous, combined Phase 1 and Phase 2, Ground Investigation Report, prepared by ListersGeo for the same client: reference 21.02.014a, dated April 2021. This previous report was for the Care Home site, some 170m to the north of the current site. This current report should be read in conjunction with the previous report for full details of the investigations undertaken.

This report has been prepared for the sole use of the client and their professional advisors. This report shall not be relied upon by third parties without the express written authority of ListersGeo. If an unauthorised third-party comes into possession of this report, they must not rely on it and the authors owe them no duty of care and skill.

SCOPE OF THE INVESTIGATION

The scope of the investigation, as requested by Fed3 Projects, was to attend site and conduct infiltration tests to determine the suitability of the near-surface soils for the adoption of a drainage solution for the Care Home development.

PROPOSALS

It is proposed to build a 2.5-storey adult care home within the area of the existing school playing fields and the site under investigation is proposed to be the location for infiltration measures to accommodate disposal of surface water discharges from that development.

SITE INFORMATION AND WALKOVER SURVEY

A walkover survey of the site and its immediate surrounds was undertaken on the 27th July 2021, in association with the fieldwork. A selection of site photographs is presented in Appendix A along with a plan showing the existing site layout.

The site comprises an area, of about 2,000m², of heavily vegetated woodland/scrubland at the southern corner of the school playing field. The site is on a gently-sloping, south-facing, hillside but has the appearance of previous surface excavation to form a central, shallow, basin. The dense vegetative cover prevented further assessment.

The site is bounded by playing fields and sports pitches to the west, north and east and by residential properties to the south, beyond a dense planting zone.

The site contains a manhole above a concrete chamber that is connected to evident ditches at surface. The precise location of this chamber and the direction of the ditches were not readily determinable due to the dense vegetation. Internal inspection of the chamber was not attempted, but it appeared to be typical of those above soakaways.

PREVIOUS WORK

Although the previous ListersGeo report was for an area some 170m to the north, some of the desk study data are relevant to this investigation. The salient points relevant to this report are included here, but the full report should be referred to for more detail.

Hydrology

The site is on a gentle, south-west facing hillside. The anticipated direction of hydraulic flow is to the south-west and the south-draining ditch along the western site boundary. The rate of flow is likely to be very low due to the anticipated low permeability of the near surface deposits.

The Environment Agency's Catchment Data Explorer records the Potwell Tributary, to be 'heavily modified' and of generally Moderate overall quality between 2013 and (the latest reported period of) 2019.

There are no recorded current surface water abstraction licenses located within 1km of the site.

Hydrogeology

The EA records the local Head deposits as a Superficial Secondary Aquifer of Medium vulnerability and the bedrock London Clay Formation as Unproductive Strata.

There are no recorded current groundwater abstraction licenses located within 1km of the site.

According to information provided by the EA the site is within a Source Protection Zone 1 (SPZ) but for subsurface activity only, which is associated with the deep Chalk aquifer beneath the site.

History of the Site

The site was agricultural land until establishment of the school in the 1950s and has been on the periphery of the playing fields since then. The nearest development to the site is the 1970s housing to the south.

SUPPLEMENTARY DESK STUDY

GEOLOGY

Reference to the British Geological Survey (BGS) 1:50,000 scale map, Sheet 316 (Fareham, dated 1998) and other published geological information on the area indicates that the site is north-western half of the site is underlain by Quaternary superficial Head deposits, with the Palaeogene bedrock London Clay Formation beneath and at surface of the south-eastern half of the site.

The London Clay is anticipated to be about 15m thick beneath the site and is further underlain by about 35m of Lambeth Group deposits and the Portsdown Chalk Member (of the White Chalk Subgroup).

Artificial Deposits

There are no Artificial deposits recorded within 500m of the site.

Superficial Deposits

Local Head deposit will, likely, comprise poorly sorted gravel, sand and clay deposits, deposited by solifluction and/or gelifluction processes.

Bedrock

The London Clay is generally represented by overconsolidated, fissured, bioturbated or poorly laminated, grey-brown, clay and silty clay, of high plasticity, locally with pockets of sand and occasionally with calcretes. Thin beds of black, rounded, flint gravel occur locally at the base of the formation, and at some other levels. The weathered deposit commonly contains crystalline (selenite) or anhydrous forms of gypsum.

The Lambeth Group is described, by the BGS, as, 'vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate'.

Both the London Clay and the Lambeth Group are known to contain occasional calcretes (calcium-rich concretions that commonly vary between gravel- and cobble-size, but which occasionally cement into thicker and laterally extensive layers).

UNEXPLODED ORDNANCE AND BOMB SITES

An Unexploded Ordnance Preliminary Risk Review of the site was undertaken by MACC International, and a copy of the report is presented in Appendix C. The report identifies that the site is within a Low risk area of encountering unexploded ordnance.

EXPLORATION AND TESTING

Two trial pits (TP01 and TP02) were formed at the site on the 27th July 2021.

The works, in this intrusive phase of investigation, comprised: two machine excavated trial pits (TP01 & TP02), and in-situ (infiltration) testing: conducted on the 27th July 2021.

The positions of the exploratory holes are shown on the Exploratory Hole Location Plans in Appendix A. The trial pit logs, and the in-situ test records are provided in Appendix B.

Engineering conclusions given in this report are based on data obtained from these sources, but it should be noted that variations, which affect these conclusions, may inevitably occur between and beyond the test locations. Also, water levels may vary seasonally and with other factors.

SAMPLING STRATEGY

The investigation was undertaken in accordance with the scope of works specified by Fed3 Projects and the two pits were located as close, as the terrain and vegetation allowed, to the positions shown on the drawing, Proposed Infiltration Tests.

Trial pit TP01 was located on the northern side of the site and was at a higher elevation than TP02, which was towards the bottom of the basin-like feature.

METHODOLOGY

Prior to commencement of excavation, the proposed locations were scanned using a Cable Avoidance Tool, in order to minimise the dangers from/to buried services.

The trial pits were excavated using a 3-tonne tracked mini-excavator to depths of 1.10m (TP02) and 1.90m (TP01) bgl (below ground level) under the supervision of a geotechnical engineer, who made a record of arisings. Small-disturbed samples were taken at regular intervals down to the base of the holes.

Infiltration testing was undertaken at the base of both pits in general accord with BRE Digest 365 'Soakaway Design'.

On completion, remaining water was bailed out and the pits were backfilled with arisings.

GROUND CONDITIONS

The intrusive investigation confirmed the published geology: revealing a thin layer of Topsoil over localised Head deposits and the bedrock London Clay.

Our Ground Model for the site is as follows

TOPSOIL

Topsoil was encountered in both pits, from ground level to depths of 0.05m and comprised dark brown, slightly gravelly and sandy, organic silty clay.

HEAD

Head deposits were encountered only in TP01, on the north-western side of the site, beneath the Topsoil down to a depth of 0.75m bgl and comprised stiff, locally firm, fissured, brown and orange-brown, veined blue-grey, slightly sandy and gravelly, silty clay, with a pockets of very clayey sandy gravel between 0.70m and 0.75m depths.

Trial pit TP02 was at a lower elevation, located towards the bottom of the basin-like feature on the site and this may account for the absence of the Head deposits there.

LONDON CLAY

London Clay was encountered to the base of both trial pits (from depths of 0.75m in TP01 and 0.05m in TP02) and comprised stiff, fissured, brown and orange-brown, veined blue-grey, clay.

GROUNDWATER

Groundwater was not encountered in either trial pit.

INFILTRATION TESTING

Infiltration testing was undertaken in the two trial pits, at depths of 1.90m (TP01) and 1.10m (TP02).

No significant drop in water level was recorded during a monitoring period of ninety minutes and, so, infiltration rates could not be calculated.

OBSERVED SOIL CONTAMINATION

No obvious evidence of olfactory or visual contamination was noted during the site work.

GEOTECHNICAL ENGINEERING CONCLUSIONS

We understand that it is proposed to develop the site to accommodate surface water infiltration measures for the pending Care Home development further to the north.

GROUND MODEL

The site has a thin cover of Topsoil (0.05m) above localised Head deposits to 0.75m depth (but absent from the depressed area of the site) and the anticipated bedrock London Clay Formation. The Head and London Clay were present as predominantly fine soils.

Groundwater was not encountered in the two pits, which were excavated to depths of 1.10m and 1.90m.

INFILTRATION MEASURES

The low permeability clay soils encountered strongly indicates that conventional soakaways will not be viable and that an alternative form of drainage will have to be adopted.

RECOMMENDATION FOR FURTHER WORK

It may be beneficial to undertake further investigation of the suspected soakaway installation within the site.

REFERENCES

- British Standards Institution (BSI), Site Investigations: Code of Practice, BS5930:2015+A1:2020, 2020
- CIRIA, Unexploded Ordnance (UXO), A Guide for the Construction Industry, C681, 2009
- BRE, Soakaway design, DG 365, 2016
- CIRIA, The SuDS Manual, C753, 2015

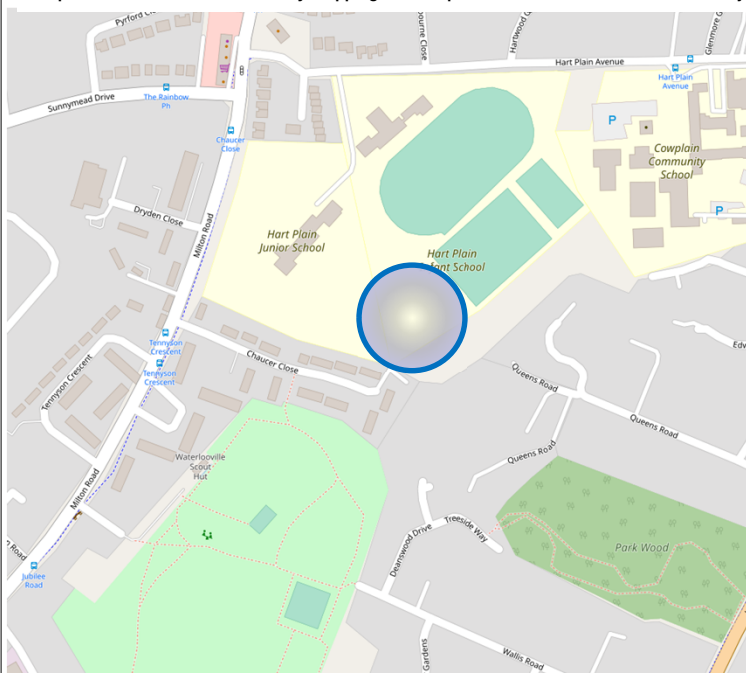
APPENDIX A PLANS & PHOTOGRAPHS



Extract from 1:50,000 Ordnance Survey Explorer Map



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© OpenStreetMap contributors

Key:  Approximate site location

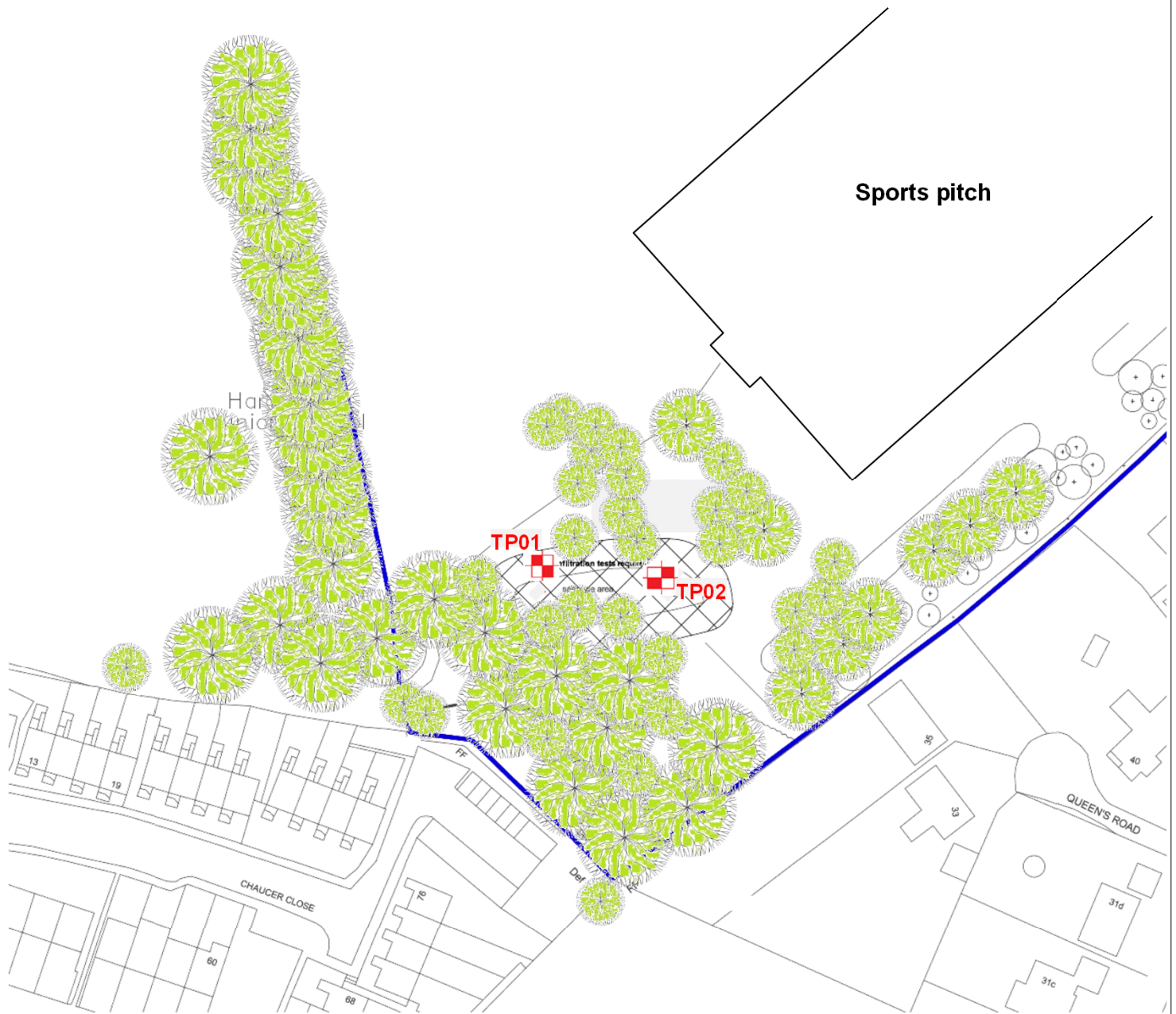


Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Site Location Plan

Site: The Cowplain School, Hart Plain Avenue, Cowplain, Waterloo, Hampshire, PO8 8RY

Scale: NTS Job Number: 21.02.014a Drawn By: MX



Extract from Fed3Projects' drawing, 'Proposed Infiltration Tests'

Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Key:



Trial Pit

Title: Exploratory Hole Location Plan – Existing Layout

Site: The Cowplain School, Hart Plain Avenue, Cowplain, Waterlooville, Hampshire, PO8 8RY

Scale: NTS **Job Number:** 21.02.014a **Drawn By:** MX



Towards the site from the west (near to TP01)



Towards the site from the south (and TP02, arrowed)



Typical clay arising



Existing ditch leading to possible soakaway chamber



Possible soakaway chamber

Site Photographs

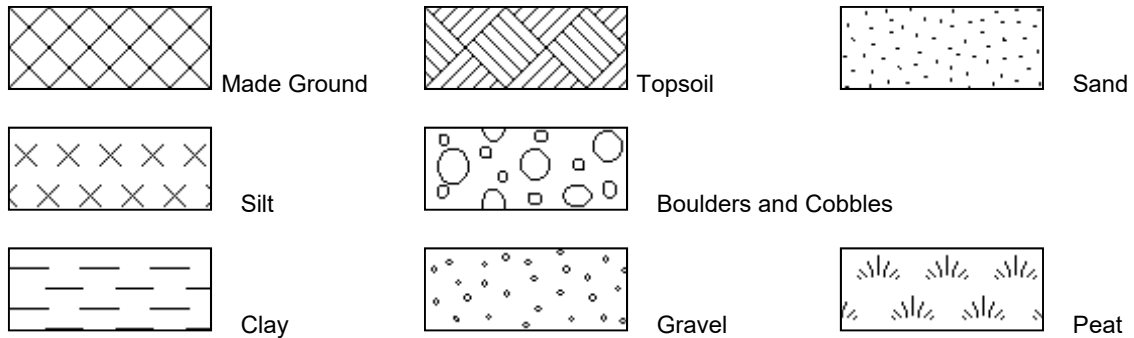
27/07/2021

Report:
21.02.014a

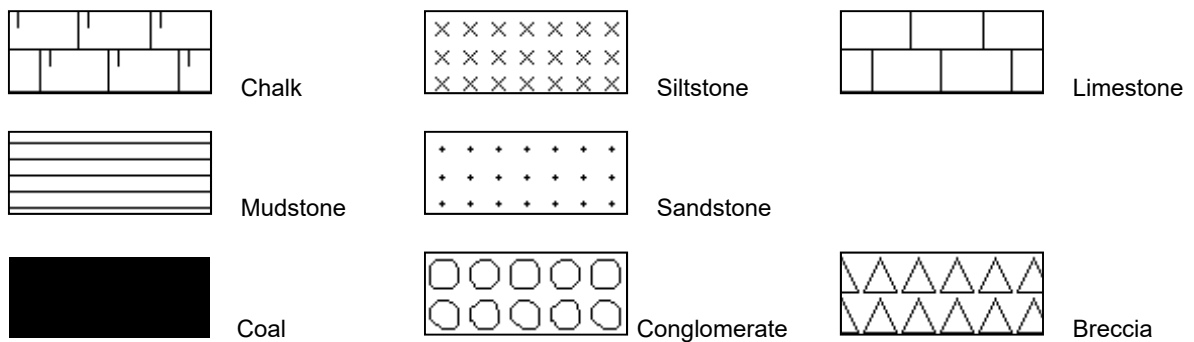
APPENDIX B

FIELDWORK AND TESTING

LEGEND - Soils



LEGEND - Rocks (Sedimentary)



LOG ABBREVIATIONS

W	Water Sample		Water Strike
B	Bulk Sample		Water (Standing Level)
D	Disturbed Sample	PP	Pocket Penetrometer
J	Jar Sample	HV	Hand Vane
U	Undisturbed Sample	SPT	Standard Penetration Test
(No. of blows shown in brackets for U100 samples)		CPT	Cone Penetration Test
WAC	Waste Acceptance Criteria Sample	CBR	California Bearing Ratio
		*	Extrapolated Value

Pocket penetrometer testing provides values of unconfined compressive strength. The results have been converted to an approximate equivalent shear strength which should be used with due circumspection. As the pocket penetrometer tends to overestimate shear strength, we have used an appropriate reduction factor.

LOG KEY

Trial Pit Log

Trial Pit No.

TP 01
Project Location: The Cowplain School, Hart Plain Avenue, Cowplain, Waterlooville, Hampshire, PO8 8RY

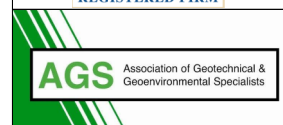
Co-ords:
Level:
Dates: 27/07/2021

Project Number:
21.02.014a

Logged By:
Matthew Clarke
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	(kPa)					
	0.05			0.05			TOPSOIL Dark brown, slightly gravelly and sandy, organic silty CLAY.	
	0.50	D		0.55			HEAD Stiff, locally firm, fissured, brown and orange-brown, veined blue-grey, slightly sandy and gravelly, silty CLAY. Gravel is of flint and siltstone.	
	1.00	D		0.75			HEAD Stiff, fissured, brown and orange-brown, slightly gravelly, silty CLAY. Gravel is of flint.	
	1.50	D					weathered LONDON CLAY Stiff, fissured, brown and orange-brown, veined blue-grey, CLAY.	1
	1.80	D						
				1.90			End of Trial Pit at 1.90m	2

Method: 3-tonne tracked mini-excavator
Dimensions: 0.30mW x 1.30mL x 1.90mDeep
Stability: Stable
Groundwater: Not encountered

Remarks: Infiltration test at base - see separate sheet.
Backfilled with arisings on completion.


Trial Pit Log

Trial Pit No.

TP 02
Project Location: The Cowplain School, Hart Plain Avenue, Cowplain,
 Waterlooville, Hampshire, PO8 8RY

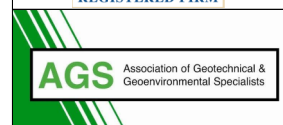
Co-ords:
Level:
Dates: 27/07/2021

Project Number:
 21.02.014a

Logged By:
 Matthew Clarke
 to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	(kPa)					
	0.05			0.05			TOPSOIL Dark brown, slightly gravelly and sandy, organic silty CLAY.	
	0.50	D					weathered LONDON CLAY Stiff, fissured, brown and orange-brown, veined blue- grey, CLAY.	
	1.00	D						1
				1.10			End of Trial Pit at 1.10m	
								2

Method: 3-tonne tracked mini-excavator
Dimensions: 0.30mW x 1.70mL x 1.10mDeep
Stability: Stable
Groundwater: Not encountered

Remarks: Infiltration test at base - see separate sheet.
 Backfilled with arisings on completion.


Site: The Cowplain School, Hart Plain Avenue,
Cowplain, Waterlooville, Hampshire, PO8 8RY

Report No: 21.02.014a

Date Tested: 27/07/2021

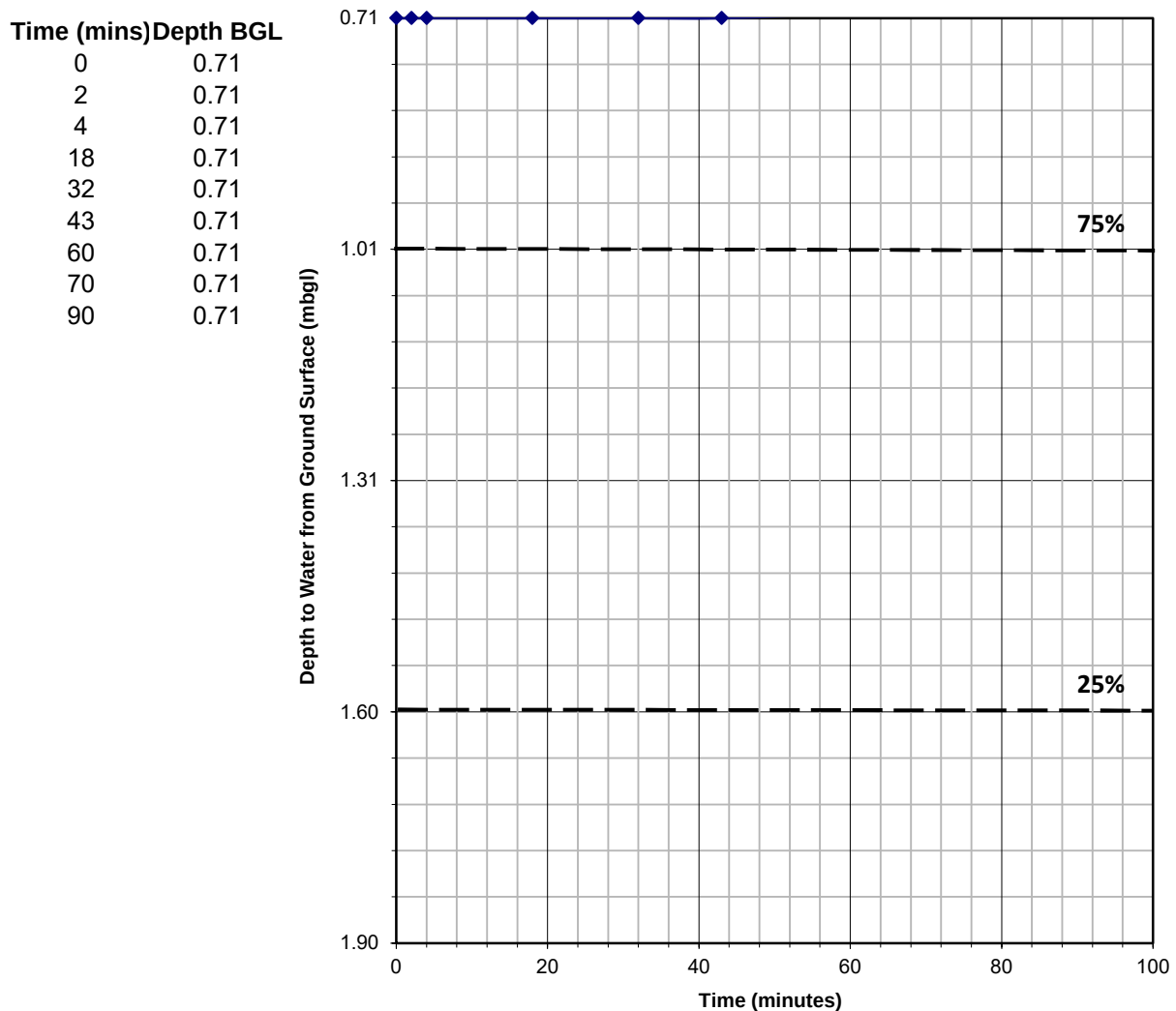
Test Location: TP01_Test 1

Groundwater: unknown

Dimensions: 0.3mWx1.3mLx1.90mD

Soil Description - test response zone:

Stiff, fissured, brown and orange-brown, veined blue-grey, CLAY.



Infiltration Rate could not be calculated:
0.01m (0.4%) drop in 90 minutes

TRIAL PIT INFILTRATION TESTING
to BRE Digest 365

Report:
21.02.014a

Site: The Cowplain School, Hart Plain Avenue,
Cowplain, Waterlooville, Hampshire, PO8 8RY

Report No: 21.02.014a

Date Tested: 27/07/2021

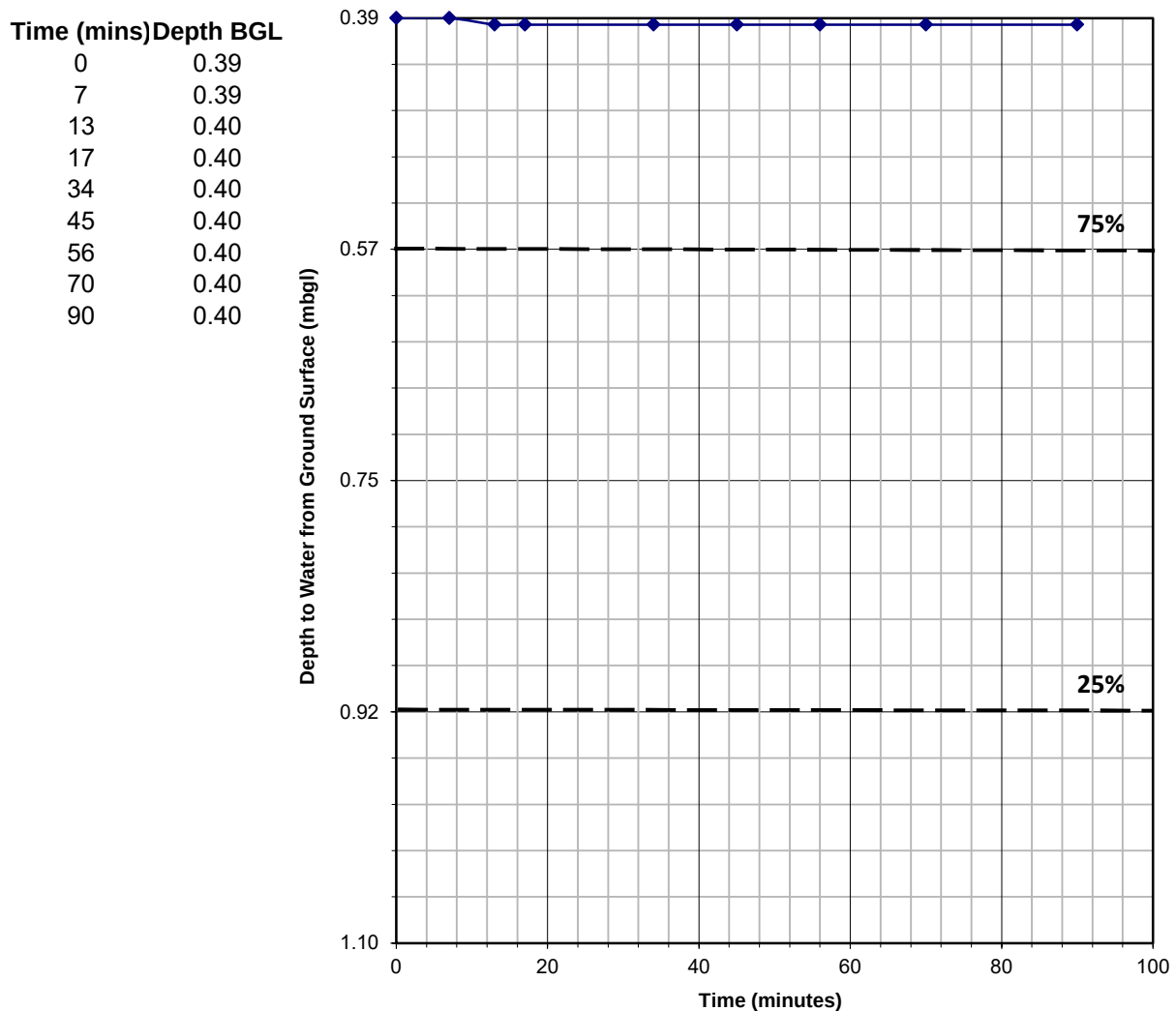
Test Location: TP02_Test 1

Groundwater: unknown

Dimensions: 0.3mWx1.7mLx1.10mD

Soil Description - test response zone:

Stiff, fissured, brown and orange-brown, veined blue-grey, CLAY.

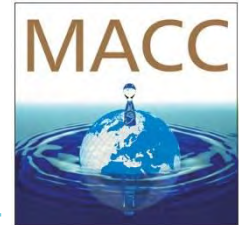


Infiltration Rate could not be calculated:
0.01m (0.7%) drop in 90 minutes

TRIAL PIT INFILTRATION TESTING
to BRE Digest 365

Report:
21.02.014a

APPENDIX C
SUPPLEMENTARY DESK STUDY DATA



MACC International Ltd, Camilla Court, Nacton, Ipswich, Suffolk, IP10 0EU, UK

Sandy David
Contracts Manager
Listers Geotechnics Ltd

Your Reference:

Our Reference: JM/7270/03

Email 1st Instance: Sandy@geotechnics.co.uk

Date: 19/07/2021

Unexploded Ordnance Preliminary Risk Review
Cowplain Community School, Hart Plain Avenue, Waterlooville, Hampshire, PO8 8RY

MACC International Ltd (MACC) has conducted a preliminary risk review for the site footprint. The review has drawn on open source and in-house information, references have been provided where available (See Annex A).

The review has been conducted to provide Listers Geotechnics Ltd with a review of the risk which may be posed by UXO while conducting investigations on the site.

This document has been produced in the United Kingdom by MACC International Limited and has been provided solely as an aid in decision making. It is not intended to be used by any person for any purpose other than that specified. Any liability arising out of use by a third party of this document for purposes not wholly connected with the above shall be the responsibility of that party, who shall indemnify MACC International Limited against all claims, costs, damages and losses arising out of such use.

Although the immediate surrounding area did suffer enemy bombing raids during WWII, no records were found to indicate a bomb strike within the footprint. Whilst considering the history of the site and the level of post-war development, the following conclusions have been reached:

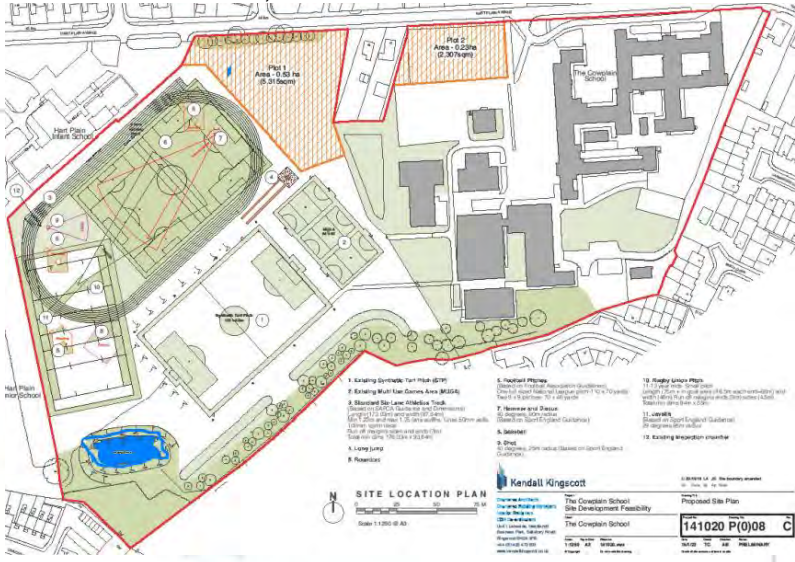
- It is considered that there is not a credible likelihood of encountering UXO on the plot.
Consequently, the UXO risk is considered to be LOW within the site boundary.
- Nevertheless, it is recommended that:
 - o All site personnel are provided with a UXO Safety Awareness Talk before intrusive works are commenced.

I trust this document has provided you with sufficient information to meet your immediate needs, should you require anything further, please do not hesitate to contact me.

Yours Sincerely

John Morrison
Operations Manager

Unexploded Ordnance Preliminary Risk Review

Site location	Site Address: Cowplain Community School, Hart Plain Avenue, Waterloo, Hampshire, PO8 8RY Grid Reference: 468433, 110722 
Scope of Intended works	Preliminary review of the risk that may be posed by UXO to geotechnical investigations.
History	Wartime Use: The site footprint was within the grounds of Cowplain Community School (formerly Cowplain Comprehensive School) during WWII. Post War Development: The site has undergone significant post-war development within the north-eastern area, with little post-war development within the south-western area.
Wartime History	Enemy Bombing: The surrounding area suffered significant enemy bombing during WWII. However, no records were found to indicate a bomb strike within the site footprint. The nearest recorded bomb strike occurred at least 250m east of the site within the Queen's Enclosure (within wooded area, exact location unknown). Anti-Aircraft Guns: No guns were recorded to have been positioned on site. The nearest Anti-Aircraft Searchlight battery was positioned approximately 900m south-east of the site footprint. Military Use: Although there was military presence in the immediate area with marshall camps for troops prior to D-Day, no records were found to confirm military use of the site footprint.
Unexploded Ordnance (UXO) Finds	No records were found to indicate that items of UXO have been found within the site footprint.