LAND OFF RUSSLEY GREEN, BAYDON

TECHNICAL NOTE ADDRESSING GROUNDWATER

1. Introduction

1.1. This Technical Note has been produced on behalf of Hannick Homes in connection with the a suggested planning condition requiring groundwater monitoring for the outline planning application for up to 9 dwellings on land off Russley Green, Baydon, Marlborough, SN8 2LJ (Planning Ref: PL/2023/09493). The planning application was support by a Drainage Strategy report, produced by PFA Consulting in October 2023 (Doc Ref: H672-DOC02- Drainage Strategy Issue 2). This sets out the proposed drainage arrangements for the development.

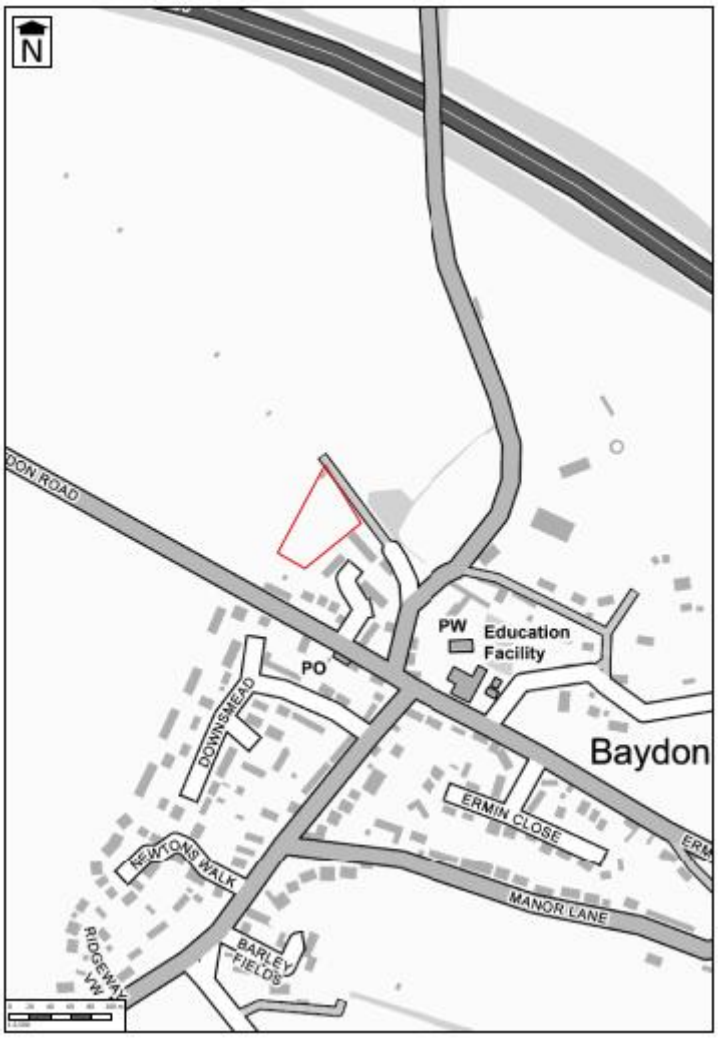


Figure 1: Site Location Plan

2. Lead Local Flood Authority

2.1. Wiltshire Council, in its role as Lead Local Flood Authority (LLFA), proposed a number of suggested conditions, one of which suggested that variations in groundwater levels should be monitored to

determine a minimum clearance of 1m from the proposed deep bore soakaways set out within the Drainage strategy report.

2.2. The suggested condition 2 states:

> **No development shall take place until ground investigations, including soakaway testing in accordance with BRE 365, have been carried out on site, and evidence has been provided to demonstrate that the results of these investigations have been considered in the drainage design which has been submitted to and approved by the local planning authority.**
>
> **In order to discharge the above drainage condition the following additional information must be provided:**
>
> **- Evidence of ground investigations that account for the seasonal variation of groundwater levels, to ensure that a minimum clearance of 1m can be always maintained between the base of the deep bore soakaways and groundwater.**

3. Ground Conditions

3.1. The British Geological Survey (BGS) geological mapping of the area shows the site is underlain by both superficial and bedrock deposits. Seaford Chalk Formation (chalk) bedrock deposits with Clay-with-flints Formation (clay, silt, sand and gravel) Superficial deposits underlay the whole site.

3.2. Based on the Flood Studies Report Winter Rainfall Acceptance Potential (WRAP) Map, as shown reproduced on Drawing No. H672/02 Rev A in **Appendix A**, the site is located in a 'Soil Index Class 1' area. Soil Index Class 1 has a high winter rainfall acceptance potential and low standard percentage runoff, and so suggests the underlying soil has good permeability.

3.3. The Cranfield Soil and AgriFood Institute (CSAI), incorporating the National Soil Resources Institute (NSRI,) at Cranfield University maintains soil reports and maps for England and Wales. The Soilscapes dataset map indicates that soils in the area are 'Freely draining slightly acid loamy soils'. These soils are identified as being 'Freely drainage'.

Ground Investigation

3.4. A site investigation was undertaken by Earth Environment and Geotechnical in May 2021. A number of trial pits across the site were carried out in accordance with BRE Digest 365. The soil profile encountered was predominately Clay with impeded drainage. Therefore, the majority of the trial pits did not drain. Within the Window Sample Boreholes chalk was encountered and soakaway results indicated an infiltration rate of 1.09×10^{-7} m/s and 9.00×10^{-8}m/s. A copy of an extract from the site investigation containing the soakage tests is reproduced in **Appendix B.**

3.5. A second site investigation was undertaken by ST Consult in June 2022 to establish the infiltration rate at the lowest point on the site at the south east corner. A borehole infiltration rate was recorded as 3.5 l/s, which indicates relatively high permeability at deeper depth. A copy of the site investigation report containing the soakage tests results is reproduced in **Appendix C**.

3.6. Therefore, across the site, traditional soakaways at depths of between 2.50m and 3.50m are considered to be inappropriate due to the poor infiltration rates. At the south east corner of the site, borehole test results at a depth of 15m below ground level (bgl) indicate that the use of a deep bore soakaway at the appropriate depth would achieve a suitable infiltration rate. It is therefore proposed that deep bore soakaways in conjunction with an attenuation basin should be used to drain surface water runoff from the development to the ground.

3.7. The proposed drainage strategy is set out in the Drainage Strategy report that accompanied the planning application.

Groundwater Investigation

3.8. Groundwater monitoring standpipes were installed in March 2024 by Earth Environmental & Geotechnical, with monthly monitoring scheduled from March 2024 to February 2025 to establish any seasonal variations in groundwater levels onsite. These standpipes were installed within the vicinity of the proposed deep bore soakaways to a depth of 16m bgl, which is 1m below the proposed 15m bgl deep bore soakaways. The Ground Investigation Factual Report by Earth Environmental & Geotechnical is provided in **Appendix D** which shows the location of these standpipes.

3.9. The groundwater monitoring results, recorded by Hannick Homes and presented in **Table 3.1** below, confirm that no groundwater ingress was observed to a depth of 16m bgl over the full testing cycle.

Table 3.1 Over Winter Groundwater Monitoring Results

Date	Borehole	
	BH01	BH02
27/03/2024	16m	Dry
17/04/2024	Dry	Dry
28/05/2024	Dry	Dry
18/06/2024	Dry	Dry
29/07/2024	Dry	Dry
05/08/2024	Dry	Dry
18/09/2024	Dry	Dry
21/10/2024	Dry	Dry
25/11/2024	Dry	Dry
20/12/2024	Dry	Dry
20/01/2025	Dry	Dry
27/02/2025	Dry	Dry

3.10. The presence of water at BH01 in March 2024 at a depth of 16m bgl is likely due to rainwater ingress into the standpipes at the time of their installation.

3.11. The results demonstrate that no significant seasonal variations in groundwater levels were observed. Furthermore, the required 1m clearance between the base of the deep bore soakaways and the groundwater table is maintained.

Appendices

Appendix A **SAAR and WRAP Map – Drawing No. H672/02A**
Appendix B **First Infiltration Test - EEGL SI Report B1547 Baydon 26 Map 2021**
Appendix C **Second Infiltration Tests – JT0485 report**
Appendix D **Groundwater Monitoring Standpipes - EEGSL SI Factual Report B3629 Russley Green Baydon**

Document Control

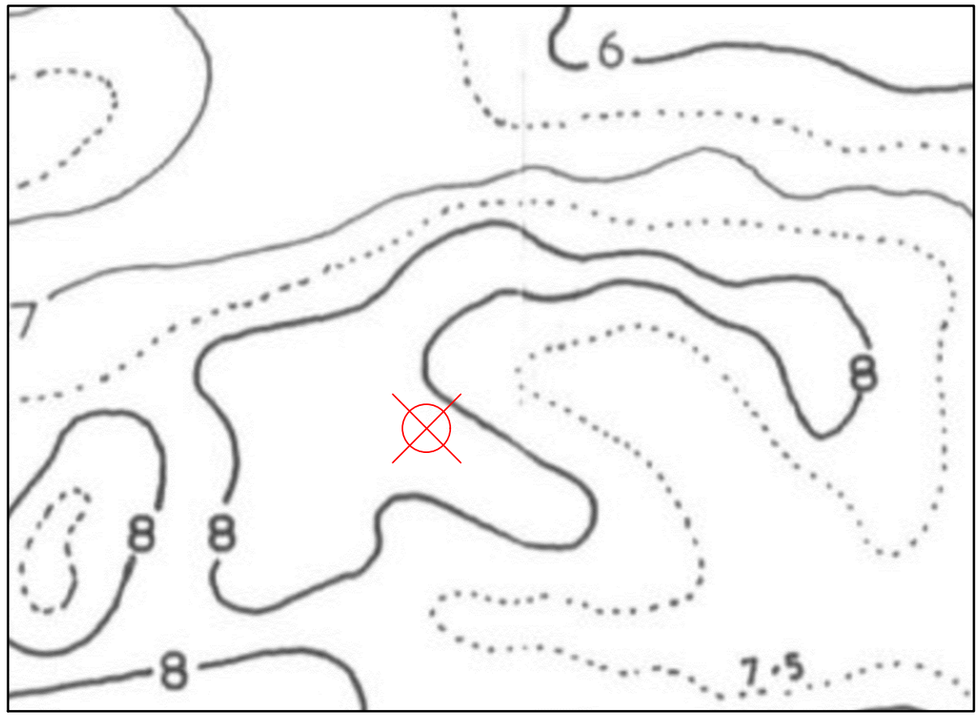
Issue	Ref	Prepared By	Checked By	Approved By	Date	Comments
1	H672-TN04	IS	MWS	MWS	5/3/2025	-

Appendices

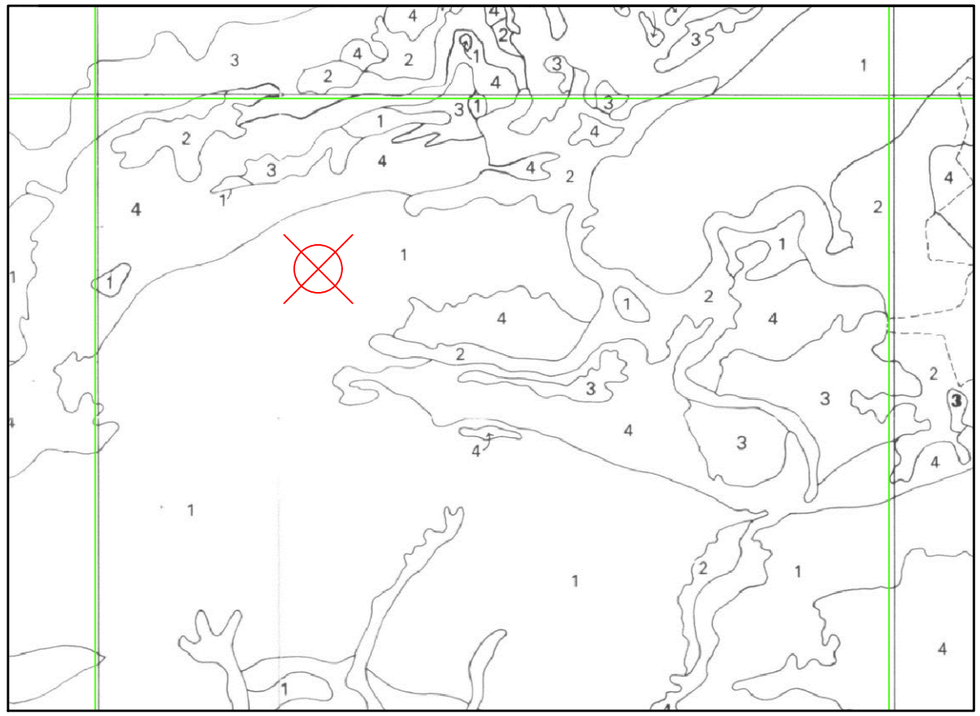
Appendix A



Location Plan



Standard Average Annual Rainfall (SAAR) (in hundreds of mm)



Winter Rain Acceptance Potential (WRAP)

Status

FOR INFORMATION

This drawing is produced for initial discussion and illustrative purposes only, and should not be relied upon for tender or pricing purposes.

NOT TO SCALE

N

NOTES

1. Standard Average Annual Rainfall (SAAR) and Winter Rain Acceptance Potential (WRAP) map extracts shown on this drawing are reproduced from the maps contained in Volume V of the Flood Studies Report – NERC:1975.

Soil Classification			
Soil Class (WRAP)	Soil Index (IoH)	SPR (FEH)	St (ADAS)
1	0.15	10	0.1
2	0.30	30	0.5
3	0.40	37	0.8
4	0.45	47	1.0
5	0.50	53	1.3

Rev	Date	Description	Drawn	Check
#	18/07/22	First Issue	IS	MWS
A	05/03/25	Title Block Revision	IS	MWS

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Project

Baydon

Drawing Title

SAAR and WRAP Map

Sheet 1 of 1

Drawing No. H672/02

Rev A

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A3

Appendix B







EARTH ENVIRONMENTAL
& GEOTECHNICAL

Geo-Environmental Site Investigation

Land at Russley Green
Baydon
SN8 2LJ

For

Hannick Developments Ltd

May 2021

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GEOENVIRONMENTAL SITE INVESTIGATION REPORT

LAND AT RUSSLEY GREEN BAYDON SN8 2LJ

Report Ref: B1547/21/1

MAY 2021

Prepared on Behalf of:

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GEOENVIRONMENTAL SITE INVESTIGATION REPORT

LAND AT RUSSLEY GREEN, BAYDON, SN8 2LJ

Report Reference: B1547/21

Version B.1

Date: 26th May 2021

Prepared for: Hannick Developments Ltd

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Definition of Version Code:
D. Applied during initial drafting of the report before it has been reviewed.
C. Applied after the report has been reviewed but before it has been approved by the Project Manager.
B. Applied after the Project Manager has approved the report ready for issue to the client.
A. Applied to reports after external/internal review.

The version number starts at "0" and is raised by "1" at each re-type.

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1.0 EXECUTIVE SUMMARY

Appointment	A Geo-Environmental Site Investigation has been commissioned by Hannick Developments Ltd to examine ground conditions and retrieve soil samples for chemical and geotechnical testing for a proposed new residential development at a site in Baydon, Wiltshire.
The Site	The site is an existing field located North West of Russley Green in Baydon, Wiltshire and is centred on National Grid Reference SU 427987 178190. The site is directly underlain by Clay-with-Flints overlying the Seaford Chalk Formation.
Environmental Considerations	On Site: no recorded pollution incidents or potential sources of contamination. Within 250m of Site: 3 industrial land uses, 3 licensed discharge consents.
Site History	The site has been occupied by fields since earlies available records in 1882.
The Investigation	The investigation comprised boreholes and trial pitting with associated sampling and in situ testing, in-situ CBR and soakaway testing, laboratory geotechnical and contamination testing.
Ground Conditions Encountered	The exploratory holes have encountered a thin veneer of topsoil overlying variably soft to stiff clay-with-flints (variable thickness 2.1m to >6.8m) overlying Grade Dm Chalk. The surface of the chalk was encountered in TP2, WS1 and WS2 only at depths of between 2.4m and 6.0m bgl. Groundwater was not encountered in any of the exploratory holes during the fieldwork.
Foundation Assessment	Strip foundations suitable taken down into Clay-wth-Flints.
Soil Contamination Risk Assessment	Low potential risk from soil contamination to workers during construction. Low potential risk from soil contamination to future site users. No soil remediation required.
Soil Waste Assessment	All samples tested (5 nr) are classified as Non-Hazardous.
This sheet is intended to provide a summary only of the report. It does not provide a definitive engineering analysis for the purposes of costing or construction, and is subject to the limitation of the agreed brief.	

2.0 INTRODUCTION

2.1 Background

A Site Investigation has been commissioned by Hannick Developments Ltd (the Client) to examine ground conditions and retrieve soil samples for chemical and geotechnical testing for a site near Russley Green, Baydon, Wiltshire.

2.2 Terms of Reference

Earth Environmental and Geotechnical (Southern) Ltd (EEGSL) was commissioned by the Client to undertake a Site Investigation of the site in accordance with a proposal B1547, dated 14th October 2010.

The objectives of this investigation are as follows:

- *Review of Phase I Desk Study Information.*
- *Assessment of ground conditions for design of foundations and infrastructure associated with proposed development, including soakaway drainage.*
- *Assess the presence and likely extent of any potential environmental hazards associated within the areas of the site investigated.*

This report presents full factual records of the site work carried out, the ground conditions encountered in the exploratory holes, the in situ and laboratory test results. All information collected has been used to provide an interpretation of the ground conditions, with recommendations on geotechnical design and potential ground contamination risks for the proposed development.

2.3 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEGSL reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are also based on exploratory records and examination of samples and, where applicable, laboratory tests. No liability can be accepted for conditions not revealed by the boreholes, particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

2.0 THE SITE

2.1 Site Location & Description

The site is an existing field located North West of Russley Green in Baydon, Wiltshire and is centred on National Grid Reference SU 427987 178190 and nearest postcode SN8 2LJ.

The site location is shown in the site plan below.

Figure 1 – Site Location Plan



The site slopes gently downwards from SW to NE. An aerial photograph of the site is included in Figure 2 below and general site photographs in Figure 3 overleaf.

Figure 2 - Aerial photograph Showing Site Location



Figure 3 – General Site Photographs

Photograph Showing Access from Russley Green (Looking NW)



Photograph looking E from Access Gate



Photograph Looking W from Access Gate



2.2 Proposed Development

It is proposed to redevelop the site for residential purposes with associated dwellings, hardstanding areas and soft landscaped areas. At the time of writing this report, proposed development layout details were not known.

3.0 PHASE I DESK STUDY INFORMATION

3.1 General

The geology of the site is covered by British Geological Survey (BGS) online data and the site-specific Envirocheck Report (Appendix 1). Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site-specific Envirocheck Report.

The following sections are generally limited to locations within 250m of the site boundary unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the site.

3.2 Geological Setting

3.2.1 *Published Geology*

According to the British Geological Survey (BGS) the site is underlain by superficial deposits of the Clay-with-flints Formation and bedrock comprised of the Seaford Chalk Formation of Cretaceous Age.

The Clay-with-flints Formation is made up of clay, silt, sand and gravel deposited during the Quaternary and Neogene Periods. It is described as orange-brown and red-brown sandy clay with abundant nodules and rounded pebbles of flint.

The Seaford Chalk Formation is described as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

The site is in an area where the hazard rating is negligible regarding compressible ground and running sands. There is a very low rating for collapsible ground and landslides, a low rating for shrinking or swelling clay and a moderate rating to high regarding ground dissolution.

There are no borehole records within 250m of site.

3.2.2 *Mining, Ground Workings & Natural Cavities*

The site does not fall within a coal mining affected area.

The site falls within the rare category for any risk relating to non-coal mining areas.

3.2.3 *Radon Potential*

The site is shown to be within a Radon Affected Area, where less than 1% of properties are affected. No protection measures are required for new buildings/extensions on this part of the site.

3.3 Environmental Setting

Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site-specific Envirocheck Report (Appendix 1).
The following sections are generally limited to locations within 250m of the site boundary unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the site.

3.3.1 *Industrial Land Use Information*

There are three records of industrial land use within 250m of site with regards to Mr Ben's Pet Foods and Animal Feeds (inactive, 143m SE), and Washmatics Servicing and Repair (inactive/active, located 174m SW).

3.3.2 *Landfill and Waste Management Activity*

There are no records of waste or landfill sites within 250m of the site.

3.3.3 *Environmental Permits, Incidents and Registers*

There are no records of hazardous substances involving COMAH, explosive sites, notices, or planning consents/enforcements.

3.3.4 *Hydrogeology and Hydrology*

The underlying bedrock is classified as a Principal Aquifer by the Environment Agency (EA). The EA definition is given below:

'These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.'

Soils on site are classified as having intermediate leaching potential. Soils which can possibly transmit a wide range of pollutants.

There are no recorded groundwater or surface water abstraction licenses within 250m of the site.

There are no records of potable water abstraction licenses within 1km of the site.

The nearest watercourse is a river located 169m E of site.

There are three records with regards to sewage discharge into land/irrigation area from Grooms Hostel/Downs Equestrian Centre which is located 204m E. These licenses were issued in 1990 and have since been revoked between 2006 to 2019.

3.3.5 *Environmentally Sensitive Sites*

The site is located within the North Wessex Downs, an area of outstanding natural beauty.

The site is located within a nitrate vulnerable zone.

3.3.6 *Archaeology*

An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist.

3.3.7 *Potential Flood Risks*

The BGS indicates there is limited potential for groundwater flooding to occur on site.

There is no risk of flooding from rivers or sea with/without defences.

3.3.8 *Visual and Cultural Designations*

There are no records of any visual and cultural designations within 250m of site.

3.4 Site History

The historical development of the site has been determined by reference to historical plans and Google Earth imagery. The reviewed historical plans comprise only readily available records and may be limited; however, the information available to date indicates that additional searches are unlikely to add to our understanding of the site. The earliest available historical mapping covering the site dates back to 1882.

The site history is summarised in Table 1 below.

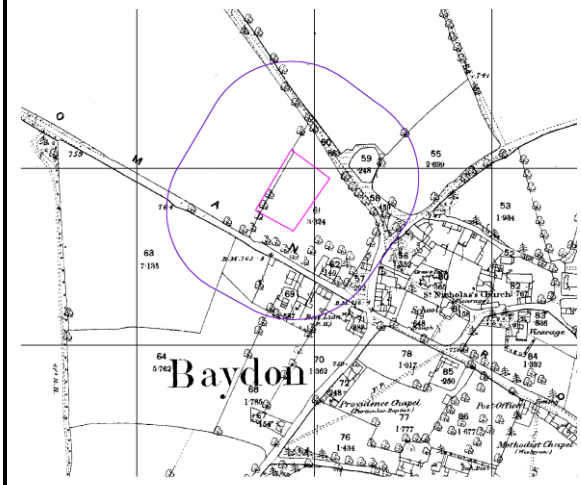
Table 1 - Summary of Site History

Date	Site	Surrounding Land Use
1882-1887	Open fields and sparse tree/vegetation cover.	Fields are in the east and west, with a tree lined road along the northern boundary whilst Baydon village lies to the southeast.
1900	No change	No change
1913	No change	No change
1925	No change	No change
1960	No change	Small building near the south boundary of site.
1974-1975	No change	A garage is located not far from the SE corner of site. The M4 is built more further afield to the north of Baydon.
1982	The south end of site crosses over with the plots of Roman Way and Midway houses.	Two houses have been constructed along the south boundary. Baydon has been expanded in size.
1999	No change	Continued expansion of Baydon.
2017	Buildings towards the south have been removed.	Several houses have been constructed along the east boundary of site.

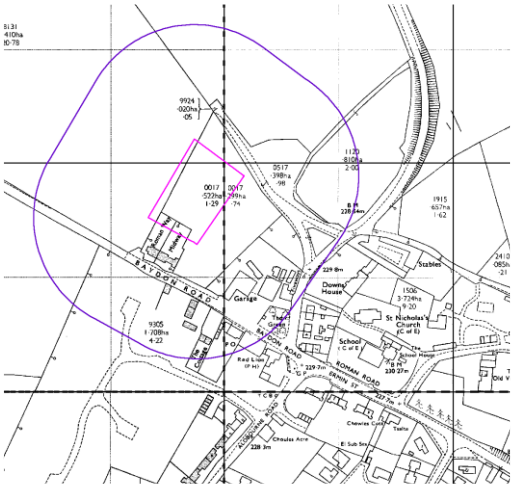
Extracts from historical OS maps are shown in Figure 4 overleaf.

Figure 4 – Historical Map Extracts

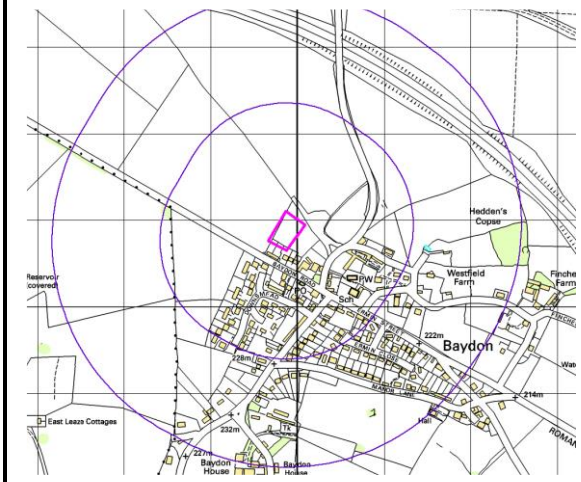
1886 OS Map



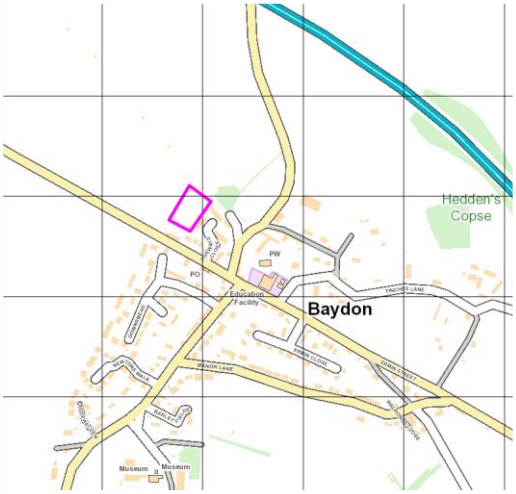
1975 OS Map



1999 OS Map



2017 OS Map



4.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

4.1 Introduction

The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by DEFRA and the EA Model Procedures for the Management of Land Contamination, CLR11(2004).

Table 4 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 2 and Table 3 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and CLR11.

Table 4 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.

Table 2 - Consequence, Probability and Risk

Probability	Consequence,	Risk
High Likelihood- There is a pollution linkage and an event either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution	Very High – acute risk to the human health likely to result in significant harm. Risk of severe or irreversible effect on ground/surface water quality. Catastrophic damage to buildings / property.	Very High – there is a high potential that the source-pathway-receptor scenarios may give rise to harm to human health or the environment and remedial action is likely to be required.
Likely – there is a pollution linkage and all the elements are present, which means that it is probable an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	High – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	High – it is likely that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks
Low likelihood– there is a pollutant linkage and circumstances are possible for an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term	Moderate – Long term or short term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. Reduced reliability of a supply at a groundwater or surface water abstraction source	Moderate – it is possible that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, however it is either relatively unlikely that such would be severe, or if any harm were to occur it is more likely that harm would be mild.
Unlikely – there is a pollution linkage, but circumstances are such that it is doubtful that an event would occur even in the very long term.	Low – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	Low – it is possible that harm could arise at the source, however it is likely that they would at worst be mild.
		Very Low – it is unlikely that the source-pathway-receptor scenarios will give rise to an impact on human health or the environment.

Table 3 - Estimation of Level of Risk by Comparison of Consequence and Probability

		Consequence			
		High	**Moderate**	**Low**	**Very low**
Probability	**High Likelihood**	Very High	High risk	Moderate risk	Moderate to low risk
	Likely	High risk	Moderate risk	Moderate to low risk	Low risk
	Low Likelihood	Moderate risk	Moderate to low risk	Low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk	Very low risk

4.2 Potential Sources

The following potential sources have been considered for the assessment site.

- The site has historically been occupied by fields used for agricultural purposes. This is unlikely to be a source of significant contamination.
- There are no recorded pollution incidents or industrial land usage on or close to the site.

4.3 Potential Receptors

The following receptors have been considered as part of this assessment.

- Current land users.
- Adjacent land users.
- Future land users.
- Construction workers during site development works.

4.4 Potential Pathways

The following pathways have been considered as part of this assessment.

- Direct / dermal contact, ingestion, inhalation pathways of potentially contaminated soils.
- Vertical or lateral migration of contamination on and off site.

Table 4 - Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Contamination of the ground beneath site due to current and historical industrial use	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Low	Low	Low	The risk to current site users from potential contamination within the ground beneath site due to current and historical site use is **LOW**.
		Future Site users	Low	Low	Low	Based on historical usage, the risk to future site users via direct exposure is considered **LOW**, even if areas of soft landscaping which are perceived high sensitivity to contamination.
		Construction Workers	Low	Low	Low	It is considered that a low to moderate risk is likely to be present to construction workers during the construction phase of development. However, it is expected that exposure duration will be short-term only, and assuming appropriate health and safety measures are adopted (in line with CDM and other relevant health and safety guidance) **LOW** risk to construction workers is anticipated.
	Vertical or lateral migration of contamination (including ground gas) on and off site.	Current Site Users	Low	Low	Low	Based on anticipated ground conditions beneath the site the risk to current users from migrating contamination at the assessment site is considered **LOW**.
		Adjacent land users	Low	Low	Low	Given the previous usage of the site and anticipated ground conditions, the risk to adjacent site users from migrating contamination (including ground gas) is considered **LOW**
		Future land users	Low	Low	Low	The risk to future site users from migrating contamination (including ground gas) at the assessment site is considered **LOW.**
		Controlled Waters/ Surface Water	Low	Low	Low	The current risk to controlled waters from contamination at the assessment site is considered **MODERATE** due to the close proximity of rivers located on site.
		Groundwater	Low	Moderate	Moderate to Low	The superficial deposits and bedrock are Secondary A aquifers. The risk to groundwater may be considered **MODERATE TO LOW.**
		Construction Workers	Low	Low	Low	The risk to construction workers from mobile contamination and ground gas is considered **MODERATE**.

4.5 Preliminary Risk Assessment

From review of available desk study information, there are no records of potential sources of contamination on or close to the site. Overall the site can be given a LOW risk rating.

5.0 SITE INVESTIGATION

5.1 Exploratory Fieldwork

The fieldwork was carried out by EEGSL between the 4th and 17th March 2021 and comprised:

- 5 No. Trial Pits (designated TP1 to TP5 inclusive) were each excavated to depths of between 2.50m and 3.70m below existing ground level using a mechanical excavator. Groundwater observations were noted where possible and representative samples retrieved for laboratory analyses. In situ hand shear vane tests were conducted in suitable materials. Trial pit logs are included in appendix 2 and trial pit photographs presented in Appendix 3.
- 4 No. window sample boreholes (designated WS1, WS2, WS3 and WS4) were sunk to depths of between 6.0m and 7.0m below existing ground level. Window sampler boring is carried out with a small, track-mounted rig, which uses a chain-driven trip hammer to drive sampling tubes or penetrometers into the ground. These tools are coupled to the anvil of the hammer by solid drill rods. Sampling tubes comprise “windowless samplers”, which are plain sampler tubes in which a continuous disturbed sample is recovered within a semi-rigid plastic liner. In order to reduce friction within the borehole, sampling tubes of progressively smaller diameter are used as the borehole depth increases. Sampler diameters generally range from between approximately 90mm to 50mm. Borehole logs are included in Appendix 2.
- Dynamic probe testing was carried out in all the trial pits at a depth of 1.0m below existing ground level. The test is performed using a Mackintosh Probe, which is a lightweight and portable penetrometer. The test is carried out by dropping a 4.5kg weight over a distance of 300mm. The 27.94mm cone is advanced into the soil by standard blows from the drop weight and the number of blows for 100mm penetration is counted (M). The number of blows to achieve a penetration of 100mm can be related to a Standard Penetration Test as carried out during the advancement of boreholes. The results of these tests are shown in Appendix 4.
- The California Bearing Ratio (CBR) of near surface materials was examined using handheld dynamic cone penetrometer. Each test was performed at existing ground surface. The test is performed by using an 8kg weight dropping a height of 575mm to drive a 20mm diameter 60 degree cone into the subsoil. The blow counts are recorded against penetration achieved and the results are plotted graphically. The CBR value of the various layers is then determined by reading from a graph showing the DCP-CBR relationship by Kleyn and Van Heerd(1983). Test Results are included in Appendix 4.
- Soakaway tests were undertaken generally in accordance with methods described in BRE Digest 365(2016) . Soakaway test results are included in appendix 5.

Each exploratory location was scanned using a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary. On completion, all samples recovered from the site were taken to a specialist laboratory for testing.

A summary of exploratory holes undertaken is presented in Table 5 overleaf.

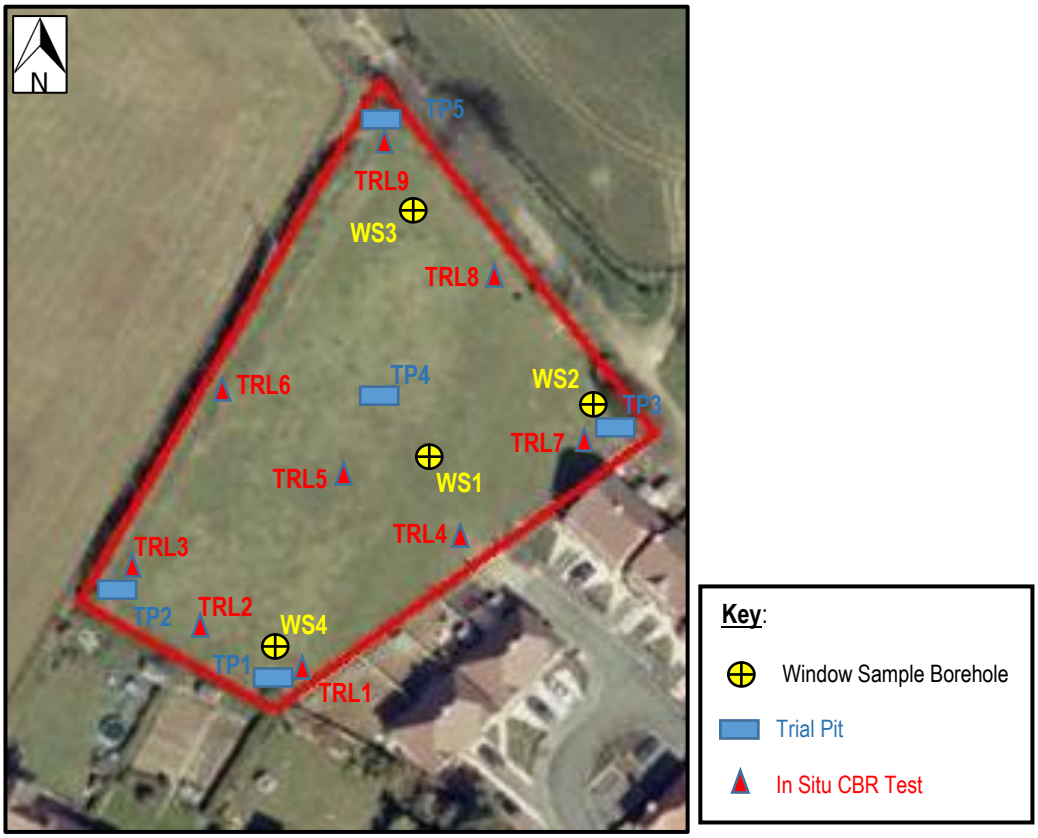
Table 5 - Summary of Exploratory Holes Undertaken

Hole	Type*	Depth (m)	Date Started	Date Finished	Backfill Details**
TP1	TP	3.00	04/03/2021	04/03/2021	A
TP2	TP	3.50	05/03/2021	05/03/2021	A
TP3	TP	3.50	04/03/2021	04/03/2021	A
TP4	TP	2.50	04/03/2021	04/03/2021	A
TP5	TP	3.50	05/03/2021	05/03/2021	A
TRL1	TRL	0.96	05/03/2021	05/03/2021	-
TRL2	TRL	0.96	05/03/2021	05/03/2021	-
TRL3	TRL	0.96	05/03/2021	05/03/2021	-
TRL4	TRL	0.96	05/03/2021	05/03/2021	-
TRL5	TRL	0.96	05/03/2021	05/03/2021	-
TRL6	TRL	0.96	05/03/2021	05/03/2021	-
TRL7	TRL	0.96	05/03/2021	05/03/2021	-
TRL8	TRL	0.96	05/03/2021	05/03/2021	-
TRL9	TRL	0.96	05/03/2021	05/03/2021	-
WS1	WS	7.00	17/03/2021	17/03/2021	A
WS2	WS	7.00	17/03/2021	17/03/2021	A
WS3	WS	6.00	17/03/2021	17/03/2021	A
WS4	WS	7.00	17/03/2021	17/03/2021	A

* TP= Trial Pit, WS=Window sample Borehole, TRL = In Situ CBR Test, **A = Arisings.

The exploratory hole locations were determined on site by EEGSL and the Client and are shown approximately on the Exploratory Hole Location Plan, below.

Figure 5 - Exploratory Hole Location Plan



The logging of soils and rocks has been carried out in accordance with BS5930(2015) except where superseded by the soil and rock description methodology in BS EN14688-1(2002), BS EN 14688-2(2004) and BS EN 14689-1(2003).

Chalk has been logged in accordance with Ciria Report C574(2002), as summarised as follows:

- **Grade Dm Chalk** - Matrix supported structureless chalk comprising predominantly fine soil with chalk clasts (>35% silt/clay)
- **Grade Dc Chalk** - Clast supported structureless chalk comprising predominantly chalk clasts with <35% silt/clay.
- **Structured Chalk (Grade C5 to A1)** - structured chalk grade depending on strength, intact density, discontinuity type, orientation, spacing, thickness, infill.

5.2 Laboratory Testing Programme

5.2.1 *Geotechnical Testing*

A programme of laboratory testing was carried out on samples taken from the various strata to assist in classification and determine the engineering properties of the materials underlying the site. The testing was scheduled by EEGSL and carried out by GSTL. The test procedures used were generally in accordance with the methods described in BS1377:1990 and BS EN 17892-1:2014. Details of the specific tests used in each case are given in Table 6 below:

Table 6 – Summary of Laboratory Testing Undertaken

TEST	STANDARD	No.
Water Content	BS EN 17892-1: 2014	5
Liquid Limit, Plastic Limit, Plasticity Index	BS1377:1990 Part 2, Clause 4/5	5
Sulphate content of 2:1 soil:water extract	BS1377:1990 Part 3, Clause 5	4
pH value	BS1377:1990 Part 3, Clause 9	4

The results of the laboratory testing are included in Appendix 6.

5.2.2 *Environmental Testing*

The environmental chemistry of the ground was investigated by specialist chemical analysis of selected samples, scheduled by EEGSL and carried out by DETS Ltd.

Chemical analyses were carried out on 5 soil samples and were submitted for the following suite of determinants:

Asbestos Screen, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Cyanide, Thiocyanate, Sulphate (SO_4), Sulphide, pH, Sulphur, Soil Organic Matter, Phenol, Extractable Petroleum Hydrocarbons (EPH) and speciated Polyaromatic Hydrocarbons (PAH).

The results of the laboratory contamination tests are included in Appendix 6.

The range of potentially hazardous contaminants present on the site can be wide and varied, and the suite has been chosen to reflect both commonly found contaminants and others indicated by research to have a significant risk of being present. It is, however, possible that others may exist for which analyses have not been carried out. It is also possible that contaminants exist on the site but were not present at any of the exploratory hole locations.

6.0 GROUND CONDITIONS ENCOUNTERED

6.1 Soil Profile Encountered

The sequence of strata encountered beneath the site was as follows:

- **Topsoil** was encountered in all the exploratory holes, thickness 0.1m to 0.4m
- **Clay-with-Flints** was encountered in all the exploratory holes, thickness 2.6m to 6.8m and comprised:
  - Silty SAND with flint gravel (TP1 only).
  - Silty CLAY with flint gravel.
- **Chalk** was encountered in TP2, WS1, WS2 WS3 and WS4 only, comprising:
  - Grade Dm Chalk.
  - Grade Dc Chalk.

The depths of the various materials encountered in each of the exploratory holes are summarised in the following table.

Table 7 - Summary of Ground Conditions Encountered

Hole	Depth to Stratum (m)					GROUNDWATER
	TOPSOIL	CLAY-WITH-FLINTS FORMATION		SEAFORD CHALK FORMATION		
		Slightly gravelly slightly silty SAND	CLAY with flint gravel and cobbles	DM chalk Gravelly SILT	DC chalk slightly sandy GRAVEL with cobbles	
TP1	GL-0.10	0.10-0.40	0.40-3.00			Dry
TP2	GL-0.30		0.30-2.40	2.40-2.90	2.90-3.50	Dry
TP3	GL-0.30		0.30-3.50			Dry
TP4	GL-0.40		0.40-2.50			Dry
TP5	GL-0.20		0.20-3.50			Dry
WS1	GL-0.25		0.25-6.00	6.00-7.00		Dry
WS2	GL-0.20		0.20-5.50	5.50-7.00		Dry
WS3	GL-0.20		0.20-6.00			Dry
WS4	GL-0.20		0.20-7.00			Dry

From the above table and Figure 5 it can be seen the thickness of clay-with flints overlying the chalk decreases to the southwest of the site (i.e. the highest part of the site).

6.2 Obstructions

No underground man-made obstructions were encountered.

6.3 Groundwater

Groundwater was not encountered.

6.4 Observable Indications of Contamination

No visual or olfactory evidence of contamination was identified in the exploratory holes during the investigation.

7.0 ENGINEERING PROPERTIES OF SOILS ENCOUNTERED

7.1 General

The following section discusses the engineering properties of strata encountered based on results of in situ testing and laboratory testing obtained during the investigation.

Laboratory test results are summarised in the following table:

Table 8 - Summary of Laboratory Test Results

Location	Depth (m)	CLASSIFICATION				CHEMICAL	
		Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	pH Value	Water Soluble Sulphate (mg/l)
TP1	1.00	35	60	26	34	6.3	18
TP2	2.00	41	99	45	54	7.0	29
TP2	3.00	-	-	-	-	7.7	14
TP3	1.00	17	52	22	30	-	-
TP4	2.00	33	87	28	59	-	-
TP5	1.00	22	54	17	37	6.7	12

7.2 Clay-with-Flints

Atterberg Limit tests have given values of **liquid limit** in the range 52% to 99% and plastic limit values in the range 17% to 45% resulting in values of plasticity index in the range 30% to 59%. These results suggest the samples tested are clay of high to very high plasticity or silt of extremely high plasticity as shown on the Plasticity Chart included in Appendix 5. For design purposes a value of 54% is recommended, based on the upper quartile value of results.

In accordance with NHBC Chapter 4.2 Building Near Trees(2003) soils can be classified in terms of **volume change potential**, using the relationship:

$$I_{p'} = I_p \times \frac{\%\ \text{less than } 425\mu m}{100\%}$$

….where $I_{p'}$ = modified plasticity index, I_p = plasticity index.

Based on the laboratory test results, the above relationship and Table 1 of NHBC Chapter 4.2, the samples tested are shown to have medium to high volume change potential.

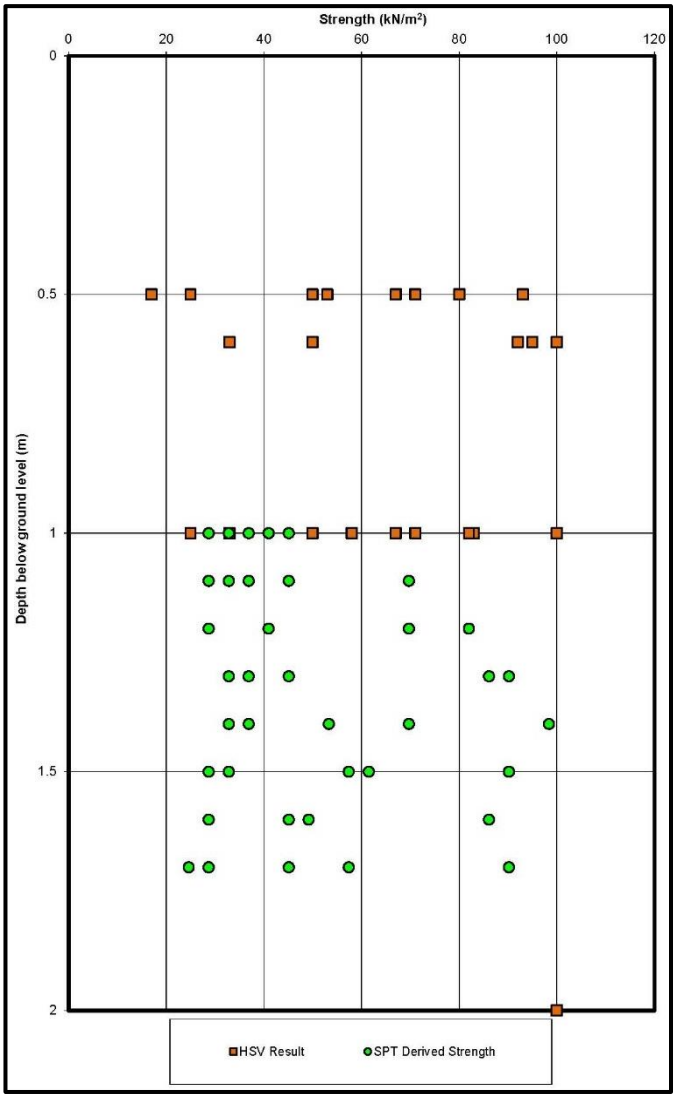
In situ hand shear vane tests have given values of **shear strength** in the range 17kN/m^2 to 100kN/m^2 at depths of between 0.5m and 2.0m below existing ground level. These results suggest the clay is variably soft to stiff.

SPT N values in the range 6 to 24 have been obtained using the Mackintosh Probe at depths of between 1.0m and 1.7m below existing ground level.

Shear strength may also be estimated from a correlation by Stroud and Butler(1975): for a clay with a plasticity index of 53%, shear strength = 4.1 x SPT N value.

A plot of all strength tests against depth is included in Figure 6 overleaf.

Figure 6 – Strength v Depth Plot



From the above Figure it can be seen there is a wide spread of results for the clay, with no discernible trend in values. Therefore, for the purposes of this report, a value of shear strength = 56kN/m^2 is recommended for design purposes, based on the average value of all results.

Laboratory tests have given values of **Water Soluble Sulphate** between 12mg/l and 29mg/l and a **pH Value** between 6.3 and 6.7.

7.3 Results of In Situ Testing

Results of the soakaway testing are presented in the table below:

Table 9 - Summary of Soakaway Test Results

Location	Test Depth (m)	Strata in Test Section	Soil Infiltration Rate (m/s)		
			Test 1	Test 2	Design Soil Infiltration Rate (m/s)
TP1	2.50	CLAY	-	-	N/A
TP2	3.50	CHALK	$3.45x10^{-5}$	$1.19x10^{-5}$	$1.19x10^{-5}$
TP4	3.00	CLAY	-	-	N/A
TP5	3.50	CLAY	-	-	N/A
WS1	7.00	CHALK	$1.09x10^{-7}$	-	$1.09x10^{-7}$
WS2	7.00	CHALK	$9.00x10^{-8}$	-	$9.00x10^{-8}$
Notes: Water did not soakaway in TP1, TP2, and TP5					

Water has soaked away where chalk has been encountered. Lower values of soil infiltration rate are to be expected in borehole soakaway tests due to the significantly reduced surface area of testing and effect of sampling on sides of the borehole, when compared to a trial pit. In this context it is considered the trial pit results are more representative of the likely soil infiltration rates in the chalk.

The results of in situ CBR tests are summarised in Table 10 below.

Table 10 – In Situ CBR Test Results

Location	Depth (mbgl)	CBR Value (%)	Location	Depth (mbgl)	CBR Value (%)
TRL1	0.051-0.179	3.7	TRL5	0.054-0.167	4.2
	0.179-0.416	7.3		0.167-0.491	6.8
	0.416-0.960	10.2		0.491-0.960	10.8
TRL2	0.052-0.282	5.3	TRL6	0.055-0.546	6.0
	0.282-0.326	11.5		0.546-0.745	23.8
	0.326-0.960	8.2		0.745-0.960	14.3
TRL3	0.045-0.195	4.8	TRL7	0.062-0.193	3.6
	0.195-0.258	12.1		0.193-0.711	6.6
	0.258-0.393	9.3		0.711-0.960	11.2
	0.393-0.571	12.9	TRL8	0.045-0.313	5.4
	0.571-0.960	12.4		0.313-0.960	8.5
TRL4	0.041-0.302	6.6	TRL9	0.067-0.302	4.1
	0.302-0.333	16.7		0.302-0.342	26.5
	0.333-0.577	11.4		0.342-0.901	8.5
	0.577-0.648	26.1		0.901-0.960	31.7
	0.648-0.960	13.9			

8.0 GEOTECHNICAL ASSESSMENT

8.1 Proposed Development

It is proposed to redevelop the site for residential purposes with associated dwellings, hardstanding areas and soft landscaped areas. At the time of writing this report anticipated structural loadings were not known.

8.2 Ground Conditions Encountered

The exploratory holes have encountered a thin veneer of topsoil overlying variably soft to stiff clay-with-flints (variable thickness 2.1m to >6.8m) overlying Grade Dm Chalk. The surface of the chalk was encountered in TP2, WS1 and WS2 only at depths of between 2.4m(TP2) and 6.0m(WS2) below existing ground level. Groundwater was not encountered in any of the exploratory holes during the fieldwork.

8.3 Foundations

Conventional strip foundations should be suitable at this site, subject to anticipated structural loadings and tolerance of the structure to settlement.

Strip foundations should be taken down a minimum depth of 1.0m and placed in the natural firm clay-with-flints. If any made ground, particularly soft or loose material is encountered at foundation level this should either be excavated and replaced with suitable granular fill, or the foundation extended to suitable strata.

The following table summarises anticipated allowable bearing pressures for strip foundations placed at different depths in the natural clay-with-flints. The bearing capacities are calculated based on Hansen's(1978) method and assuming a factor of safety against bearing capacity failure of 3. Ground water is assumed to be at foundation level.

Table 11 – Summary of Allowable Bearing Pressures

Depth (m)	Stratum	Design Value	Foundation Type	Foundation Width	Allowable Bearing Pressure
1.00	CLAY	c_u= 56kN/m^2	Strip	0.4m	140kN/m^2
				0.9m	130kN/m^2
1.50	CLAY	c_u = 56kN/m^2	Strip	0.4m	150kN/m^2
				0.9m	140kN/m^2
2.00	CLAY	c_u = 56kN/m^2	Strip	0.4m	150kN/m^2
				0.9m	145kN/m^2

Table 12 overleaf summarises anticipated settlements of the above foundations configurations. For the purposes of the calculations, foundation loadings have been taken as the allowable bearing pressures in Table 11 to give a worse-case scenario and also 75kN/m^2 for comparison.

Table 12 – Summary of Anticipated Settlements

Foundation Depth (m)	Stratum	Foundation Type	Foundation Width	Foundation Loading	Average Settlement* (mm)
1.00	CLAY	Strip	0.4m	75kN/m²	5-10
				140kN/m²	10-15
			0.9m	75kN/m²	10-15
				130kN/m²	20-25
1.50	CLAY	Strip	0.4m	75kN/m²	5-10
				150kN/m²	10-15
			0.9m	75kN/m²	10-15
				140kN/m²	20-25
2.00	CLAY	Strip	0.4m	75kN/m²	5-10
				150kN/m²	10-15
			0.9m	75kN/m²	10-15
				145kN/m²	20-25

Settlements for other bearing pressures may be estimated on a pro-rata basis but bearing pressures should not exceed the allowable net bearing pressure based on ultimate bearing capacity.

If trees are to be planted as part of the proposed development, foundations should be designed in accordance with NHBC Chapter 4.2 'Building Near Trees'. In this context clay soils on site should be considered as having high volume change potential.

All foundation excavations should be inspected by a suitable qualified engineer to prove that the founding strata is suitable and uniform along the length of the foundation, and capable of taking the anticipated structural loadings.

8.5 Pavement Design

Results of in-situ testing on the surface have given values of CBR in the range 3.6% to 31.7%.

Based on the above results and ground conditions encountered, it is recommended for preliminary design purposes a CBR value = 3% is adopted for near surface cohesive materials.

Consideration should also be given to the use of geotextiles to allow reduction of capping thickness. For examples biaxial geogrids such as Tensar SSLA20 and SSLA30 are often used to reduce capping thickness. The advice of a suitable contractor should be sought as to the most appropriate type of geotextile to use in the ground conditions encountered at this site. For guidance, the following table gives a comparison of granular layer thickness with and without the use of a geotextile, in accordance with the requirement of HA25/94 Part 2.

Table 13 – Comparison of Granular Layer Thickness With and Without Geotextile

CBR	Unreinforced			Reinforced with Tensar Geogrid				
	Sub-base	Capping	Total	Sub-base	Capping	No. of grids	Total	Thickness saving
0.5%	Design not suitable			200mm	400mm	2	600mm	-
1.0%	150mm	600mm	750mm	400mm	0	1	400mm	350mm
1.5%	150mm	600mm	750mm	310mm	0	1	310mm	440mm
2.0%	150mm	600mm	750mm	260mm	0	1	260mm	490mm
3.0%	150mm	350mm	500mm	210mm	0	1	210mm	290mm
4.0%	150mm	300mm	450mm	175mm	0	1	175mm	275mm
5.0%	150mm	250mm	400mm	160mm	0	1	160mm	240mm
These figures are suitable for light access roads and car parks, based on 1000 standard axles. For heavier loaded pavements the advice of specialist contractor should be sought.								

It should be noted the type of construction will depend on proposed finished pavement levels across the site and it is recommended the pavement design is reviewed once these levels are known. In this context, it is essential further in situ CBR testing is carried out once formation levels are known to confirm design CBR values.

All formation excavations should be examined by a suitably experienced engineer or inspector to check for soft or unsuitable material, which should be removed and replaced with compacted granular fill. Also, to ensure good compaction and remove unevenness, the formation should be compacted with equipment suitable for use in the ground conditions encountered. Careful inspection of this work will also help identify any soft spots at or just below formation level.

8.6 Chemical Attack on Buried Concrete

Chemical tests (see Appendices) show low levels of water soluble sulphates and near neutral conditions.

Based on these conditions, it is recommended that for buried concrete the Design Sulphate Class for the site, as defined in BRE Special Digest 3$^{(2005)}$, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1s.

8.7 Suitability of Excavated Materials

Acceptability criteria and testing, and methods of compaction/placement will depend on the type of contract and specification used for the construction of the proposed development and it is recommended that earthworks specifications are reviewed by a suitably qualified engineer once these have been prepared by the relevant parties.

The Clay-with-Flints could be suitable for re-use as structural fill, providing they are not contaminated and subject to further compliance testing.

8.8 Temporary Works

Formations will be susceptible to damage both by weather and trafficking, and should be protected immediately on exposure, particularly in areas where construction plant will access the site. It is unlikely protection will be required in backfilled areas.

Vertically sided excavations in the Clay-with-Flints should be stable in the short term. All excavations should be adequately supported where personnel are required to enter.

All natural soils on site should be capable of being excavated using conventional excavating machinery. Attention ids drawn to the refusal of boreholes in Made Ground in the area of the former fuel tank to the west of the proposed building footprint.

8.9 Drainage

The soakaway test results have given variable results. Soil infiltration rates were not obtained in Clay-with-Flints which is to be anticipated, given its generally impermeable nature.

Soil infiltration rates of 1.19×10^{-5} to 3.45×10^{-5} m/s have been obtained in the trial pit soakaways and 1.09×10^{-7} to 9.00×10^{-8} m/s obtained in borehole soakaway tests in the chalk.

Taking into consideration the ground conditions encountered and results of soakaway testing, it is considered the only ‘suitable’ location for soakaway drainage is likely to be TP2. However, this test is located in the SW corner of the site which is topographically higher than the rest of

the site and it is likely finished site levels will be different from the present levels and creating a ‘fall’ across the site to this location will be extremely difficult and uneconomic.

The other tests in chalk have obtained very low soil infiltration rates which are not normally considered suitable for soakaway drainage. In addition, there is a significant depth to chalk across the site 5.5m to 7.00m in places. It is likely significant depths of construction will be required depending on proposed locations of soakaways and final site levels, which will preclude the use of soakaway drainage.

9.0 SOIL CONTAMINATION RISK ASSESSMENT

9.1 General

The following sections provide a Human Health Soil Assessment for groundworkers during development and future site users.

9.2 Soil Risk Assessment – Groundworkers During Development

To assess the risk of soil contamination to construction and ground workers during development, guidelines from the HSE Document 'Protection of workers and the general public during development of contaminated land'(1991) are used. The document assesses soil contamination test results and classifies the site as being uncontaminated or slightly contaminated.

The guideline values and laboratory test results are summarised in the following table:

Table 14 - Summary of Guideline Values for Protection of Workers and the General Public during Development of Contaminated Land

Contaminant	Typical Values* for:					Test Results	Class
	Uncontaminated Soils	Slight Contamination	Contaminated	Heavy Contamination	Unusually Heavy Contamination		
	Class A	Class B	Class C	Class D	Class E		
pH (Acid)	6-7	5-6	4-5	2-4	<2	5.8-6.5	A-B
Arsenic	0 - 30	30 - 50	50 - 100	100 - 500	500	7-15	A
Cadmium	0 - 1	1 - 3	3 - 10	10 - 50	50	<0.2-0.4	A
Chromium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	14-34	A
Copper	0 - 100	100 - 200	200 - 500	500 - 2500	2500	11-29	A
Lead	0 - 500	500 - 1000	1000 - 2000	2000 – 1%	1.0%	15-48	A
Mercury	0 - 1	1 - 3	3 - 10	10 - 50	50	<1	A
Nickel	0 - 20	20 – 50	50 - 200	200 - 1000	1000	10-17	A
Zinc	0 - 250	250 - 500	500 - 1000	1000 - 5000	5000	53-102	A
Boron	0 - 2	2 - 5	5 - 50	50 - 250	250	<1	A
Selenium	0 - 1	1 - 3	3 - 10	10 - 50	50	<3	A
Barium	0-500	500-1000	100002000	2000-1.0%	1.0%	49-75	A
Beryllium	0 - 5	5 - 10	10 - 20	20 - 50	50	0.8-1.6	A
Vanadium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	25-67	A
Sulphate	0 - 2000	2000 - 5000	5000 – 1%	1% - 5%	5.05%	250-772	A
Sulphide	0 - 10	10 - 20	20 - 100	100 - 500	500	<5	A
Cyanide (free)	0 - 1	1 - 5	5 - 50	50 - 100	100	<2	A
Coal Tar	0-500	500-1000	1000-2000	2000-1.0%	1.0%	<6-35	A
Phenol	0 - 2	2 - 5	5 - 50	50 - 250	250	<2-4.2	A-B

Based on the above results there is a low potential risk from soil contamination to construction workers, ground workers during construction, and appropriate measures, such as PPE, site health plans, appropriate disposal of material arisings will mitigate any risk.

9.3 Tier I Human Health Soil Risk Assessment – Future Site Users

As part of the contamination assessment, the chemical results obtained by EEGSL have been screened against accepted compliance criteria, namely:

- Defra C4SL Health Criteria Values (March 2014), where available; and
- Tier 1 assessment values - based on LQM/CIEH Suitable 4 Use Levels(2015) (S4ULs).

As a preliminary screening assessment, all results have been compared to a residential end use criteria. The comparison of results is summarised in Table 15 below.

Table 15 - Soil Results Comparison with C4SL/S4UL Values

Determinand	Residential		TP1 (0.10m)	TP2 (0.40m)	TP3 (0.50m)	TP4 (0.90m)	TP5 (0.20m)	No of Exceedences
	with homegrown produce (1)	without homegrown produce (2)						
Metals								
Arsenic	37	40	7	10	10	15	11	0
Beryllium	1.7	1.7	0.8	1.0	1.1	1.6	1.2	0
Boron	290	11000	< 1	< 1	< 1	< 1	< 1	0
Cadmium	26	149	0.3	0.2	< 0.2	< 0.2	0.4	0
Chromium	910	910	14	19	23	34	21	0
Chromium VI	21	21	< 2	< 2	< 2	< 2	< 2	0
Copper	2400	7100	11	15	12	17	29	0
Lead	200	310	26	32	17	15	48	0
Mercury	1.2	1.2	< 1	< 1	< 1	< 1	< 1	0
Nickel	180	180	10	12	16	17	15	0
Selenium	250	430	< 3	< 3	< 3	< 3	< 3	0
Vanadium	410	1200	25	35	39	67	39	0
Zinc	3700	4000	59	62	54	53	102	0
Polyaromatic Hydrocarbons								
Naphthalene	2.3	2.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthylene	170	2900	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthene	210	3000	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluorene	170	2800	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Phenanthrene	95	1300	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Anthracene	2400	31000	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluoranthene	280	1500	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Pyrene	620	3700	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benz(a)anthracene	7.2	11	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Chrysene	15	30	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(b)fluoranthene	5.0	5.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(k)fluoranthene	2.6	3.9	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(a)pyrene	77	110	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Indeno(1,2,3-cd)pyrene	27	45	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Dibenz(a,h)anthracene	0.24	0.31	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(ghi)perylene	320	360	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Phenols								
Phenol	280	750	4.2	< 2	< 2	< 2	< 2	0

The samples have shown contaminants at levels below the recommended C4SL and S4UL for residential end use. No significant chemical contamination has been identified when compared with the criteria for long term protection of human health for residential end use.

Asbestos has not been encountered in any of the samples tested.

9.4 Soil Disposal Waste Assessment

Environment Agency Technical Guidance WM3.1: Hazardous Waste; “Guidance on the classification and assessment of waste”, May 2018, published by Environment Agency of England and Wales, SEPA, NIEA and Natural Resources Wales has been used to characterise soil materials.

HazWasteOnline™ a cloud-based software application for the management, analysis and reporting of hazardous waste materials has been used to make this assessment. This assessment, included in Appendix 7, classifies the samples tested as non-hazardous waste.

10.0 REVIEW OF PRELIMINARY CONTAMINATION ASSESSMENT

The following table provides a review of the Preliminary Conceptual Model/Contamination Risk Assessment included in Section 4.0, based on the findings of the Phase II investigation, laboratory testing and gas/groundwater monitoring.

Table 16 - Revised Conceptual Model

Source	Pathway	Receptor	Risk
Contamination of the ground beneath site due to current and historical use	Dermal contact, ingestion and inhalation of soils, dust	Current Site Users	LOW
		Future Site users	Hard Cover Areas: LOW Soft Landscaped Areas: LOW
		Construction Workers	LOW
	Vertical or lateral migration of contamination (including ground gas) on and off site.	Current Site Users	LOW
		Adjacent land users	LOW
		Future land users	LOW
		Controlled Waters	LOW
		Construction Workers	LOW

11.0 GROUND CONTAMINATION CONCLUSIONS & RECOMMENDATIONS

The following section provides a summary of the conclusions and recommendations based on the findings of the contamination testing.

11.1 Soil Contamination

Based on available soil contamination test results there is a low potential risk from soil contamination to construction workers, ground workers and members of the public, and appropriate measures, such as PPE, site health plans, appropriate disposal of material arisings will mitigate this risk. The groundworks contractor must provide a soil management plan including methods of dealing with unanticipated soil contamination encountered during groundworks.

As discussed in the above sections, the contamination tests indicate generally low concentrations of the potential contaminants. It is therefore considered that, based on the information available, remedial action should not generally be required at this site.

11.2 Soil Disposal

Soils should be disposed of at a suitable site, registered to take the levels of contamination encountered.

11.3 Risk to Buried (Water) Services

It is considered that, due to the low levels of contamination on the site, standard materials should be appropriate for new water pipes. Further advice should be sought from the local water company.

Previous guidance on buried water pipes was contained in Water Regulations Advisory Scheme (WRAS) Guidance Note No. 9-04-03$^{(2002)}$, however this has been superseded by the UK Water Industry Research Report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' Ref 10/WM/03/21 (January 2011).

11.4 Site Personnel

As with all construction sites, personnel working on the site during the construction period should be encouraged to maintain a high standard of personal hygiene and on site washing facilities should be available.

11.5 Other Matters

Due diligence is required during the construction period, and should any further evidence of contamination be found, appropriate investigation and / or action should be taken. The significance of any contamination not discovered by this investigation is outside the scope of this report.

APPENDIX 1

ENVIRONMENTAL DATABASE REPORT

APPENDIX 2

EXPLORATORY HOLE LOGS

APPENDIX 3

TRIAL PIT PHOTOGRAPHS

APPENDIX 4

IN SITU PROBE & CBR TEST RESULTS

APPENDIX 5

IN SITU SOAKAWAY TEST RESULTS

APPENDIX 6

LABORATORY TEST RESULTS

APPENDIX 7

SOIL WASTE CLASSIFICATION

APPENDIX 8

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2021 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth

Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

Appendix C

Our Ref: RJ/LF/JT0485

ST Consult
Environmental & Geotechnical

ST Consult
Unit 5, Hannington Farm, Hannington
Kingsclere, Hampshire, RG26 5TZ

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ST Consult is a regional office of Southern Testing Laboratories Ltd
Regional Manager Robert Jiagge BSc (Hons) MSc FGS MIEnvSc CSci

17 May 2022

Hannick Homes & Developments Ltd
Dammas House, Dammas Lane
Old Town, Swindon
Wiltshire
SN1 3EF

For the attention of Conor Lee
conorlee@hannick.com

Dear Sirs,

Re: Borehole Soakaway Investigation at: A Land off Russley Green, Baydon, Wiltshire, SN8 2JR
National Grid Reference: SU 27981 78199
Geology: Clay-with Flints over Seaford Chalk Formation

Further to your instructions to carry out 1 No borehole soakaway at the above site, we are hereby pleased to present our results of our findings.

A desk study, geotechnical and any contamination assessment are outside the scope of this investigation.

This report has been prepared for the sole internal use and reliance of Hannick Homes & Developments Ltd and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation 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.

Site Description

The site is located northwest of Russley Green in Baydon, Wiltshire and is centred on National Grid Reference SU 27981 78199.

It is currently a field with two small stables for horses. It is bounded to the north and east by agricultural lands, and to the south and west by residential properties. The site boundaries to the north east and are formed of hedgerows with trees of varying maturity.

Access to the site is either from a track along the eastern boundary or via the Russley Green along the southern boundary.

The site is at a ground elevation between 232.16m AOD (northwest) and 230.48m AOD (southeast) and slopes slightly to the to the southeast.

Fieldworks

A single 200mm diameter cable percussive borehole was drilled to 15m bgl. A constant head test was carried using 1950 litres of water from a water bowser. Upon completion of the soakage test the hole was backfilled with arisings and sealed with bentonite.

A summary of the ground conditions encountered is presented in the table below:

Depth to Base	Thickness	Soil Type	Description
0.3	0.3	Topsoil	Dark brown slightly gravelly sandy Clay with frequent fibrous rootlets
3	0.27	Clay-with-Flints	Firm to stiff brown slightly sandy gravelly Clay with occasional flint cobble. Gravel is fine to coarse angular to subangular flint.
3.8	0.8	Clay-with-Flints	Brown slightly clayey slightly sandy fine to coarse angular to subangular flint Gravel with occasional flint cobble.
8	4.2	Clay-with-Flints	Firm to stiff brown gravelly Clay. Gravel is fine to coarse angular to subangular flint.
15	7	Chalk	Recovered as structureless Chalk composed of white gravelly Silt. Gravel consist of weak chalk and fine to coarse flint.

Groundwater

No groundwater was encountered in the borehole during the drilling works. It should be noted that 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 included in our scope of work for this investigation.

Soakaway Test Results

The test result are provided in the table below.

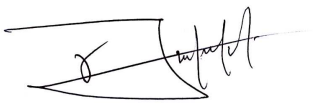
Borehole	Borehole depth (mbgl)	Test Results	Water head depth (mbgl)	Comments
BH1	15	210 litres/min (3.5 l/s) *Constant Head Method)*	see comments	After 400 litres of water was poured into the hole within 2 minutes, water head was kept at 5m bgl for 5 minutes at which time additional 1050 litres of water soaked away. On completion of the constant head test, the water level in the hole was measured at 5.1m bgl. Falling head test was then carried out from 5.1m bgl for 28 minutes until the water level in the hole dropped to 14.11 bgl.

Based on the ground conditions encountered and the test result achieved, the use of borehole soakaway could be viable on this site.

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, and as such appropriate factor of safety should be applied. Our figures therefore should not supersede the Engineer's design.

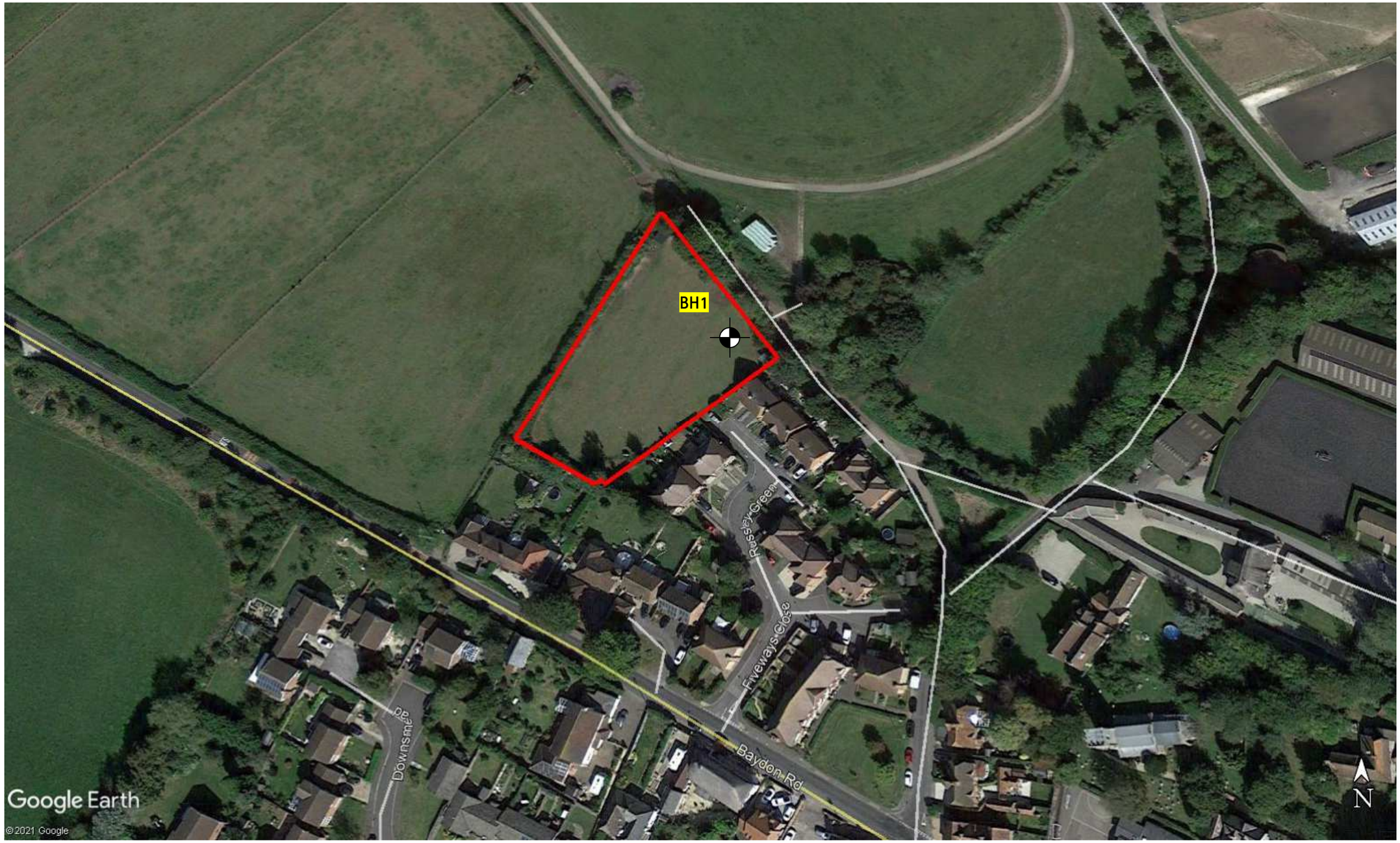
If you have any queries please do not hesitate to contact us.

Yours faithfully,



Robert Jiagge
For and on behalf of
Southern Testing Laboratories Limited
DDI: 01635 800 950
Email: rjiagge@stconsult.co.uk

APPENDIX A – SITE PLAN



NB: Positions of Boreholes are only indicative unless dimensioned

Site:	Land off Russley Green, Baydon, Wiltshire, SN8 2JR	STL: JT0485	Fig No: 1
Date:	17 May 2022	Site and borehole location plan	

Southern Testing

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

ST Consult

Appendix D



EARTH ENVIRONMENTAL
& GEOTECHNICAL

Ground Investigation
Factual Report

Russley Green

Baydon

Wiltshire

SN8 2LJ

Report Reference: B3629/24

April 2024



Earth Environmental & Geotechnical (Southern) Ltd
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Bath
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GROUND INVESTIGATION FACTUAL REPORT

RUSSLEY GREEN

BAYDON

WILTSHIRE

SN8 2LJ

Report Ref: B3629/24

APRIL 2024

Prepared on Behalf of:

Hannick Homes & Developments Ltd

By:

Earth Environmental & Geotechnical (Southern) Ltd
3 Tollbridge Studios
Toll Bridge Road
Bath
BA1 7DE

DISTRIBUTION:

1 electronic copy Hannick Homes & Development Ltd

GROUND INVESTIGATION FACTUAL REPORT

Russley Green, Baydon, Wiltshire, SN8 2LJ

Report Reference: B3629/24

Version B.0

Date: 4th April 2024

Prepared for: Hannick Homes & Developments Ltd

Prepared by: Earth Environmental & Geotechnical (Southern) Ltd
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Definition of Version Code:
D. Applied during initial drafting of the report before it has been reviewed.
C. Applied after the report has been reviewed but before it has been approved by the Project Manager.
B. Applied after the Project Manager has approved the report ready for issue to the client.
A. Applied to reports after external/internal review.

The version number starts at "0" and is raised by "1" at each re-type.

Written by:

Cameron Montgomery
Geo-Environmental Consultant



Approved by: **Simon Leat**
Director

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APPENDICES

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1.0 INTRODUCTION

1.1 Background

A Ground Investigation has been commissioned by Hannick Homes & Developments Ltd (the 'Client) to install groundwater monitoring standpipes at a site in Baydon, Wiltshire.

2.2 Terms of Reference

Earth Environmental and Geotechnical (Southern) Ltd (EEGSL) was commissioned by the Client to undertake the works in accordance with a proposal B3629rev, dated 29th February 2024.

The objectives of this investigation are as follows:

- *Installation of groundwater monitoring standpipes in 2nr boreholes.*

1.3 Report Scope

This report presents full factual records of the site work carried out.

1.4 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEGSL reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

2.0 THE SITE

2.1 Site Location & Description

The site is a field located immediately northwest of Russley Green on the northwestern outskirts of the village of Baydon in Wiltshire and National Grid Reference 427987 178176 and with a nearest postcode of SN8 2LJ.

Figure 1 – Aerial Photograph Showing Site Location



2.2 Geology

According to the British Geological Survey (BGS), the site is underlain by superficial deposits of Clay-with Flints, overlying the Seaford Chalk Formation of Cretaceous age.

The Clay-with-Flints is described as comprising orange-brown and red-brown sandy clay with abundant nodules and rounded pebbles of flint.

The Seaford Chalk Formation is described as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

3.0 FIELDWORK

The fieldwork was carried out by EEGSL on 26th March 2024 and comprised:

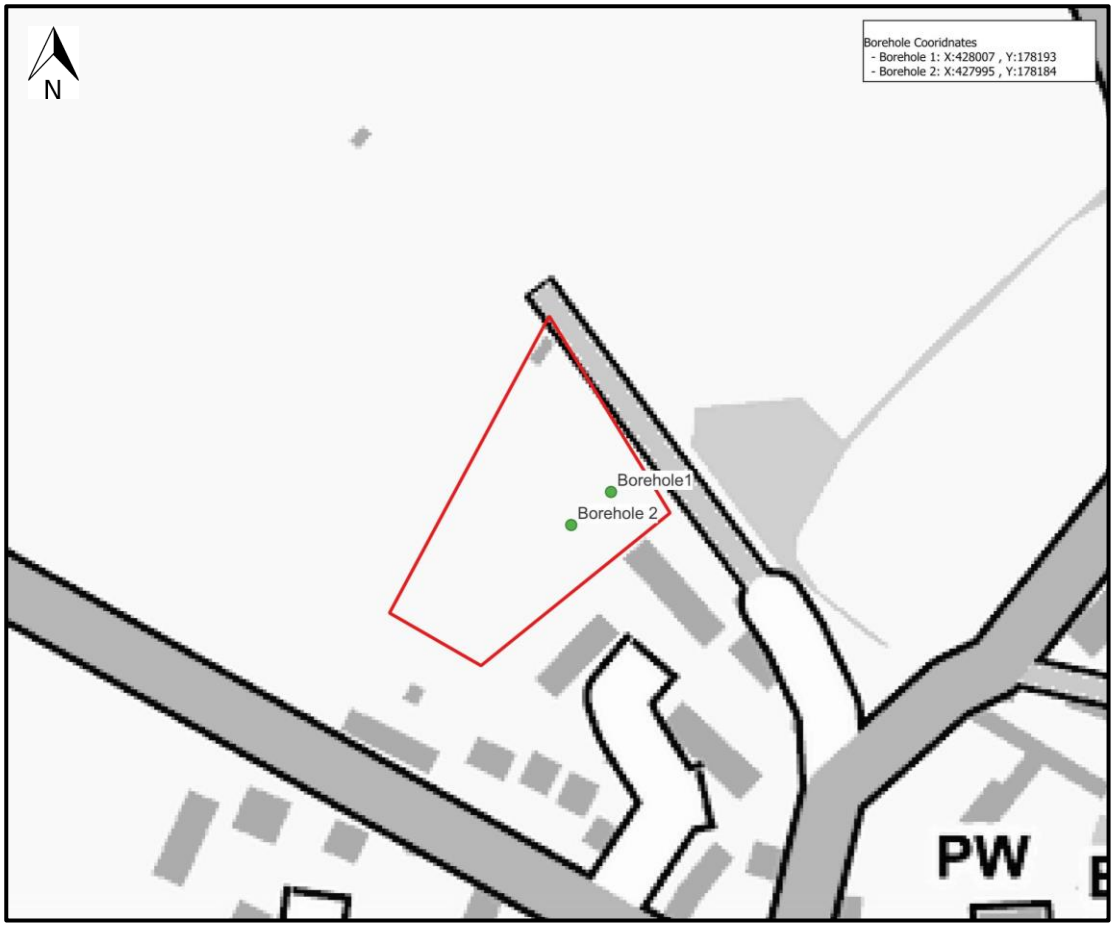
- 2 no. boreholes (reference BH01 and BH02) were drilled to a depth of 16.0m using a track-mounted rotary coring rig. The boreholes were sunk using rock roller down the hole hammer, producing a 114mm nominal diameter hole. Air/water was used as the flushing medium. Logsheets are included in Appendix 1. A 50mm diameter standpipe was installed in each borehole to 16.0m depth. Installation and backfill details are shown with the appropriate borehole logsheet in Appendix 1.

Each exploratory location was scanned using a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary.

All site investigation work was supervised full time by a representative of EEGSL. The logging of soils and rocks has been carried out in accordance with BS5930(2015) except where superseded by the soil and rock description methodology in BS EN14688-1(2002), BS EN 14688-2(2004) and BS EN 14689-1(2003).

The fieldwork was carried out generally in accordance with BS 5930:2015 Code of Practice for Site Investigations, Eurocode 7, unless otherwise stated. The exploratory hole locations, as selected by the Client, are shown approximately on the Exploratory Hole Location Plan below:

Figure 2 - Exploratory Hole Location Plan



APPENDIX 1

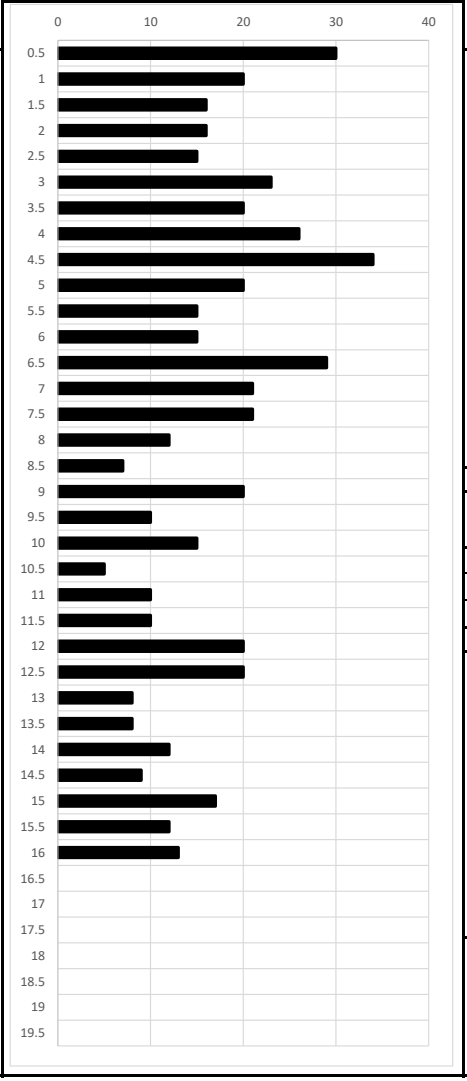
EXPLORATORY HOLE LOGS

ROTARY PERCUSSIVE BOREHOLE RECORD (OPEN HOLE)

Project Number	B3629	Client	Hannick Homes	Date	26/03/2024	BH Ref	BH01
Project Name	Russley Green, baydon	Subcontractor	360 Drilling	Logged by	CM	Page Ref	1/1

Drilling Rate		Drilling		Returns			Colour				Graphic Log
Depth (m)	Sec/0.5m	Steady	Unsteady	Good Dust	No Dust	Water	Brown	Grey	Black	Other	
0.5	30	✓			✓		✓				
1	20	✓			✓		✓				
1.5	16	✓			✓		✓				
2	16	✓			✓		✓				
2.5	15	✓			✓		✓				
3	23	✓			✓		✓				
3.5	20		✓		✓		✓				
4	26	✓			✓		✓				
4.5	34	✓			✓		✓				
5	20	✓			✓		✓				
5.5	15	✓			✓		✓				
6	15	✓			✓		✓				
6.5	29	✓			✓					✓	
7	21	✓			✓					✓	
7.5	21	✓			✓					✓	
8	12	✓			✓					✓	
8.5	7	✓			✓					✓	
9	20	✓			✓					✓	
9.5	10	✓			✓					✓	
10	15		✓		✓					✓	
10.5	5	✓			✓					✓	
11	10	✓			✓					✓	
11.5	10	✓			✓					✓	
12	20		✓		✓					✓	
12.5	20	✓			✓					✓	
13	8	✓			✓					✓	
13.5	8	✓			✓					✓	
14	12	✓			✓					✓	
14.5	9		✓		✓					✓	
15	17	✓			✓					✓	
15.5	12	✓			✓					✓	
16	13	✓			✓					✓	
16.5											
17											
17.5											
18											
18.5											
19											
19.5											

Plot of drilling
Penetration with Depth (Time /0.50m)



Depth (m) From	Depth (m) To	Description
0.0	2.5	TOPSOIL: Grass over brown slightly sandy slightly gravelly clay with frequent rootlets to 0.10m. Gravel is angular to subangular fine to medium of limestone and flint.
2.5	6.0	Brown slightly sandy silty CLAY. Sand is fine.
2.0		… From 2m: becoming slightly gravelly. Fine subrounded gravel of chalk in clay.
3.5		…At 3.5m: Thin band of chalk.
6.0	16.0	Pale brown grey CLAY interbedded with CHALK

Remarks: Drilled with water. No groundwater encountered.

Standpipe: 2m plain, 14m slotted.

Drlling Activity recorded in seconds

Drill Rig:	Beretta T41
Bit Type:	PCD
Bit Size:	142mm

Key to Graphic Log

Made Ground

Fine Soil / Weathered rock

Chalk

EARTH ENVIRONMENTAL & GEOTECHNICAL

ROTARY PERCUSSIVE BOREHOLE RECORD (OPEN HOLE)

Project Number	B3629	Client	Hannick Homes	Date	26/03/2024	BH Ref	BH02
Project Name	Russley Green, baydon	Subcontractor	360 Drilling	Logged by	CM	Page Ref	1/1

Drilling Rate		Drilling		Returns			Colour				Graphic Log
Depth (m)	Sec/0.5m	Steady	Unsteady	Good Dust	No Dust	Water	Brown	Grey	Black	Other	
0.5	30	✓			✓		✓				
1	30	✓			✓		✓				
1.5	30	✓			✓		✓				
2	30	✓			✓		✓				
2.5	30	✓			✓		✓				
3	30	✓			✓		✓				
3.5	30		✓		✓		✓				
4	35	✓			✓		✓				
4.5	10	✓			✓		✓				
5	11	✓			✓		✓				
5.5	14	✓			✓		✓				
6	20	✓			✓		✓				
6.5	33	✓			✓					✓	
7	17	✓			✓					✓	
7.5	20	✓			✓					✓	
8	10	✓			✓					✓	
8.5	71	✓			✓					✓	
9	4	✓			✓					✓	
9.5	2	✓			✓					✓	
10	6		✓		✓					✓	
10.5	17	✓			✓					✓	
11	5	✓			✓					✓	
11.5	35	✓			✓					✓	
12	30		✓		✓					✓	
12.5	10	✓			✓					✓	
13	12	✓			✓					✓	
13.5	13	✓			✓					✓	
14	8	✓			✓					✓	
14.5	7		✓		✓					✓	
15	5	✓			✓					✓	
15.5	5	✓			✓					✓	
16	10	✓			✓					✓	
16.5		✓			✓					✓	
17		✓			✓					✓	
17.5		✓			✓					✓	
18											
18.5											
19											
19.5											

Plot of drilling
Penetration with Depth (Time /0.50m)



Depth (m) From	Depth (m) To	Description
0.0	2.5	TOPSOIL: Grass over brown slightly sandy slightly gravelly clay with frequent rootlets to 0.10m. Gravel is angular to subangular fine to medium of limestone and flint.
2.5	2.6	... Between 2.50m to 2.60m: Band of chalk.
2.6	5.5	Brown slightly sandy silty CLAY. Sand is fine.
6.0	17.5	Pale brown grey CLAY interbedded with CHALK

Remarks: Drilled with air. No groundwater encountered.

Standpipe: 3m plain, 14.5m slotted.

Drlling Activity recorded in seconds

Drill Rig:	Beretta T41
Bit Type:	PCD
Bit Size:	142mm

Key to Graphic Log

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APPENDIX 2

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2024 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth

Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.