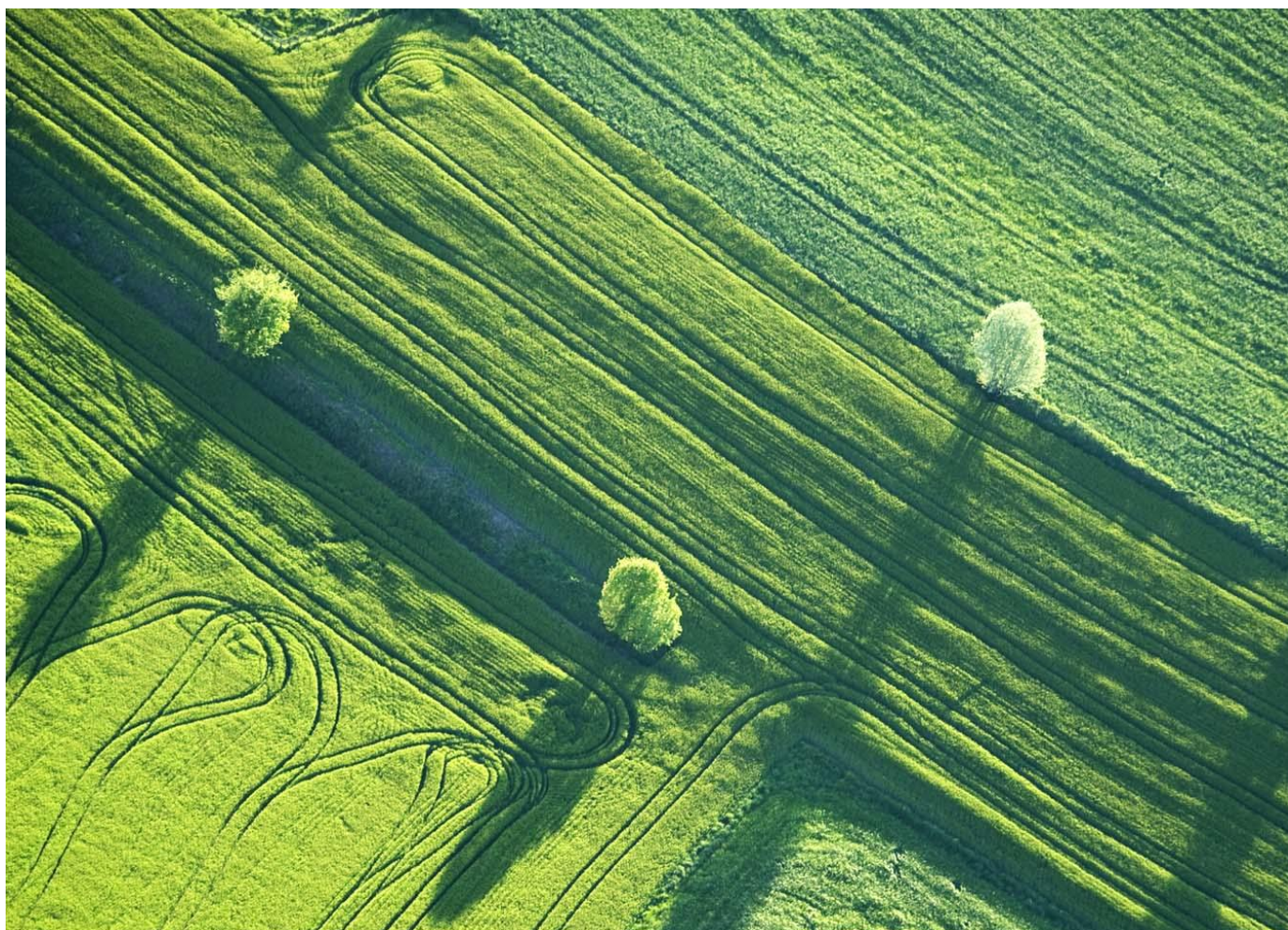




CALA Homes (Thames) Limited

Coors Brewery, Alton

Phase 2 Geotechnical Site Investigation

1921322-R01(00)

NOVEMBER 2020





RSK GENERAL NOTES

Project No.: 1921322

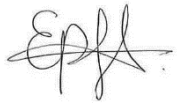
Title: Phase 2 Geo-environmental and Geotechnical Site Investigation: Coors Brewery, Alton, Lower Turk Street, Alton GU34 2PS

Client: CALA Homes (Thames) Limited

Date: November 2020

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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.

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1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by CALA Homes (Thames) Limited to carry out a Phase 2 Geotechnical Site Investigation of the land at Coors Brewery, Alton Lower Turk Street, Alton GU34 2PS.

1.2 Objectives

The objectives of this assessment are as follows:

- Undertake supplementary trial investigation to assess the shallow ground conditions to provide information on the potential suitability of the adoption of spread foundations in the areas indicated by the structural engineer; and
- Undertake deep boreholes to provide geotechnical data to inform recommendations with respect to pile design.

1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2020) – which supersedes CLR11 Model Procedures for Land Contamination – and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017. Ground gas assessment has been undertaken in general accordance with BS8576: 2013 and BS 8485:2015+A1:2019.

The project was carried out to an agreed brief as set out in RSK's proposal (Ref. 1921322 T01 01, dated September 2020).



1.4 Existing reports

The following reports detailing previous works at the site were made available for review:

- RPS, Ground Investigation Interpretive Report, Ref. JER6653, dated 13th July 2016.

Pertinent information from these reports has been summarised in Section 2.

1.5 Limitations

This report is subject to the RSK service constraints given in **Appendix A** and limitations that may be described through this document.

2 SITE DETAILS

2.1 Site location

Site location details are presented in **Table 1** and a site location plan is provided on **Figure 1**.

Table 1 Site location details

Site name	Coors Brewery, Alton
Full site address and GU34 2PS	Lower Turk Street, Alton GU34 2PS
National Grid reference (centre of site)	471952, 139206

2.2 Site description

The Site covers an area of c. 5 hectares. It is currently occupied by the now redundant Coors Brewery, which includes warehouses, brewing tanks and equipment as well as tanks formerly containing fuels (diesel) and acid (sulphuric and hydrochloric). The site is predominantly hardstanding with the River Wey running through the centre from west to east.

2.3 Surrounding land uses

The Site is located in Alton, within a predominantly residential and commercial setting. Immediate surrounding land uses are described in **Table 2**.

Table 2 Surrounding land uses

North	Draymans Way, Kingsmead residential properties, Curtis Museum, further residential properties along with commercial properties including restaurants, clothing shops and local newsagents etc.
East	Railway adjacent, River Wey, Kings Pond and residential properties.
South	Lower Turk Street, Austen Place - Retirement Living Plus, Sainsburys Supermarket and petrol station and Alton Maltings with railway and residential properties further south.
West	Draymans Way, Alton High Street with businesses including M & Co, Boots and Costa Coffee.

2.4 Development plans

The Site in question is being considered for redevelopment into residential use. The planned layout of the site is shown in **Figure 2**.



The proposed development consists of a mixture of private and shared ownership, one to two bed flats and two to four bed houses along with associated parking, shared and private soft landscaping and an open hall space.

There are no active planning applications pertaining to the site according to the Hampshire County Council planning portal.

2.5 Geology

Published records (British Geological Survey (BGS), 1990) for the area indicates the geology of the site to be characterised by superficial deposits comprising alluvium (within central areas alongside the River Wey) overlying River Terrace Deposits, which in-turn overly the bedrock geology comprising the Zig Zag Chalk Formation.

3 SUMMARY OF PREVIOUS INVESTIGATIONS

A summary of pertinent information from previous investigations is included below in Table 3.

Table 3 Summary of previous investigation reports

Report Details	1. Ground Investigation Interpretive Report, RPS, July 2016
Site coverage	This investigation covers the whole of the subject site and divides the site into four separate zones based on the different former land uses; • Zone 1 – North Yard • Zone 2 – Processing Area • Zone 3 – Kegging Hall and Warehousing Area • Zone 4 – Car Park and Gatehouse
Summary scope of works	• Six cable percussive boreholes were drilled to a maximum depth of 6.20 mbgl; five of which were installed with combined groundwater and ground gas monitoring wells; • Thirty-three windowless sampler boreholes were drilled to a maximum depth of 5.50 mbgl; seventeen of which were installed with combined groundwater and ground gas monitoring wells; • Laboratory analysis of environmental and geotechnical soil samples were taken throughout the site work; and • A programme of groundwater, surface water and ground gas monitoring.
Does the client have reliance upon the report?	Yes
Geology	Made Ground was encountered in all locations beneath a surfacing of concrete ranging in thickness between 0.18 and 0.25 m. The average thickness of Made Ground was around 1.50 m across the site with the maximum thickness in Zone 1 of 3.10 m in BH-Z1-01. Underlying the Made Ground within the central parts was the superficial deposits of Alluvium, generally comprising a very soft dark brown slightly sandy silt with wood fragments and ranged in thickness from 0.10 to 0.80 m. River Terrace Deposits were encountered beneath the Alluvium in several locations and generally comprised a loose to medium dense brown grey sandy gravel with cobbles ranging in thickness from 0.50 to 1.40 m. Underlying the made ground or the superficial deposits was the Zig Zag Chalk Formation, however, due to refusal on dense ground the cable percussive boreholes were not able to be advanced any deeper than 6.20 mbgl.

Groundwater	Groundwater was encountered within the Zig Zag Chalk Formation at depths of between 2.30 mbgl and 4.20 mbgl, with the groundwater rising to depths of between 1.20 mbgl and 2.80 mbgl after 20 minutes.
Key factual Environmental findings	Hydrocarbon odours were noted within both the Made Ground and chalk locally in several locations within Zones 1 and 2 (namely within areas of tanks and former infrastructure). Fifteen samples of Made Ground were analysed for a range of contaminants. The GACs were exceeded locally for arsenic, lead, dibenzo(ah)anthracene and TPH bands >C12 to C16 and >C16 to C21. Each of these samples was also screened for the presence of asbestos fibres. Asbestos was identified within one samples at the quantification of 0.005 % w/w. Eight samples of the Zig Zag Chalk Formation were analysed for Total Petroleum Hydrocarbons (TPH) from boreholes noted to have evidence of hydrocarbon contamination during the investigation. None of the samples were identified as exceeding that GAC. Groundwater and surface water samples were obtained during a subsequent monitoring visit and submitted for analysis of a range of contaminants including heavy metals, TPH, PAH, ammoniacal nitrogen, pH, BOD, COD and dissolved oxygen. Overall, all heavy metal results were below lower detection limits (LDL) apart from those from BH104 where elevated arsenic and nickel concentrations were detected. Concentrations of PAHs were typically below the LDL apart from within the sample from WS-Z1-02 in Zone 1. The majority of samples analysed for TPH were found to exceed the LDL with the highest concentration of 89.9 mg/l at WS-Z1-02 against an adopted EQS of 0.11 mg/l. Surface water samples were generally below GAC / LDL and it was concluded that the site was not impacting the surface waters. Derived from one monitoring visit, the calculated maximum GSV for the site is 0.0015 l/hr, however a classification was not provided due to the lack of monitoring visits.
Key factual Geotechnical findings	Made ground and alluvium were considered suitable as a founding stratum, whilst the River Terrace Deposits and Chalk were considered potentially suitable as a founding stratum dependent on proposed loading pressures.

4 SITE INVESTIGATION STRATEGY & METHODOLOGY

4.1 Introduction

RSK carried out intrusive investigation works between 05th and 09th October 2020 to provide further information for the design of foundations.

4.2 Health, safety and environment considerations

The works were fully undertaken in accordance with RSK's Safety, Health, Environmental and Quality Management Systems (SHEQMS).

Prior to intrusive works, service plans were obtained by RSK and each location was cleared for the presence of underground services by a specialist service clearance contractor.

A tool box talk was undertaken prior to commencing any works to brief staff concerning the work scope and potential hazards identified on site during the initial site walkover.

4.3 Sampling strategy, methodology and Investigation locations

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930:2015+A1:2020, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the exploratory holes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

The constraints to the investigation were that there was no access into the buildings, therefore soils underlying were not assessed. Each location required the use of a hydraulic breaker to remove the overlying reinforced concrete.

Details of the investigation locations and rationale are presented in **Table 4**. Fifteen machine excavated trial pits were dug to a maximum depth of 3.40 mbgl before being backfilled with arisings. Rotary boreholes were drilled to a maximum depth of 20.0 mbgl, each backfilled with bentonite upon completion. The exploratory hole logs and other site work records are presented in **Appendix B**. Standard penetration tests (SPTs) in the chalk at regular intervals within the boreholes.

The exploratory hole locations are identified in **Figure 2**. The investigation points were located by GPS surveying techniques.

Table 4 Exploratory hole and monitoring well location rationale

Investigation Type	Number	Designation	Monitoring well installation	Rationale Examples below
Boreholes by rotary core methods	3	RBH1 to RBH3	N / A	To prove the geological succession beneath the site, to inform for pile design.
Trial-pits excavated by mechanical excavator	15	TP1 to TP15	N / A	To prove the geological succession beneath targeted areas of the site, to inform potential spread foundation design.

4.3.1 Implementation of investigation works

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930:2015+A1:2020 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1) and CIRIA C574.

The soil sampling and analysis strategy was designed to characterise each encountered soil strata and investigate the geotechnical characteristics. In addition, samples were taken to allow for geotechnical testing to be undertaken.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite required. They were dispatched to the laboratory in cool boxes under chain of custody documentation. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

4.4 Laboratory testing

4.4.1 Geotechnical analysis of soils

Where appropriate, disturbed bulk and undisturbed soil samples were taken for geotechnical classification testing with the depth and nature of samples detailed within the exploratory hole records.

Where appropriate, testing was undertaken in accordance with BS 1377:1990 Method of Tests for Soils for Civil Engineering Purposes or, where superseded, by the relevant part of BS EN ISO 17892:2014 Geotechnical investigation and testing - Laboratory Testing of Soil. Tests carried out in order to classify the concrete class required on-site have been undertaken following the procedures within BRE SD1:2005.

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in **Table 5**. The results and UKAS accreditation of tests methods are shown in **Appendix C**.

Table 5 Summary of geotechnical testing undertaken

Strata	Tests undertaken	No. of tests
Made Ground	BRE brownfield non-pyritic	2
Alluvium	Moisture content % and liquid/plastic limits	1
	BRE brownfield non-pyritic	2
River Terrace Deposits	Sieve analysis	2
Zig Zag Chalk Formation	Saturated moisture content	12
	BRE brownfield non-pyritic	2

5 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation and subsequent geo-environmental and geotechnical laboratory analysis undertaken are detailed below.

5.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented in **Appendix B**.

The exploratory holes revealed that the site is underlain by a variable thickness of made ground over superficial deposits of Alluvium and River Terrace Deposits with the Zig Zag Chalk Formation encountered at relatively shallow depths. This appears to confirm the stratigraphical succession described within the previous investigations.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in **Table 6** with the strata discussed in subsequent subsections.

Table 6 General succession of strata encountered

Stratum		Exploratory holes encountered	Depth to top of stratum m bgl (m AOD)	Proven thickness (m)
Made Ground	Concrete hardstanding (reinforced)	All locations	GL (100.53 to 101.65)	0.25 to 1.20
	Subbase	TP1, TP2, TP3, TP7, TP8, TP9, TP11, TP14, TP15	0.20 to 1.20 (99.89 to 101.45)	0.10 to 0.35
	General Made Ground – variably granular/cohesive	TP1, TP2, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP15	0.30 to 0.80 (100.03 to 101.23)	0.20 to 2.1
Alluvium		TP1, TP3 to TP10, RBH1, RBH2	0.50 to 2.40 (98.88 to 100.03)	0.30 to 1.30
River Terrace Deposits		TP1, TP6, TP7, TP8, TP10 to TP13	0.25 to 2.90 (98.47 to 101.12)	0.20 to 1.75
Zig Zag Chalk Formation		TP3 to TP5, TP11 to TP15, RBH1, RBH2, RBH3	0.45 to 2.20 (98.55 to 101.20)	Not proven ≥ 20.00 m

5.1.1 Made ground

The external site surface was initially constructed in reinforced concrete hardstanding, ranging between 0.25 m, to a maximum 1.20 m proven within exploratory location RBH1.

The concrete was underlain by a membrane in the majority of positions and sub cropped by a granular subbase of brick and concrete crush.

Made ground of variable thickness and composition was encountered within the majority of exploratory locations (excluding TP3, and TP13, TP14 where the subbase was directly underlain either Alluvium or Chalk) ranging between 0.20 m and 2.10 m in thickness. The materials were generally found to be heterogenous, comprising variable proportions of cohesive and granular matrix, with inclusions of anthropogenic materials including brick, concrete, occasional metal, ash, plastics, tarmacadam and clinker.

Based upon the heterogeneity of these materials, it would appear that this layer has not been historically engineered or placed to a specification.

5.1.2 Alluvium

Alluvium was locally encountered within the ground profile, extending directly beneath the made ground (where present) down to a maximum depth of 2.70 m bgl (TP10). The soils typically comprised soft dark grey to black, slightly organic to organic sandy gravelly clays and clayey silts, which ranged in thickness between 0.30 and 1.30 m. The alluvium was noted for the presence of organic content comprising inclusions of fibrous wood, and plant material throughout the deposit.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in **Table 7**.

Table 7 Summary of in-situ and laboratory test results for Alluvium

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	105	-	Appendix C
Modified moisture content (%)	106	-	-
Liquid limit (%)	117	-	Appendix C
Plasticity limit (%)	65	-	
Plasticity index (%)	52	-	
Modified plasticity index (%)	52	-	Appendix C
Plasticity term	-	Extremely high	Appendix C
Volume change potential	-	High	Appendix C
Consistency term from field description	Soft	-	Appendix B

5.1.3 River Terrace Deposits (RTD)

Granular soils interpreted as River Terrace Deposits were encountered either immediately beneath the Made Ground or alternatively, sub cropping cohesive alluvium. The soils varied in thickness between 0.20 and 1.75 m, and typically comprised multicoloured sandy subangular to subrounded fine to coarse gravels and sands and gravels of flint and chalk lithology.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in **Table 8**.

Table 8 Summary of in-situ and laboratory test results for River Terrace Deposits

Soil parameters		Min. Value	Max. Value	Reference
Grading (%)	Gravel	49	71	Appendix C
	Sand	14	24	Appendix C
	Silt/Clay (undifferentiated)	15	27	Appendix C Appendix C
Field density / consistency term		Moderately Compact		Appendix B

5.1.4 Zig Zag Chalk Formation

The Chalk bedrock was encountered either directly beneath alluvium/and or River Terrace Deposits, or locally directly beneath the Made Ground (TP13, TP14, TP15), and extended below the terminal depth of the investigation (RC boreholes) at 20.00 m bgl. The Chalk was initially encountered as a weathered sequence, and based upon the findings of the site investigation, in situ testing and subsequent laboratory testing, the chalk may be described initially as a structureless matrix supported (Grade Dm) near surface, recovered as soft, grey and white sandy slightly gravelly silt, grading into clast supported structureless chalk with depth (Grade Dc). The sand fraction was observed to be fine to coarse whilst the gravel fraction, as reported by subsequent laboratory testing, was described as subangular to subrounded fine to coarse moderately weak, high density chalk (Grade Dm).

The weathered chalk in the upper profile graded relatively quickly into a structured chalk bedrock (Grade C) at approximately 5.0 m, composed of moderately weak, high density greyish white chalk with occasional orange brown staining. Fractures were noted to be very closely to closely spaced, open and filled with greyish white silt, sand and gravel sized comminuted chalk.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in **Table 9**.

Table 9 Summary of in-situ and laboratory test results for Chalk

Soil parameters	Min. Value	Max. Value	Reference
Saturated moisture content (%)	11	21	Appendix C
Natural moisture content (%)	10	19	
SPT 'N' values	8	≥ 50	Appendix B
SPT 'N60' values	11	68	Figure X
Chalk density term	Low	Very High	CIRIA C574
Chalk strength term (BS 5930)	Very weak	Moderately weak	

Soil parameters	Min. Value	Max. Value	Reference
Chalk grade	Dm / Dc	C	
Bulk density (Mg/m ³)	20	23	Appendix C
Dry density (Mg/m ³)	1.73	2.10	

5.1.5 Visual/olfactory evidence of soil contamination

During the investigation, hydrocarbon odours were noted within several trial pit locations. These are detailed in **Table 10** below along with the strata encountered and whether groundwater was present.

Table 10 Visual/olfactory evidence of contamination identified

Exploratory Hole Location	Contamination	Stratum encountered (depths in mbgl)	Groundwater present
TP4	Strong hydrocarbon odour	Made Ground (0.30 to 0.80 m) Chalk (0.90 to 3.0)	Yes
TP8	Moderate hydrocarbon odour	River Terrace Deposits (1.80 to 2.30)	Yes
TP9	Strong hydrocarbon odour	River Terrace Deposits (2.60 to 3.0)	Yes
TP10	Faint hydrocarbon odour	River Terrace Deposits (2.70 to 2.90)	Yes

Each environmental sample was screened with a PID and the results ranged between 0.0 and 31.1 with the highest results at various depths within TP4.

5.1.6 Groundwater encountered during intrusive works

Groundwater was encountered during the intrusive investigation works as detailed on the logs in **Appendix B**. During the trial pitting groundwater was encountered at various depths ranging between 0.80 and 2.90 mbgl, with inflow velocity noted to be relatively fast flowing.

Rotary boreholes encountered water seepages between 1.0 and 4.0 mbgl.

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations. On-going monitoring would be required to establish both the full range of conditions and any trends in groundwater levels.

6 GEOTECHNICAL ASSESSMENT

6.1 Proposed development

It is proposed to construct residential houses and apartments with associated private and communal gardens and infrastructure.

At the time of reporting no indicative loadings for the proposed structure were available, although it is considered that a maximum line load of between 100 kN/m to 175 kN/m is envisaged.

6.2 Key geotechnical hazards / development constraints

A summary of commonly occurring geotechnical hazards is given in **Table 11** together with an assessment of whether the site may be affected by each of the stated hazards.

Table 11 Summary of main potential geotechnical hazards that may affect site

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	✓	Varying depths of made ground encountered		Likely to affect ground engineering and foundation design and construction
Shrinkable clay soils	✓	Medium to high (based upon this and previous RPS assessment) volume change potential soils within made ground and within Alluvium.		Design to NHBC Standards Chapter 4 or similar
Highly compressible and low bearing capacity soils, (including peat and soft clay)	✓	Made ground locally soft / low strength Alluvium– soft / low strength		Likely to affect ground engineering and foundation design and construction
Silt-rich soils susceptible to rapid loss of strength in wet conditions	✓	Made ground and Alluvium – potentially silt rich.		Likely to affect ground engineering and foundation design and construction
Running sand at and below water table		✓		Likely to affect ground engineering and foundation design and construction
Karstic dissolution features (including 'swallow holes' in Chalk terrain)		✓ risk category is low.		May affect ground engineering and foundation design and construction – refer to Section 4.1.2

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Ground subject to or at risk from coastal or river erosion		✓		Likely to require special protection/stabilisation measures
High groundwater table (including waterlogged ground)	✓	Groundwater within Alluvium / River Terrace / Chalk recorded typically between 1 and 3 mbgl.		May affect temporary and permanent works
Underground mining		✓		Likely to require special stabilisation measures
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)	✓	✓ Anticipated beneath existing buildings and structures		Likely to affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	✓	Significant thicknesses of made ground encountered across the site between 0.20mbgl and 2.4mbgl during the investigation and up to 3.0m within the RPS works.		Likely to affect ground engineering and foundation design and construction
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	✓	Refer to Section 6.5.		May affect ground engineering and foundation design and construction
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.				

6.3 Foundations

6.3.1 General Suitability

The made ground and / or Alluvium are not considered suitable founding strata for spread foundations to support the proposed residential structures. Whilst the underlying granular River Terrace Deposits and Chalk will provide suitable bearing resistance for traditional spread foundations to support low-rise structures the groundwater table generally rests at or above these founding strata, precluding suitability (with the exception of areas within the north eastern flank of the site). It is also noted that the potential exists for further disturbance of the founding stratum to occur during demolition.

In areas where traditional spread foundations are not considered to be viable, recourse to deep foundations taken into the underlying competent strata at depth are recommended.

Whilst ground improvement techniques, such as vibro-replacement, may provide an alternate solution, low strength (shear strength <30 kPa) and locally organic clays are unlikely to provide sufficient lateral support and therefore this is unlikely to be acceptable to the NHBC. It is therefore considered essential that advice from a specialist contractor be sought to confirm the feasibility of adopting ground improvement.

It should be noted that the use of deep penetrative foundation solutions will require consultation and approval from the Environment Agency to minimise risks pose to the groundwater resources.

6.3.2 Spread foundations

As detailed above, traditional spread foundations may be permissible within areas of the site where either the granular River Terrace Deposits or chalk are present above the groundwater, which have been identified locally within the north eastern flank of the site. Recommendations for the design and construction of traditional spread foundations in relation to these ground conditions are set out in **Table 12**.

Table12 Design and construction of spread foundations

Design/construction considerations	Design/construction recommendations
Founding stratum	River Terrace Deposits and / or Zig Zag Chalk Formation
Depth	Based on inspection of the soils encountered in the exploratory holes, it is considered that structural loads may be supported on lightly reinforced conventional strip or trench fill foundations taken down through any Made Ground and / or soft compressible soils to a minimum depth of 0.6 m, below the final or existing ground level (whichever is lower), and at least 0.2 m into the sand and gravel or weathered chalk.
Special design considerations	
Presumed bearing capacity	Strip foundations with a width of up to 1.0 m and constructed within the undisturbed Chalk or River Terrace Deposits at a minimum depth of 0.6 m may be designed using a net allowable bearing pressure of 125 kN/m ² . Total settlements associated with the presumed bearing pressure are anticipated to be less than 25 mm.
Stability of excavations	The trial pits carried out on site generally remained stable during excavation above the groundwater table which indicates that foundation excavations should also remain stable in the short term. In the event that excavations are to remain open for longer periods or are to be undertaken within groundwater table, consideration should be given to the use of trench support systems.
Dewatering	Groundwater was encountered at relatively shallow depths in all boreholes and the majority of the trial pits. Notwithstanding the above dewatering is only considered necessary where excavations extend into the Alluvium.

Design/construction considerations	Design/construction recommendations
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete. Owing to the variability of the founding strata, it would be prudent to incorporate nominal mesh reinforcement into the foundations to overcome any potential issues with differential settlement. However, this will not be required for foundations bearing wholly within the chalk. All formations should be inspected and if any pockets of soft or loose materials are found then these should be excavated and the foundation locally deepened.

6.3.3 Piled foundations

Recommendations for the design and construction of pile foundations in relation to the ground conditions are set out in **Table 13**.

Table 13 Design and construction of piled foundations

Design/construction considerations	Design/construction recommendations
Pile type	The construction of both bored and driven piles is considered technically feasible at this site.
Possible constraints on choice of pile type	Given the close proximity of the site to a residential area it is considered possible that the vibration/noise associated with pile driving may not be acceptable. On this basis, CFA piles are considered the most viable option. However, it is recommended that advice be sought from a specialist contractor.
Temporary casing	Given the presence of groundwater strikes over the full depth of the investigation and non-self-supporting superficial soils in the upper ground profile, bored piles will likely require temporary casing throughout their depth. Alternatively, the use of continuous-flight-auger (CFA) injected bored piles or driven piles usually overcomes this issue.
Soft superficial deposits	For the purpose of assessing preliminary pile capacities, the thicknesses of made ground and underlying variable superficial deposits (alluvial clays, silts and River Terrace Deposits), should be presumed not to contribute to the load-carrying capacity for the piles and have been provisionally ignored within the calculations.
Man-made obstructions	Substantial thicknesses of Made Ground containing a proportion of brick and concrete were encountered in areas of the site during the investigation. Consequently, the presence of buried sub-structures or other obstructions within made ground may lead to some difficulty during piling. It is recommended that once the proposed pile layout has been determined, pre-pile probing be carried out at each of the pile positions. Where buried obstructions are encountered, it will be necessary to either relocate the pile(s) or make allowance for removing the obstruction.

Design/construction considerations	Design/construction recommendations	
Hard strata	An allowance should be made for chiselling through bands of flint within the chalk.	
Pile design parameters for chalk	Pile design parameter	Continuous Flight Auger (CFA)
	Shaft Resistance (τ_{sf})	$0.8 \sigma_v'$
	Limiting shaft friction (kN/m ²)	100
	Base resistance (kN/m ²)	Q = 200N Q _{all} = 1000 to 1800kN/m ² for N > 25.
General parameters	Limiting concrete stress (kN/m ²)	7.5 N/mm ²
	Factor on ultimate shaft friction and base friction (below water table)	Lesser of: $P_{su}/1.0 + P_{bu}/3.5$ or $P_{su} + P_{bu}/2.5$
Special precautions relating to bored pile shafts and bases	Bored pile concrete should be cast as soon after completion of boring as possible and in any event the same day as boring. Prior to casting the base of the pile bore should be clean, otherwise a reduced safe working load will be required. Similarly, if the pile bore is left open the shaft walls may relax/soften, leading to a reduced safe working load.	

The design procedure for piles varies considerably, depending on the proposed type of pile. However, for illustrative purposes **Table 14** gives likely working pile loads for traditional bored, cast-in-situ concrete piles of various diameters and lengths, based on the design parameters given in **Table 13**.

Table 14 Illustration of typical pile working loads for bored cast-in-situ piles

Typical pile working loads (kN)				
Depth of pile below existing ground level (m)	Pile diameter			
	300 mm	400 mm	450 mm	500 mm
6	170	284	351	426
7	191	312	383	461
8	215	344	419	501
9	242	380	459	546
10	272	420	504	596
11	305	464	554	651
12	341	512	608	711
13	379	562	664	774

14	417	613	721	836
15	455	663	778	899

It should be stressed that the above capacities do not take into consideration pile group effects which is more pronounced for a large number of closely spaced piles.

Notwithstanding the above, it is recommended that the detailed advice of a specialist-piling contractor be sought as to the most suitable type of pile for the prevailing ground conditions and as to their lengths and diameters to support the required design loads.

6.3.4 Foundation works risk assessment

A foundation works risk assessment report is likely to be required by the Environment Agency given that both soil and groundwater contamination have been identified and that penetrative foundation options are being recommended.

6.3.5 Floor slabs

The Site is generally underlain by more than 600 mm of existing made ground. National House-Building Council (NHBC) standards require that ground floor slabs should be suspended in areas where made ground is greater than 600 mm in thickness.

6.4 Excavations for foundations and services

Some of the trial pits became unstable during excavation. It is therefore recommended that excavation support systems are made available during the groundwork stage of the development.

Manned entry into any excavations should not be undertaken without provision of suitable shoring and support and dewatering or suitable regrading and battering of side slopes to safe angles. Confined spaces protocols for the Health and Safety of personnel should always be used where man entry into excavations is to be undertaken as low oxygen conditions may be present.

Groundwater was encountered in the majority of the trial pits. Dewatering may therefore be required to facilitate foundation excavation.

Pumping from open sumps in non-cohesive soils should be avoided as this can result in instability and general loosening of the soils at the base of the excavation. It is likely that dewatering in non-cohesive soils will require the use of well-pointing systems.

Excavation should be possible using conventional site plant. Breakers may be necessary to remove the overlying concrete and any concrete obstructions within the made ground.

6.5 Chemical attack on buried concrete

This assessment of the potential for chemical attack on buried concrete at the site is based on BRE Special Digest 1: Concrete in aggressive ground, which represents the most up-to-date guidance on this topic currently available in the UK.

The desk study and site reconnaissance indicate that, for the purposes of assessing the aggressive chemical environment of the site, the site should be considered as comprising brownfield ground unlikely to contain pyrite.

Based on testing result **Table 15** gives the characteristic pH, water-soluble and total sulphate content values for soils from each of the geological units and groundwater encountered on-site.

Table 15 Characteristic pH, water soluble sulphate and total sulphate values

Stratum	pH	Water Soluble Sulphate (mg/l)
Made Ground	7.93 to 8.14	13 to 379
Alluvium	7.94 to 8.04	96 to 239
Zig Zag Chalk Formation	8.55 to 8.59	<10 to 10

Based on the results above and following the steps outlined in the BRE guidance, the Design Sulphate Classes and Aggressive Chemical Environment for Concrete classifications are summarised in **Table 16**, on the basis of water soluble sulphate.

Table 16 Concrete design class

Stratum	Groundwater	Water Soluble Sulphate	
		DS Class	AC Class
Made Ground	Mobile	DS-1	AC-1
Alluvium	Mobile	DS-1	AC-1
Zig Zag Chalk Formation	Mobile	DS-1	AC-1

Assuming that disturbed ground will be minimised by the use of piled foundations, the recommended ACEC Classification is therefore AC-1 with a Design Sulphate Class of DS-1.

6.6 Settlements

Parts of the site have been recorded to be underlain by Alluvium comprising soft organic clays and silts, which will be sensitive to any changes in loading. Should there be a requirement to change ground levels as part of the proposed development or to load / unload the ground surface from existing, within areas of the site underlain by Alluvium, it is recommended that checks be completed to ensure any associated ground movements remain within the serviceability limits of the development for the duration of its proposed design life.

REFERENCES

Standards and guidance

AGS Interim Guidance (2013), 'Site investigation and asbestos risk assessment for the protection of site investigation and geotechnical laboratory personnel', February.

British Standards Institution (BSI) (1990), 'BS 1377:1990. Methods of test for soils for civil engineering purposes'.

British Standards Institution (BSI) (2020), 'BS 5930:2015+A1:2020. Code of practice for ground investigations'.

British Standards Institution (BSI) (2011), 'BS 10175:2011 + A2:2017. Investigation of potentially contaminated sites: Code of practice'.

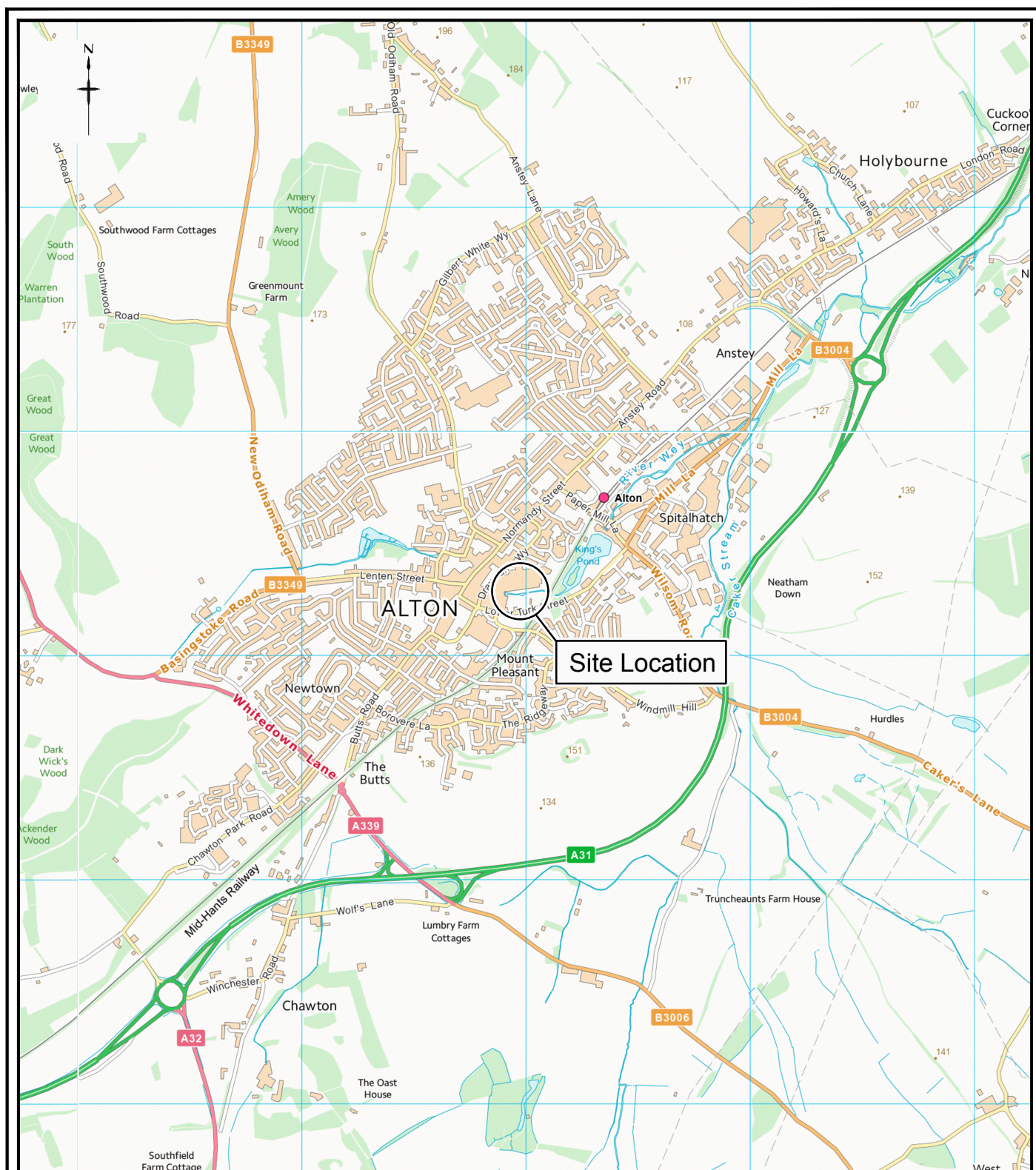
Building Research Establishment (2005), BRE Special Digest 1: Concrete in aggressive ground.

Environment Agency (2020), Land contamination risk management,
<https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>, 8
October 2020

Norbury, D. (2010), Soil and Rock Description in Engineering Practice.

CIRIA C574 engineering in Chalk.

FIGURES



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Client

CALA HOMES (THAMES) LTD

Project Title

ALTON BREWERY

Drawing Title

SITE LOCATION PLAN

Rev	Drawn	Date	Checked	Date	Approved	Date
01	LN	05.11.20	RC	05.11.20	SJ	05.11.20
Dimensions		Scale		Original Size		
m		1:25,000		A4		

Project Number

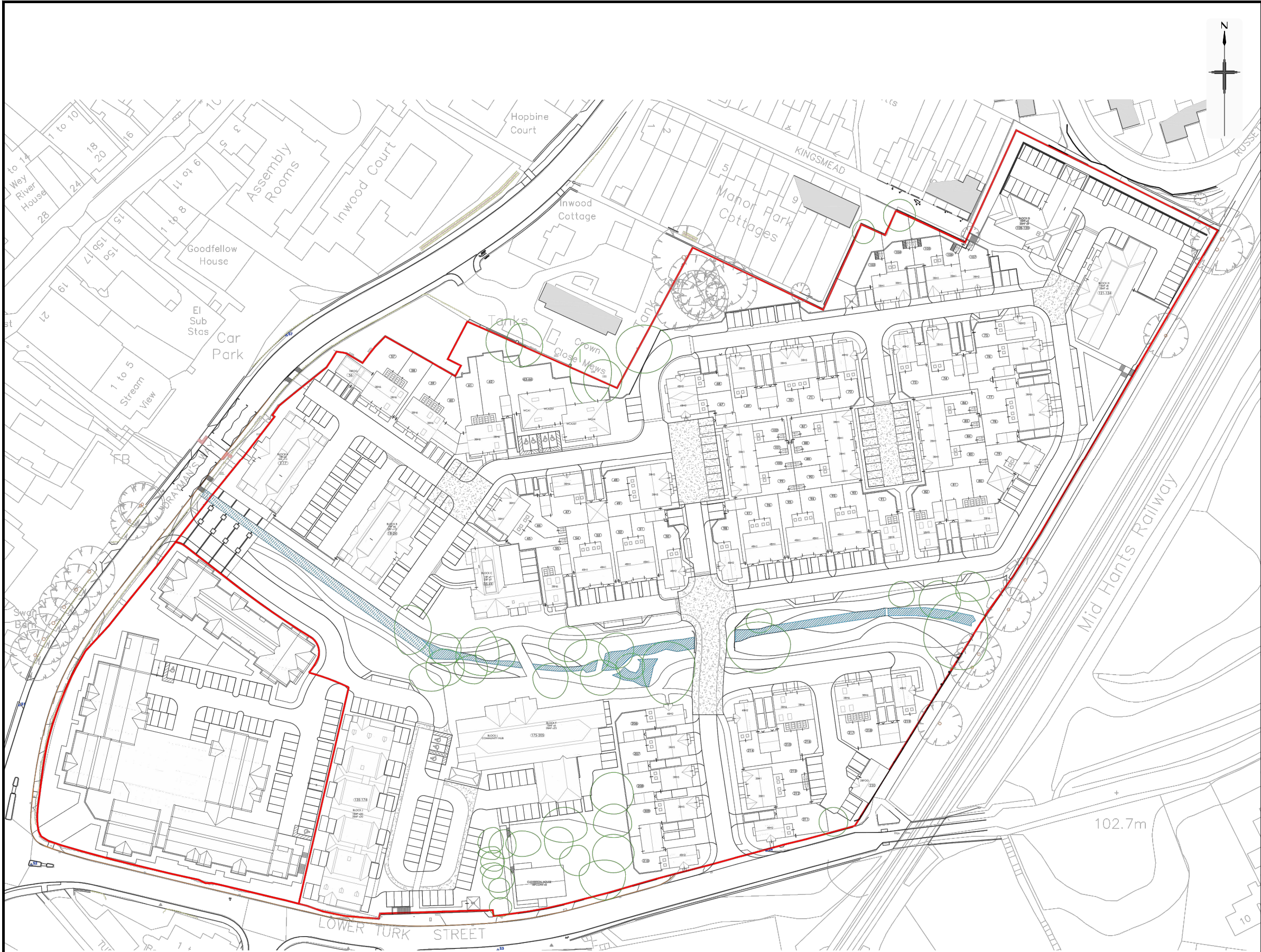
1921322 - R01 (00)

Drawing File

1921322 (R01-00) Figure 1.dwg

Drawing Number

FIGURE 1



LEGEND

Site Boundary

P1	05.11.20	First Issue	LN	RC	SJ
Rev.	Date	Amendment	Drawn	Chkd.	Appd.



18 Frogmore Road
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Web: www.rsk.co.uk

Client
CALA HOMES (THAMES) LTD

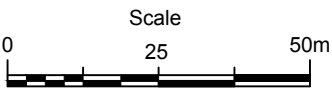
Project Title
ALTON BREWERY

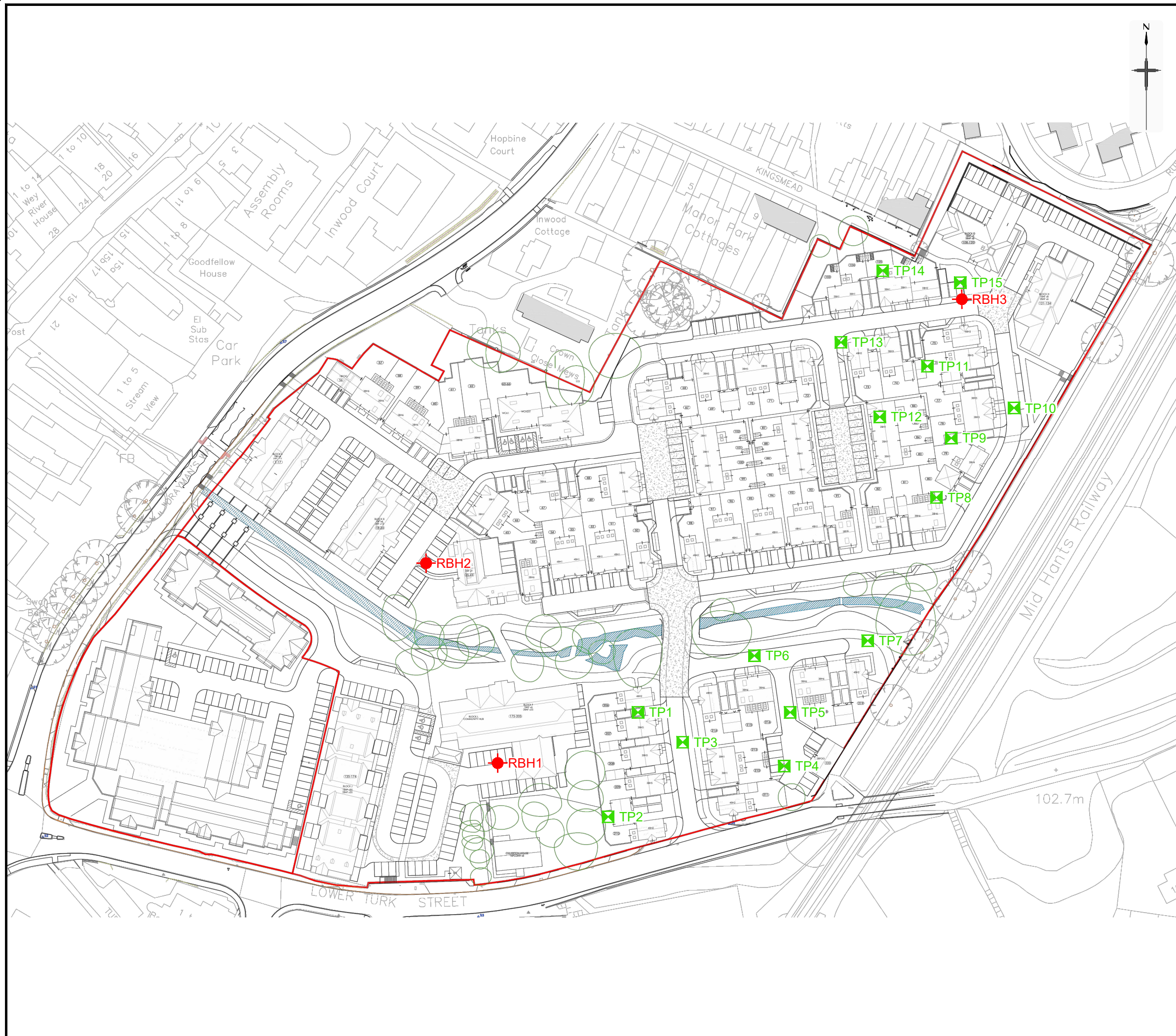
Drawing Title
PROPOSED DEVELOPMENT
PLAN

Drawn LN	Date 05.11.20	Checked RC	Date 05.11.20	Approved SJ	Date 05.11.20
Scale 1:1250	Orig Size A3	Dimensions M			

Project No. 1921322 - R01 (00)	Drawing File 1921322 (R01-00) Figure 2.dwg
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Drawing No. FIGURE 2	Rev. P1
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LEGEND

- Site Boundary
- Rotary Borehole Location
- Trial Pit Location

P1	05.11.20	First Issue	LN	RC	SJ
Rev.	Date	Amendment	Drawn	Chkd.	Appd.

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Client

CALA HOMES (THAMES) LTD

Project Title

ALTON BREWERY

Drawing Title

EXPLORATORY HOLE
LOCATION PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	05.11.20	RC	05.11.20	SJ	05.11.20

Scale	Orig Size	Dimensions
1:1250	A3	M

Project No.	Drawing File
1921322 - R01 (00)	1921322 (R01-00) Figure 3.dwg

Drawing No.	Rev.
FIGURE 3	P1

Scale

0 25 50m

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for CALA Homes Thames (the "Client") in accordance with the terms of a contract [RSK Environment Standard Terms and Conditions] between RSK and the Client. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant 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 may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. 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 RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK 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, RSK did not seek to evaluate the presence on or off the site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site,

unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):

- a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services 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.

RSK is not liable for any inaccurate information 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 RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and 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 scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.
9. 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. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.
11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.
12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.



APPENDIX B

EXPLORATORY HOLE RECORDS

BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Borehole: RBH1		
Contract Ref: 1921322		Start: 05.10.20 End: 06.10.20	Ground Level: 101.21		National Grid Co-ordinate: E:471944.0 N:139235.0		Sheet: 1 of 3	

Mechanical Log					Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results						
1.20-1.58					1	SPT	1,2/2,1,1 for 75mm			CONCRETE (Reinforced)	100.01	1.20	
1.20-1.50					1	LB				Brown sandy gravelly CLAY/SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and chalk. (ALLUVIUM) Structureless CHALK composed of soft grey white slightly gravelly sandy SILT. Sand is fine to coarse chalk. Gravel is very weak, low density subangular to subrounded fine to coarse chalk. (ZIG ZAG CHALK FORMATION, Low Density, Grade Dm).	99.61	1.60	
1.50-1.95					2	SPT	N=11						
1.50-3.00					2	LB							
3.00-3.45					3	SPT	N=19			Moderately weak high density greyish white CHALK. Fractures are very closely spaced open and filled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High Density, Grade C) ... 6.00m, fractures are less closely spaced and filled with coarse sand and fine to medium chalk gravel.	96.91	4.30	
3.00-4.50					3	LB							
4.30-4.50					1	D							
4.50-6.00					1	C							
4.50-6.00					4	SPT	N=16						
4.50-4.95													
5.50-5.60					2	D							
6.00-7.50					2	C							
6.00-7.50					5	SPT	N=35						
6.00-6.45													
6.70-6.80					3	D							
7.35					4	D							
7.50-9.00					4	C							
7.50-9.00					4	SPT	2,9/7,11,22 for 75mm						
7.50-7.88					6								

Drilling Progress and Water Observations						General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth			
						1. Location scanned with CAT and GENNY prior to breaking ground. 2. Inspection pit hand dug to 1.20m depth. 3. Rotary borehole cased in 150mm casing to 3.0m, 125mm casing to 7.00m, 116.30mm to 10.50m. 4. Borehole drilled by dynamic sampling methods to 4.50m, and rotary cored with water flush thereafter. 5. Groundwater recorded at 1.00m at borehole completion.		
All dimensions in metres						Scale:	1:50	
Method Used:	Inspection pit + Rotary coring		Plant Used:	Comacchio GEO 205		Drilled By:	ADP Group	Logged By: RCann
						Checked By:	GW	AGS

BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames		Borehole: RBH1
Contract Ref: 1921322	Start: 05.10.20 End: 06.10.20	Ground Level: 101.21	National Grid Co-ordinate: E:471944.0 N:139235.0		Sheet: 2 of 3

Mechanical Log				Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results					
9.00-10.50 9.00-10.50 9.00-9.30	↑	↑	↑		5 7	C SPT	8,17/25,25 for 75mm					
10.00-10.30	100	93	42		5	D						
10.50-12.00 10.50-12.00 10.50-10.65	↓	↓	↓		6 8	C SPT	25/50 for 75mm					
11.10-11.30	66	60	22		6	D						
12.00-13.50 12.00-13.50 12.00-12.23	↓	↓	↓		7 9	C SPT	2,23/50 for 75mm				(15.70)	
12.20-12.50	100	73	13		7	D						
13.50-15.00 13.50-15.00 13.50-13.65	↓	↓	↓		8 10	C SPT	25/50 for 75mm					
14.40-14.70	100	80	70		8	D						
15.00-16.50 15.00-16.50 15.00-15.15	↓	↓	↓		9 11	C SPT	25/50 for 75mm					
15.60-16.00	100	93	55		9	D						
16.50-18.00 16.50-18.00 16.50-16.65	↓	↓	↓		10 12	C SPT	25/50 for 75mm					
16.90-17.20	90	76	41		10	D						

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth		
						6. Borehole backfilled with bentonite pellets upon completion.	
All dimensions in metres						Scale:	1:50
Method Used:	Inspection pit + Rotary coring		Plant Used:	Comacchio GEO 205		Drilled By:	ADP Group
						Logged By:	RCann
						Checked By:	GW
							AGS



BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Borehole: RBH1			
Contract Ref: 1921322		Start: 05.10.20 End: 06.10.20		Ground Level: 101.21		National Grid Co-ordinate: E:471944.0 N:139235.0		Sheet: 3 of 3	

Mechanical Log				Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type						
18.00-19.50 18.00-19.50 18.00-18.15	↑ 90	↑ 74	↑ 72		11 13	C SPT			Moderately weak high density greyish white CHALK. Fractures are very closely spaced open and filled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High Density, Grade C) (stratum copied from 4.30m from previous sheet)			
19.00-19.40	↓	↓	↓		11	D						
19.50-19.65	↓	↓	↓		14	SPT				81.21	20.00	
									Rotary borehole terminated at 20.00m depth.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth		

BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames		Borehole: RBH2
Contract Ref: 1921322	Start: 07.10.20	Ground Level: 101.33	National Grid Co-ordinate: E:471920.0 N:139302.0		Sheet: 1 of 3
	End: 07.10.20				

Mechanical Log				Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results					
1.20-1.65 1.20-1.50 1.50-3.00					1 1 2	SPT LB LB	N=8		MADE GROUND: Dark brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint, chalk with rare concrete and brick.	100.03	1.30	
3.00-3.45 3.00-4.00					2 3	SPT LB	N=13		Structureless CHALK composed of white mottled orange brown and grey gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular to rounded fine to medium very weak, low density chalk. (ZIG ZAG CHALK FORMATION, Grade Dm). ... 3.00m, gravel becoming more coarse.			
4.00-5.50 4.00-5.50 4.00-4.38	↑	↑	↑		1 3	C SPT	2,5/7,13,30 for 75mm		... 3.90m, rare cobble sized clasts of chalk.	96.83	4.50	
4.55-4.70	95	75	0		1	D			Moderately weak high density greyish white CHALK with occasional orange brown staining. Fractures are very closely spaced open and infilled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High Density, Grade C) ... 6.00m, fractures filled with fine sand.			
5.50-7.00 5.50-7.00 5.50-5.73	↑	↑	↑		2 4	C SPT	8,15/50 for 75mm					
6.20-6.40	100	80	21		2	D						
7.00-8.50 7.00-8.50 7.00-7.38	↑	↑	↑		3 5	C SPT	3,4/5,25,20 for 75mm					
7.60-7.85	100	47	15		3	D						
8.50-10.00 8.50-10.00 8.50-8.73	95	87	33		4 6	C SPT	5,7/50					

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth		
						1. Location scanned with CAT and GENNY prior to breaking ground. 2. Inspection pit hand dug to 1.20m depth. 3. Rotary borehole cased in 150mm casing to 3.00m. 4. Borehole drilled by dynamic sampling methods to 4.00m, and rotary cored with water flush thereafter. 5. Groundwater recorded at 2.50m at borehole completion. 6. Backfilled with bentonite pellets upon completion.	
Method Used: Inspection pit + Rotary coring						All dimensions in metres	Scale: 1:50
Plant Used: Comacchio GEO 205		Drilled By: ADP Group		Logged By: RCann		Checked By: GW	

BOREHOLE LOG

Contract:		Client:		Borehole:
Alton Brewery		CALA Homes Thames		RBH2
Contract Ref:	Start: 07.10.20	Ground Level:	National Grid Co-ordinate:	Sheet:
1921322	End: 07.10.20	101.33	E:471920.0 N:139302.0	2 of 3

Mechanical Log					Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results						
9.20-9.40	95	87	33		4	D	for 75mm			Moderately weak high density greyish white CHALK with occasional orange brown staining. Fractures are very closely spaced open and infilled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High Density, Grade C) (stratum copied from 4.50m from previous sheet)	(13.00)		
10.00-11.50	95	87	33		5	C							
10.00-11.50					7	SPT	4,15/20,30 for 75mm						
10.00-10.30	100	63	7										
11.20-11.30					5	D							
11.50-13.00					6	C							
11.50-13.00					8	SPT	25/50 for 75mm						
11.50-11.65	100	80	43										
12.40-12.60					6	D							
13.00-14.50					7	C							
13.00-14.50					9	SPT	6,19/50 for 75mm						
13.00-13.23	100	97	73										
13.80-14.30					7	D							
14.50-16.00					10	SPT	3,22/50 for 75mm						
14.50-14.73	100	82	54										
15.45-15.60					8	D							
16.00-17.50													
	93	73	42										
17.10-17.25					9	D							
17.50-19.00													
	100	97	77										
										Description on next sheet	83.83	17.50	

Drilling Progress and Water Observations						General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	
All dimensions in metres						Scale: 1:50
Method Used:	Inspection pit + Rotary coring		Plant Used:	Comacchio GEO 205		Drilled By: ADP Group Logged By: RCann Checked By: GW

BOREHOLE LOG

Contract:		Client:		Borehole:
Alton Brewery		CALA Homes Thames		RBH2
Contract Ref:	Start: 07.10.20	Ground Level:	National Grid Co-ordinate:	Sheet:
1921322	End: 07.10.20	101.33	E:471920.0 N:139302.0	3 of 3

Mechanical Log					Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results						
18.75-19.00	100	97	77		10	D				Moderately strong, high to very high density, grey to dark grey CHALK with occasional orange staining and inclusion of white shell fragments. Fractures are closely spaced and infilled with silt and sand sized chalk. (ZIG ZAG CHALK FORMATION, High to Very High Density, Grade C) (stratum copied from 17.50m from previous sheet)		(2.50)	
19.00-20.00													
19.75-20.00	120	103	103		11	D					81.33	20.00	
										Rotary borehole terminated at 20.00m depth.			

Drilling Progress and Water Observations						General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth			
All dimensions in metres						Scale:		1:50
Method Used:	Inspection pit + Rotary coring		Plant Used:	Comacchio GEO 205		Drilled By:	ADP Group	
						Logged By:	RCann	
						Checked By:	GW	
							AGS	

BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Borehole: RBH3		
Contract Ref: 1921322		Start: 08.10.20 End: 09.10.20	Ground Level: 101.63		National Grid Co-ordinate: E:472099.0 N:139396.0		Sheet: 1 of 2	

Mechanical Log					Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results						
0.00-1.50					1	LB				Refer to exploratory hole log TP15. Rotary borehole drilled through base of trial pit.			
1.50-3.00					2	LB						(3.00)	
3.00-3.45					1	SPT	N=9				98.63	3.00	
3.00-4.50					3	LB				Structureless CHALK composed of whitish grey sandy gravelly SILT. Sand is fine to coarse. Gravel is very weak, low density, subangular to rounded fine to coarse chalk. (ZIG ZAG CHALK FORMATION, Low Density, Grade Dm)		(2.00)	
4.30-4.40					1	D							
4.50-6.00					1	C							
4.50-6.00					2	SPT	N=13			... 4.50m, Structureless Grade Dc, becoming structured chalk with depth.	96.63	5.00	
4.50-4.95													
5.60-5.85	100	0	0		2	D				Moderately weak to moderately strong high becoming very high density greyish white CHALK with occasional orange brown staining. Fractures are very closely spaced open and infilled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High to Very High Density, Grade C)			
6.00-7.50					2	C							
6.00-7.50					3	SPT	N=18						
6.00-6.45	100	49	27										
7.00-7.40					3	D							
7.50-9.00					3	C							
7.50-9.00					4	SPT	2,2/3,17,30 for 75mm						
7.50-7.88	100	50	0										
8.80-8.90					4	D							

Drilling Progress and Water Observations						General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth			
						1. Location scanned with CAT and GENNY prior to breaking ground. 2. Inspection pit hand dug to 1.20m depth. 3. Rotary borehole cased in 150mm casing to 4.50m, 125mm casing to 6.00m. 4. Borehole drilled by dynamic sampling methods to 4.50m, and rotary cored with water flush thereafter. 5. Groundwater recorded at 4.00m end of shift (borehole at 7.50m). 6. Borehole backfilled with bentonite pellets upon completion.		
All dimensions in metres						Scale:	1:50	
Method Used:	Inspection pit + Rotary coring		Plant Used:	Comacchio GEO 205		Drilled By:	ADP Group	Logged By: RCann
						Checked By:	GW	AGS

BOREHOLE LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Borehole: RBH3		
Contract Ref: 1921322		Start: 08.10.20 End: 09.10.20	Ground Level: 101.63		National Grid Co-ordinate: E:472099.0 N:139396.0		Sheet: 2 of 2	

Mechanical Log				Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	No	Type	Results					
9.00-10.50 9.00-9.30	↑	↑	↑		4 5	C SPT	4,10/15,35 for 75mm		Moderately weak to moderately strong high becoming very high density greyish white CHALK with occasional orange brown staining. Fractures are very closely spaced open and infilled with whitish grey silt and coarse sand sized comminuted chalk. (ZIG ZAG CHALK FORMATION, High to Very High Density, Grade C) (stratum copied from 5.00m from previous sheet)		(10.23)	
9.80-10.00	100	53	21		5	D						
10.50-12.00 10.50-10.50 10.50-10.73	↑	↑	↑		5 6	C SPT	13,12/50 for 75mm					
11.30-11.50	100	80	0		6	D						
12.00-13.50 12.00-13.50 12.00-12.23	↑	↑	↑		6 7	C SPT	5,20/50 for 75mm					
13.25-13.50	100	80	45		7	D						
13.50-15.00 13.50-15.00 13.50-13.73	↑	↑	↑		7 8	C SPT	4,21/50 for 75mm					
14.45-14.75	100	76	57		8	D						
15.00-15.23	↓	↓	↓		9	SPT	2,23/50 for 75mm					
									Rotary borehole terminated at 15.23m depth.	86.40	15.23	

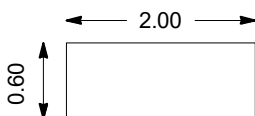
Drilling Progress and Water Observations						General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP1		
Contract Ref: 1921322		Start: 06.10.20 End: 06.10.20	Ground Level: 100.77		National Grid Co-ordinate: E:471991.0 N:139252.0		Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).	100.52	0.25	
						Terram and sub-base		(0.35)	
							100.17	0.60	
0.70	1	ES				MADE GROUND: Brown and grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint with brick, concrete and rare ash, charcoal, metal and plastic.		(0.40)	
0.90	2	ES					99.77	1.00	
1.20	3	D				Soft brown slightly sandy SILT. Sand is fine to coarse with flint, shell fragments and wood. (ALLUVIUM)		(1.30)	
1.90	4	D					98.47	2.30	
2.60	5	D				Multicoloured sandy subangular to rounded fine to coarse GRAVEL with low cobble content. Cobbles are subrounded of flint. (RIVER TERRACE DEPOSITS)		(0.70)	
							97.77	3.00	
						Trial pit terminated at 3.0 mbgl.			

Plan (Not to Scale)



General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. No visual or olfactory evidence of contamination.
3. Trial pit remained stable during excavation.
4. Water seepage at 1.0 mbgl and fast flowing.
5. Trial pit backfilled with arisings in reverse order upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

8 Ton Tracked Excavator

Logged By:

RCann

Checked By:

GW



TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP2	
Contract Ref: 1921322		Start: 07.10.20	Ground Level: 101.50	National Grid Co-ordinate: E:471981.0 N:139217.0		Sheet: 1 of 1	
		End: 07.10.20					

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES				CONCRETE (Reinforced).	101.20	(0.30)	
						Terram and sub-base	101.10	0.40	
						MADE GROUND: White and brown subangular to subrounded fine to coarse silty GRAVEL of flint and chalk with occasional brick, tarmacadam and concrete with rare chalk cobbles and boulders.			
1.00	2	D						(1.10)	
1.30	3	D							
							100.00	1.50	
Trial pit terminated at 1.50 mbgl due to cable at base of pit.									

Plan (Not to Scale) 			General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Trial pit remained dry and stable during excavation. 4. Electrical cable identified in the base of the pit. 5. Trial pit backfilled with arisings in reverse order upon completion.			
			All dimensions in metres		Scale: 1:25	
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: RCann	Checked By: GW			

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP3			
Contract Ref: 1921322		Start: 06.10.20	Ground Level: 100.53		National Grid Co-ordinate: E:472006.0 N:139242.0			Sheet: 1 of 1	
		End: 06.10.20							

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).		(0.30)	
						Terram and sub-base	100.23	0.30	
							100.03	0.50	
0.60	1	ES				Soft dark grey sandy slightly gravelly CLAY / SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint and chalk. (ALLUVIUM)		(0.40)	
0.80	2	D					99.63	0.90	
						Structureless CHALK composed of gravelly sandy SILT. Sand is fine to coarse. Gravel is off white weak, medium density subangular to rounded fine to coarse chalk with occasional flint and red brown staining. (ZIG ZAG CHALK FORMATION, GRADE Dm).		(1.00)	
1.40	3	D							
1.80	4	D					98.63	1.90	
						Structureless CHALK composed of silty sandy subangular to rounded fine to coarse GRAVEL with low cobble content. Gravel is off white weak, medium density chalk with occasional flint and red brown staining. (ZIG ZAG CHALK FORMATION, GRADE Dc).		(1.40)	
2.70	5	D							
							97.23	3.30	
						Trial pit terminated at 3.30 mbgl.			

Plan (Not to Scale)			General Remarks					
			1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Trial pit unstable during excavation. 4. Trial pit damp during excavation. 5. Trial pit backfilled with arisings in reverse order upon completion.					
			All dimensions in metres			Scale: 1:25		
Method Used: Machine dug		Plant Used: 8 Ton Tracked Excavator		Logged By: RCann		Checked By: GW		

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames		Trial Pit: TP4
Contract Ref: 1921322	Start: 05.10.20 End: 05.10.20	Ground Level: 100.74	National Grid Co-ordinate: E:472040.0 N:139234.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).		(0.30)	
							100.44	0.30	
0.40	1	ES				MADE GROUND: Grey and brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint, with inclusion of brick, concrete, and rare metal and clinker (strong hydrocarbon odour).	100.29	0.45	
0.50	2	ES					100.14	0.60	
0.70	3	ES				MADE GROUND: Black clayey sandy subangular to subrounded fine to coarse GRAVEL of flint, with inclusion of brick and concrete, with rare metal and clinker (strong hydrocarbon odour).	99.94	0.80	
							99.84	0.90	
1.00	4	ES				MADE GROUND: Grey and brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint with inclusion of brick, concrete and rare metal and clinker (strong hydrocarbon odour).			
1.10	5	D				Soft grey and brown sandy CLAY. Sand is fine to coarse flint and chalk.		(1.00)	
1.40	6	D				Structureless CHALK composed of greyish white gravelly sandy SILT. Sand is fine to coarse. Gravel is very weak, low density, subangular to subrounded fine to coarse chalk with frequent black and dark grey patches (strong hydrocarbon odour). (ZIG ZAG CHALK FORMATION, GRADE Dm).	98.84	1.90	
2.00	7	D				Structureless CHALK composed of greyish white silty sandy subangular to rounded fine to coarse GRAVEL of weak, medium density chalk (strong hydrocarbon odour). (ZIG ZAG CHALK FORMATION, GRADE Dc)		(1.10)	
2.80	8	D					97.74	3.00	
						Trial pit terminated at 3.0 mbgl.			

Plan (Not to Scale) 			General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. Trial pit unstable during excavation. 3. Water ingress into pit and reasonably fast flowing. 4. Trial pit backfilled with arisings in reverse order upon completion.		
Method Used: Machine dug			Plant Used: 8 Ton Tracked Excavator		
Logged By: RCann			Checked By: GW		
All dimensions in metres			Scale: 1:25		

TRIAL PIT LOG

Contract: Alton Brewery		Client: CALA Homes Thames		Trial Pit: TP5
Contract Ref: 1921322	Start: 07.10.20 End: 07.10.20	Ground Level: 100.75	National Grid Co-ordinate: E:472042.0 N:139252.0	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).			
							100.05	0.70	
0.80	1	ES				MADE GROUND: Soft black and grey sandy gravelly CLAY/ SILT. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint and chalk with rare brick and concrete.	99.85	0.90	
1.00	2	D				Soft black and grey sandy gravelly CLAY / SILT. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint and chalk.	99.55	1.20	
						(ALLUVIUM)			
1.50	3	D				Dark brown slightly organic sandy SILT with frequent inclusion of plant material. Sand is fine.		(1.00)	
						(ALLUVIUM)			
							98.55	2.20	
2.30	4	D				Possible structured CHALK recovered as silty sandy subangular to rounded fine to coarse GRAVEL of off white and light grey moderately weak, high density chalk with occasional flint and orange brown staining. Sand is fine to coarse.		(0.90)	
						(ZIG ZAG CHALK FORMATION, GRADE Dc/C)			
2.70	5	D							
3.00	6	D				. . . frequent chalk cobbles and boulders from 2.90 mbgl.	97.65	3.10	
						Trial pit terminated at 3.10 mbgl.			

Plan (Not to Scale) 		General Remarks - Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. - No visual or olfactory evidence of contamination. - Water ingress from 2.90 mbgl and fast flowing. - Trial pit remained relatively stable during excavation. - Trial pit backfilled with arisings in reverse order upon completion.	
Method Used: Machine dug		Plant Used: 13 Ton Tracked Excavator	
Logged By: RCann		Checked By: GW	
Scale: 1:25			

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP6			
Contract Ref: 1921322		Start: 07.10.20	Ground Level: 100.73		National Grid Co-ordinate: E:472030.0 N:139271.0			Sheet: 1 of 1	
		End: 07.10.20							

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).			
							100.03	0.70	
0.80	1	D				MADE GROUND: Soft black and grey gravelly sandy CLAY / SILT. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint and chalk with rare brick and concrete.	99.73	1.00	
1.10	2	D				Soft black and grey gravelly sandy CLAY / SILT. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint and chalk. (ALLUVIUM)		(0.60)	
1.50	3	D					99.13	1.60	
1.90	4	D				Dark brown slightly organic sandy SILT with frequent plant material. Sand is fine. (ALLUVIUM)	98.73	2.00	
2.50	5	D				Multicoloured sandy subangular to rounded fine to coarse GRAVEL of flint with low cobble content. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)		(1.00)	
							97.73	3.00	
						Trial pit terminated at 3.0 mbgl.			

Plan (Not to Scale)			General Remarks					
			- Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. - No visual or olfactory evidence of contamination. - Water ingress at 0.80 mbgl and fast flowing. - Trial pit partially stable in clay and silt but unstable in gravel. - Trial pit backfilled with arisings in reverse order upon completion.					
			All dimensions in metres			Scale: 1:25		
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: RCann	Checked By: GW					

TRIAL PIT LOG

Contract: Alton Brewery		Client: CALA Homes Thames		Trial Pit: TP7
Contract Ref: 1921322	Start: 07.10.20 End: 07.10.20	Ground Level: 100.59	National Grid Co-ordinate: E:472068.0 N:139276.0	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.75	1	D				CONCRETE (Reinforced).	100.19	0.40	
1.00	2	D				Terram and CONCRETE.	99.89	0.70	
1.30	3	D				MADE GROUND: Reddish brown clayey subangular to rounded fine to coarse SAND and GRAVEL of flint (subbase).	99.79	0.80	
1.80	4	D				MADE GROUND: Soft black and grey gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint, brick and chalk.		(0.60)	
						Dark brown slightly organic sandy SILT with frequent plant material. Sand is fine. (ALLUVIUM)	99.19	1.40	
						Multicoloured sandy subangular to rounded fine to coarse GRAVEL of flint with low cobble content. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	98.59	2.00	
								(1.10)	
							97.49	3.10	
						Trial pit terminated at 3.10 mbgl.			

Plan (Not to Scale) 		General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Water ingress at 2.0 mbgl and very fast flowing. 4. Pit unstable within gravel material. 5. Trial pit backfilled with arisings in reverse order upon completion.	
Method Used: Machine dug		Plant Used: 13 Ton Tracked Excavator	
Logged By: RCann		Checked By: GW	
Scale: 1:25			

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP8	
Contract Ref: 1921322		Start: 06.10.20	Ground Level: 101.10	National Grid Co-ordinate: E:472091.0 N:139324.0		Sheet: 1 of 1	
		End: 06.10.20					

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.60	1	ES				CONCRETE (Reinforced).	100.90	0.20	
						Brick and concrete crush (subbase).	100.70	0.40	
						MADE GROUND: Brown becoming dark grey and black gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint, chalk, brick and concrete with rare metal.		(0.80)	
1.00	2	ES				Dark brown slightly organic sandy SILT with frequent plant material. Sand is fine. (ALLUVIUM)	99.90	1.20	
1.10	3	D							
1.50	4	D				Black very clayey sandy subangular to rounded fine to coarse GRAVEL of flint and chalk. Sand is fine to coarse (moderate hydrocarbon odour). (RIVER TERRACE DEPOSITS)	99.30	1.80	
2.00	5	D				Green and white mottled orange brown clayey sandy subangular to rounded fine to coarse GRAVEL of flint and chalk. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	98.80	2.30	
2.00	6	ES							
2.80	7	D					98.10	3.00	
Trial pit terminated at 3.0 mbgl.									

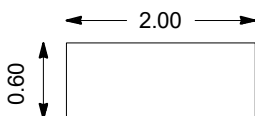
Plan (Not to Scale) 			General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Water seepage at 1.80m depth. 4. Trial pit unstable below 1.80 mbgl. 5. Trial pit backfilled with arisings in reverse order upon completion.			
			All dimensions in metres		Scale: 1:25	
Method Used: Machine dug	Plant Used: 8 Ton Tracked Excavator	Logged By: RCann	Checked By: GW			

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP9	
Contract Ref: 1921322		Start: 06.10.20 End: 06.10.20	Ground Level: 101.28		National Grid Co-ordinate: E:472096.0 N:139344.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES				CONCRETE (Reinforced).	100.98	(0.30)	
						Brick and concrete crush (subbase).	100.68	(0.30)	
1.00	2	ES				MADE GROUND: Black and grey sandy silty subangular to subrounded fine to coarse GRAVEL of flint, brick, chalk and ash with occasional metal and plastic.	100.18	(0.50)	
						MADE GROUND: White and dark grey sandy silty subangular to subrounded fine to coarse GRAVEL of flint, brick, chalk and ash.	100.08	1.10	
1.50	3	ES				MADE GROUND: Black and grey sandy silty subangular to subrounded fine to coarse GRAVEL of flint, brick, chalk and ash.		(0.90)	
							99.18	2.10	
2.50	4	D				Dark brown very organic sandy SILT with frequent plant material. Sand is fine. (ALLUVIUM)		(0.50)	
							98.68	2.60	
2.70	5	D				Black, green and brown very clayey sandy subangular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse (strong hydrocarbon odour). (RIVER TERRACE DEPOSITS)		(0.40)	
						... water ingress and strong hydrocarbon odour from 2.60 mbgl.	98.28	3.00	
3.00	6	D				Trial pit terminated at 3.0 mbgl.			

Plan (Not to Scale)



General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Water ingress from 2.60 mbgl.
3. Trial pit remained relatively stable during excavation.
4. Trial pit backfilled with arisings in reverse order upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

8 Ton Tracked Excavator

Logged By:

RCann

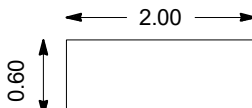
Checked By:

GW

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP10	
Contract Ref: 1921322		Start: 07.10.20 End: 07.10.20	Ground Level: 101.28		National Grid Co-ordinate: E:472117.0 N:139354.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).		(0.30)	
							100.98	0.30	
0.60	1	ES				MADE GROUND: Black and grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint, brick, concrete and ash with occasional metal and plastic.		(0.70)	
							100.28	1.00	
1.10	2	D				MADE GROUND: Soft black and grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint with occasional brick and chalk.		(1.40)	
							98.88	2.40	
1.80	3	D							
2.50	4	D				Dark brown organic sandy SILT with frequent plant material.. Sand is fine. (ALLUVIUM)		(0.30)	
							98.58	2.70	
2.80	5	D				Grey sandy very clayey subangular to rounded fine to coarse GRAVEL of flint and chalk. Sand is fine to coarse (faint hydrocarbon odour).		2.90	
2.80	6	ES					98.38		
2.95	7	D				(RIVER TERRACE DEPOSITS)	98.28	3.00	
						Green and white mottled orange brown sandy clayey subangular to rounded fine to coarse GRAVEL of flint and chalk. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)			
						Trial pit terminated at 3.0 mbgl.			

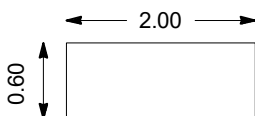
Plan (Not to Scale) 		General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. Water seepage at 2.70 m depth. 3. Trial pit unstable within gravel material. 4. Trial pit backfilled with arisings in reverse order upon completion.			
		All dimensions in metres		Scale: 1:25	
		Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: RCann	Checked By: GW

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames		Trial Pit: TP11
Contract Ref: 1921322	Start: 06.10.20 End: 06.10.20	Ground Level: 101.50	National Grid Co-ordinate: E:472088.0 N:139368.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES				CONCRETE (Reinforced).	101.30	0.20	
						Brick and concrete crush (subbase).	101.10	0.40	
						MADE GROUND: White and black sandy silty subangular to rounded fine to coarse GRAVEL of chalk and brick with occasional ash.	100.90	0.60	
0.90	2	D				MADE GROUND: Black gravelly silty fine to coarse SAND. Gravel is subangular to rounded fine to coarse brick, concrete with ash.		(0.80)	
1.00	3	ES							
							100.10	1.40	
1.60	4	D				Brown very clayey subangular to rounded fine to coarse SAND and GRAVEL of flint. (RIVER TERRACE DEPOSITS)		(0.70)	
							99.40	2.10	
2.10	5	D				Structureless CHALK composed of greyish white silty sandy subangular to rounded fine to coarse GRAVEL of moderately weak, high density chalk with occasional flint and orange brown staining. (ZIG ZAG CHALK FORMATION, GRADE Dc)		(1.00)	
2.50	6	D							
3.00	7	D							
							98.40	3.10	
						Trial pit terminated at 3.10 mbgl.			

Plan (Not to Scale)



General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. No visual or olfactory evidence of contamination.
3. No groundwater encountered.
4. Trial pit remained relatively stable during excavation.
5. Trial pit backfilled with arisings in reverse order upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

8 Ton Tracked Excavator

Logged By:

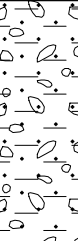
RCann

Checked By:

GW

TRIAL PIT LOG

Contract:		Client:		Trial Pit:	
Alton Brewery		CALA Homes Thames		TP12	
Contract Ref:	Start: 06.10.20	Ground Level:	National Grid Co-ordinate:	Sheet:	
1921322	End: 06.10.20	101.29	E:472072.0 N:139351.0	1 of 1	

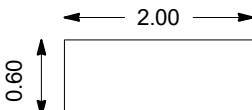
Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	D				CONCRETE (Reinforced).	101.04	0.25	
						Brown clayey subangular to rounded fine to coarse SAND and GRAVEL of flint. (RIVER TERRACE DEPOSITS)		(0.95)	
1.30	2	ES				Greyish brown sandy very clayey subangular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	100.09	1.20	
1.60	3	D						(0.80)	
2.30	4	D				Structureless CHALK composed of light brown sandy gravelly SILT. Sand is fine to coarse. Gravel is off white very weak, low density subangular to rounded fine to medium chalk. (ZIG ZAG CHALK FORMATION, GRADE Dm).	99.29	2.00	
								(0.50)	
2.80	5	D				Structureless CHALK composed of greyish white silty sandy subangular to rounded fine to coarse GRAVEL with low cobble content. Gravel is moderately weak, high density chalk with occasional flint and orange brown staining. (ZIG ZAG CHALK FORMATION, GRADE Dc)	98.79	2.50	
3.20	6	D						(0.90)	
									
						Trial pit terminated at 3.40 mbgl.	97.89	3.40	

Plan (Not to Scale)		General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Trial pit damp at base and partially unstable during excavation. 4. Trial pit backfilled with arisings in reverse order upon completion.	
		All dimensions in metres	Scale: 1:25
Method Used: Machine dug	Plant Used: 8 Ton Tracked Excavator	Logged By: RCann	Checked By: GW

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP13			
Contract Ref: 1921322		Start: 07.10.20 End: 07.10.20	Ground Level: 101.42		National Grid Co-ordinate: E:472059.0 N:139376.0			Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						CONCRETE (Reinforced).		(0.30)	
0.40	1	ES					101.12	0.30	
0.40	2	D				Reddish brown clayey subangular to rounded fine to coarse SAND and GRAVEL of flint. (RIVER TERRACE DEPOSITS)	100.92	0.50	
0.80	3	D				Possibly structured CHALK recovered as silty sandy subangular to rounded fine to coarse GRAVEL of off white and light grey weak, medium density chalk with occasional flint and orange brown staining. Sand is fine to coarse. (ZIG ZAG CHALK FORMATION, GRADE Dc/C)			
1.40	4	D				. . . chalk cobbles and boulders more frequent from 1.50 mbgl.			
2.10	5	B						(2.80)	
2.70	6	D							
3.10	7	B					98.12	3.30	
						Trial pit terminated at 3.30 mbgl.			

Plan (Not to Scale) 		General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Trial pit remained stable during excavation. 4. Trial pit damp at base. 5. Trial pit backfilled with arisings in reverse order upon completion.				
		All dimensions in metres			Scale: 1:25	
		Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: RCann	Checked By: GW	

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP14		
Contract Ref: 1921322		Start: 06.10.20 End: 06.10.20	Ground Level: 101.65		National Grid Co-ordinate: E:472073.0 N:139400.0		Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES				CONCRETE (Reinforced).	101.45	0.20	
						Brick and concrete crush (with intact bricks).	101.20	0.45	
						Structureless CHALK composed of sandy silty subangular to rounded fine to coarse GRAVEL with low cobble content. Gravel and cobbles are off white and light grey weak, medium density chalk with occasional flint and orange brown staining. Sand is fine to coarse. (ZIG ZAG CHALK FORMATION, GRADE Dc)			
0.70	2	D							
1.10	3	D							
1.50	4	D						(1.95)	
1.80	5	D							
2.30	6	D					99.25	2.40	
Trial pit terminated at 2.40 mbgl.									

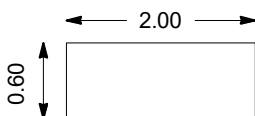
Plan (Not to Scale) 			General Remarks 1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation. 2. No visual or olfactory evidence of contamination. 3. Trial pit remained dry and stable during excavation. 4. Trial pit backfilled with arisings in reverse order upon completion.		
Method Used: Machine dug			Plant Used: 8 Ton Tracked Excavator		
Logged By: RCann			Checked By: GW		
All dimensions in metres			Scale: 1:25		

TRIAL PIT LOG

Contract: Alton Brewery			Client: CALA Homes Thames			Trial Pit: TP15	
Contract Ref: 1921322		Start: 06.10.20 End: 06.10.20	Ground Level: 101.63		National Grid Co-ordinate: E:472099.0 N:139396.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50 0.50	1	ES				CONCRETE (Reinforced).	101.43	0.20	
	2	D				Brick and concrete crush (subbase).	101.23	0.40	
1.00 0.50	3	D				MADE GROUND: Soft brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and chalk with occasional brick, concrete and ash. Structureless CHALK composed of sandy silty subangular to rounded fine to coarse GRAVEL with low cobble content. Gravel and cobbles are off white and light grey weak, medium density chalk with occasional flint and orange brown staining. Sand is fine to coarse. (ZIG ZAG CHALK FORMATION, GRADE Dc)	101.03	0.60	
	4	D							
1.50	5	D						(2.60)	
2.40	6	D				... occasional chalk boulders from 3.0 mbgl.	98.43	3.20	
3.00						Trial pit terminated at 3.20 mbgl.			

Plan (Not to Scale)



General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. No visual or olfactory evidence of contamination.
3. Trial pit remained dry and stable during excavation.
4. Trial pit backfilled with arisings in reverse order upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

8 Ton Tracked Excavator

Logged By:

RCann

Checked By:

GW




APPENDIX C

LABORATORY CERTIFICATES FOR GEOTECHNICAL ANALYSIS



STRUCTURAL SOILS LTD
TEST REPORT



Report No. 584366-01 (00)

1774

Date 24-November-2020 Contract Coors, Alton

Client RSK
Address 18 Frogmore Rd
Apsley
Hemel Hempstead
Hertfordshire
HP3 9RT

For the Attention of Stuart Jeffery

Samples submitted by client	23-October-2020	Client Reference	1921322
Testing Started	02-November-2020	Client Order No.	n/a
Testing Completed	18-November-2020	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

1.01	Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2 (superseded)*
1.03	Liquid Limit (one point method) & Plastic Limit BS1377:Part 2:1990,clause 4.4/5.3 (superseded)*
1.10	Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2 (superseded)*
10.02	Saturated moisture content of chalk BS1377:Part 2:1990,clause 3.3

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .

Test were undertaken on samples 'as received' unless otherwise stated.

Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 18 Frogmore Rd Hemel Hempstead HP3 9RT Tel.01442 416661 e-mail dimitris.xirouchakis@soils.co.uk

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **24/11/2020 10:51:57**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Sharon Cairns (Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU



**STRUCTURAL
SOILS LTD**

Contract:

Coors, Alton

Job No:

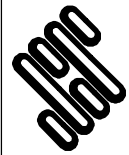
584366



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Description of Sample
TP5		D	1.50	105	117	65	52	99	Brown slightly sandy SILT. Air-dried sample due to diesel odour



STRUCTURAL
SOILS LTD

Contract:

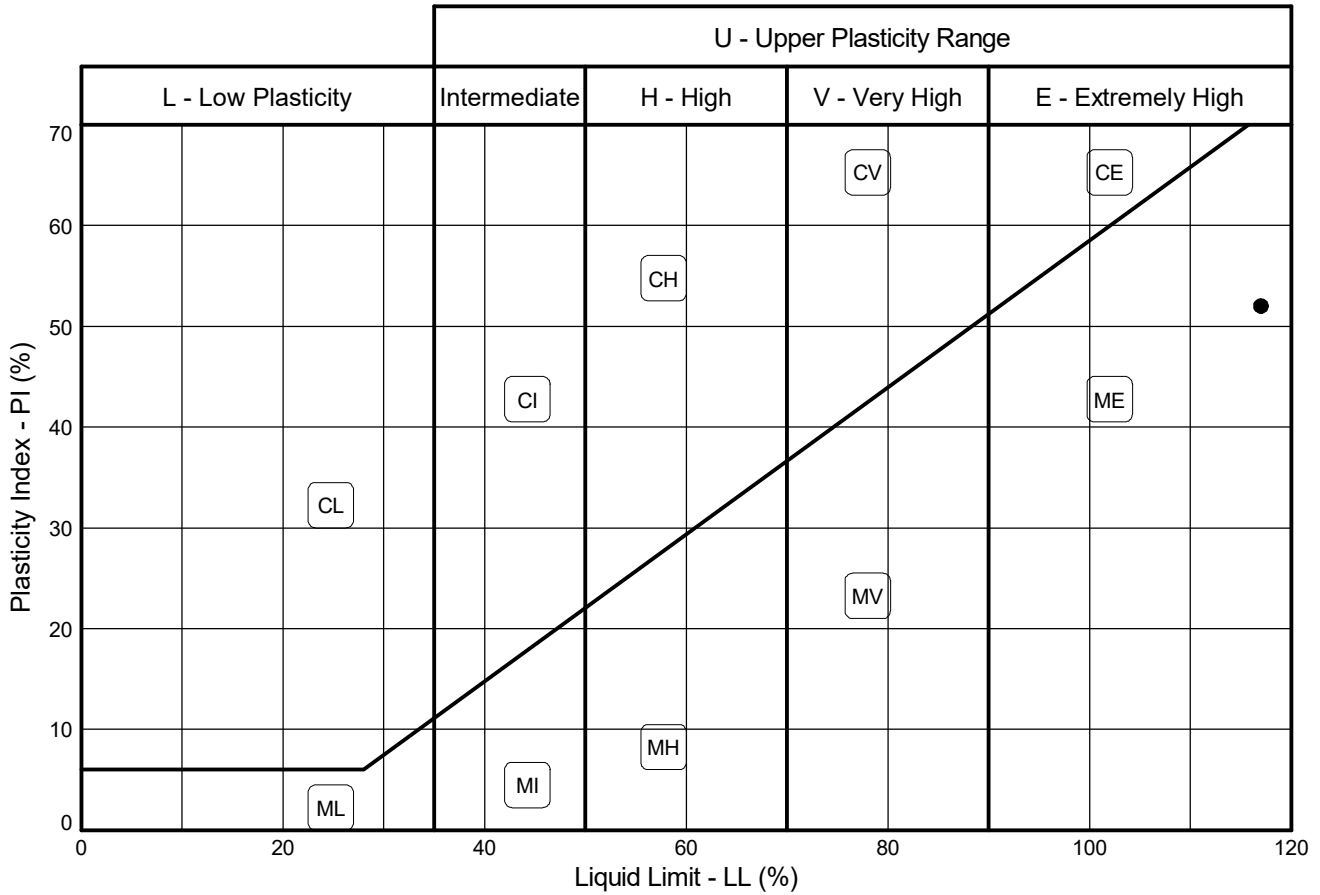
Coors, Alton

Contract Ref:

584366



In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990

[illegible]

Tested in accordance with the following clauses of BS1377-2:1990.

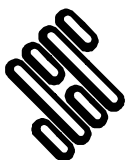
- 3.2 - Moisture Content
- 4.3 - Cone Penetrometer Method
- 4.4 - One Point Cone Penetrometer Method
- 4.6 - One Point Casagrande Method
- 5.3 - Plastic Limit Method
- 5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

- 4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By

Date

56—

SHARON CAIRNS

18/11/20

Contract

Coors, Alton

Contract Ref:

584366



PARTICLE SIZE DISTRIBUTION TEST

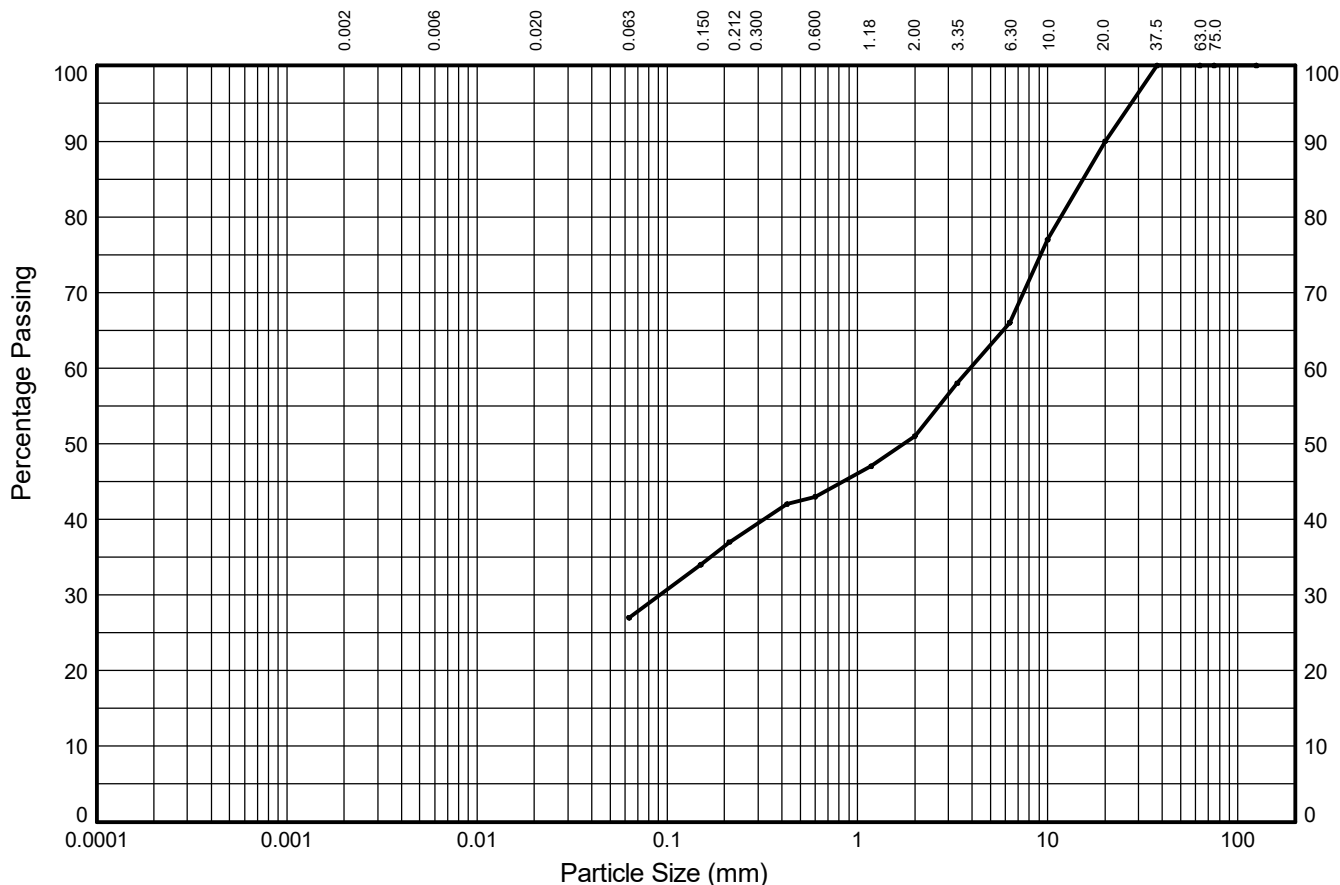
In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP11**

Sample Ref:

Sample Type: **B**

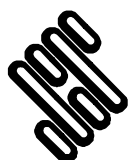
Depth (m): **1.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	9%	7%	8%	15%	24%	10%	
	SILT			SAND			GRAVEL			
27%				24%			49%			0%

Test Sieve (mm)	Percent Passing (%)	Particle Diameter (mm)	Percent Passing (%)	Coefficients	
125.0	100			D ₁₀ (mm)	NA
75.0	100			D ₁₅ (mm)	NA
63.0	100			D ₃₀ (mm)	0.091
37.5	100			D ₅₀ (mm)	1.753
20.0	90			D ₆₀ (mm)	3.923
10.0	77			D ₈₅ (mm)	15.320
6.30	66			D ₉₀ (mm)	20.000
3.35	58			C _U	NA
2.00	51			C _C	NA
1.18	47			Sedimentation sample was not pre-treated Soil Description: Brown very sandy very clayey GRAVEL	
0.600	43				
0.425	42				
0.212	37				
0.150	34				
0.063	27				

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By

Francesca Bennett

FRANCESCA BENNETT

Date

13/11/20

Contract

Coors, Alton

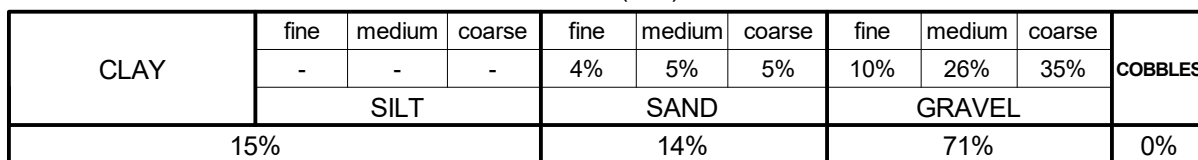
Contract Ref:

584366



In accordance with clauses 9.2 of BS1377:Part 2:1990

Depth (m): **1.60**



Coefficients	
D_{10} (mm)	NA
D_{15} (mm)	0.063
D_{30} (mm)	2.375
D_{50} (mm)	11.225
D_{60} (mm)	16.497
D_{85} (mm)	29.625
D_{90} (mm)	32.682
C_u	NA
C_c	NA

Brown sandy silty/clayey GRAVEL



SUMMARY OF SATURATED MOISTURE CONTENT OF CHALK TESTS

In accordance with clause 3.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Number of Lumps	Moisture Content %	Bulk Density Mg/m ³	Dry Density Mg/m ³	Saturated Moisture Content %	Description of Sample	Lab location
RBH1		B	4.30	2	17*	2.15*	1.84*	17*	White structured CHALK	H
RBH1		B	10.00	1	19	2.28	1.92	15	White structured CHALK	H
RBH1		B	14.40	1	14	2.23	1.96	14	White structured CHALK	H
RBH2		B	6.20	1	15	2.21	1.93	15	White structured CHALK	H
RBH2		B	9.20	1	15	2.20	1.91	15	White structured CHALK	H
RBH2		B	14.45	1	10	2.31	2.10	11	White structured CHALK	H
RBH3		B	5.56	1	15	2.20	1.91	15	White structured CHALK	H
RBH3		B	7.00	1	15	2.26	1.97	14	White structured CHALK	H

* denotes the average values from multiple lumps

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By

Francesca Bennett

FRANCESCA BENNETT

Date

13.11.20

Contract Ref:

584366



Contract:

Coors, Alton

SUMMARY OF SATURATED MOISTURE CONTENT OF CHALK TESTS

In accordance with clause 3.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Number of Lumps	Moisture Content %	Bulk Density Mg/m ³	Dry Density Mg/m ³	Saturated Moisture Content %	Description of Sample	Lab location
TP5		B	2.70	1	17	2.14	1.83	17	White structured CHALK	H
TP11		B	2.50	1	17	2.16	1.85	17	White structured CHALK	H
TP13		B	1.40	1	19	2.07	1.73	21	White structured CHALK	H

* denotes the average values from multiple lumps

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
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Contract:

Coors, Alton