Report Title: **Soakage Investigation**

Project Name: **Bartons Road, Havant**

Report Reference: **BRD4469-OR3-C**

Date: **July 2025**

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REPORT CONTROL SHEET

REPORT TITLE	**SOAKAGE INVESTIGATION**
PROJECT	**BARTONS ROAD, HAVANT**
CLIENT	**STONEBOND**

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
BRD4469-OR3-A	First Issue	10/04/2025	L Chippington	J Brockwell
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REPORT LAYOUT

This report is divided into the following three sections: Technical Report, Supporting Information and Appendices.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the investigation and is intended to provide the level of information required by current guidance documents and practice. The Technical Report is written in a language that, in part, assumes knowledge of subject matter so that it can be written in as concise a form as possible. Its intended audience is peers, regulators and other professionals in related disciplines.

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REFERENCES

SUPPORTING INFORMATION

This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.

APPENDICES

The final section of the report presents the factual data collected and employed as part of the investigation.

APPENDIX 1	**SITE PLANS**	
	Site Location Plan	Ref. BRD4469-OP2-A
	Exploratory Hole Location Plan	Ref. BRD4469-OD1-B
APPENDIX 2	**EXPLORATORY HOLE RECORDS**	
	Logs of trial pits.	Ref. TP301-TP303
	Photographic records of trial pits.	Ref. BRD4469-OP8-A
	BRE365 soakage test records.	7No. x A4 pages

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Stonebond Properties (Guildford) Limited trading as Stonebond.
SITE	Land situated off Bartons Road at the former SSE Office, in the town of Havant.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client intends to purchase the site and develop it for residential housing.
REPORT TYPE	Soakage investigation.
REPORT OBJECTIVES	The purpose of this report is to present the findings of a soakage investigation to determine the suitability for using soakaways at the proposed development.

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Mobilisation to site and production of health and safety documentation.
- Delivery of 20mm granular material to site for backfilling the pits and supply of 75-100mm diameter perforated pipes for the inspection well in each soakage test pit.
- One day of trial pitting using a mechanical excavator to provide 3No. trial pits to a nominal depth of 2m-3m, ground conditions permitting.
- Performance of soakage tests based upon BRE Digest 365 in each of the trial pit locations. Supply of water to site via a water bowser unit on up to three consecutive days for the repeat filling of each test pit. A Geo-Environmental Technician will monitor the soakage tests.
- Removal of pipework at the end of the soakage tests and restoration of trial pit surface with spoil. The surplus soil from excavating the pits will be neatly stockpiled on site. The disposal of this surplus soil has not been allowed for.
- All exploratory points will be logged and sampled in general accordance with BS5930:2015+A1:2020 by supervising Geo-Environmental Consultant.
- Determination of the accurate location and level of exploratory points by topographical grade GPS unit.
- Provision of a soakage investigation report to include all exploratory point records, monitoring and soakage test results, together with commentary on the soakage rates attained and the feasibility for adopting surface water infiltration devices on the site.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. In the case of Japanese Knotweed, BRD can undertake separate surveys for this plant undertaken by a Property Care Association qualified surveyor.

The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. It should be recognised that the collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

The recommendations, interpretations and conclusions of this report are based solely on the ground conditions found at the exploratory holes. Due to the variability in the nature of ground, conditions between exploratory holes can only be interpreted and not defined. The description of the site and the ground conditions is accurate only for the dates of the field works. In particular, groundwater levels can vary due to seasonal and other effects.

This report is restricted to the provision of soakage advice only and does not include any form of contamination or further geotechnical assessment.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

SITE ADDRESS AND POST CODE	Former SSE Offices, Bartons Road, Havant, PO9 5TH.
NATIONAL GRID REFERENCE	Approximate centre of the site - 472160, 108010.

2.2. SITE DESCRIPTION

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	All previous buildings on the site have been demolished and the site is awaiting development. There is a large stockpile of crushed demolition waste in the central northern area and much of the site has a surface formed by demolition rubble. However, the surface of the southern part and areas close to the boundaries are formed by soft landscape. There is an approximately 1.0m high retaining wall close to the northern boundary, with the ground level close to the northern boundary approximately 1.0m below the ground levels to the north. The site generally slopes gently towards the south, however following re-grading associated with the previous history of development and demolition, the slope is steeper, with a 'step down' in the central southern area. The areas of soft landscaping have some immature trees and other low vegetation across them.
SURROUNDING LAND USE	The site is located in a mixed residential and commercial area. To the north and west are Bartons Road and Petersfield Road, respectively, with residential houses beyond. Beyond the northern and central parts of the eastern boundary is a football club and beyond the southern part an electricity substation and office building. Beyond the eastern part of the southern boundary is Martin Road, with a car sales and servicing workshop beyond the central and western parts of the southern boundary.
PROPOSED DEVELOPMENT	The proposed development is for 90No. residential dwellings, comprising 32No. apartments and 58No. houses.
HISTORICAL SUMMARY	The earliest available map from 1867 shows the site as agricultural. Up to 1957 a stream was shown in the eastern and southern areas of the site, however, this stream was not shown on any of the later maps. By 1972 office buildings had been constructed on site, a petrol station to the southwest and an electricity substation to the east. By 1991 the offices had been extended, but between 2016 and 2019 they were demolished, with the crushed arisings remaining on site.

SUBJECT	COMMENTS
PUBLISHED GEOLOGY	No superficial deposits are indicated to be present, however, Head Deposits and River Terrace Deposits are shown close to the east and south respectively. All of these deposits can be composed of clay, silt, sand or gravel. The shallowest bedrock is shown to be the Bognor Sand Member, which typically comprises fine and medium-grained sand. The London Clay Formation underlies the Bognor Sand Member and typically comprises silty clay.
HYDROGEOLOGY	The Bognor Sand Member is classified as a bedrock Secondary A Aquifer. The site is shown to lie within a Zone 1c Source Protection Zone, which means the associated aquifer is at depth and is only likely to be affected by subsurface activities, such as deep drilling. Based on the BGS maps for the area, it is considered the SPZ1c relates to a deep Chalk aquifer, which forms a drinking water resource. At this site, the chalk is likely to be present at a significant depth and confined by the overlying fine-grained Lambeth Group and London Clay Formation.
HYDROLOGY	The closest surface water feature to the site is a small stream located approximately 311m to the east. The site is outside of areas classified at risk from Extreme Flooding from Rivers or Seas without Defences.

2.3. PREVIOUS INVESTIGATIONS

Prior to BRD's involvement, the site had been subject to two ground investigations. The first was competed prior to the demolition of the on-site buildings and the second was completed following the demolition. These are referenced as follows:

- 'Ground Investigation Report', Soiltechnics, ref. STM3168D-GD1 and dated May 2016.
- 'Interpretive Site Investigation and Remedial Strategy Report', Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1 and dated March 2020.

These two investigation reports were reviewed within the BRD desk study, referenced as:

- 'Phase 1 Environmental Desk Study – Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR1-B and dated July 2025.

Following the desk study BRD carried out a Phase 2 Geo-Environmental Investigation, referenced as:

- 'Phase 2 Geo-Environmental Investigation – Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.

Salient information from these four previous investigations relevant to this latest soakaway investigation are summarised below, however the reports should be referred to for full details.

The ground conditions generally comprised a layer of crushed demolition waste across the northern and central areas, extending down to a typical depth of 0.4m below ground level (bgl). From near surface in the southern area and beneath the demolition waste across the rest of the site, variable Made Ground soils were encountered, extending down to depths typically ranging from 0.4m to 1.4m bgl, but locally down to 2.3m bgl. The nature of the Made Ground ranged from slightly gravelly slightly sandy clay through to clayey sandy gravel, with the gravel including concrete, brick, plastic, metal, glass and ceramics. Some whole bricks and cobble sized fragments of concrete were encountered within the Made Ground.

The natural strata beneath the Made Ground generally comprised superficial Head Deposits, which varied from clayey sandy gravel to slightly gravelly slightly sandy clay, with the gravel generally comprising flint. In addition, in the central area some Alluvial clay, likely associated with an old ditch, was encountered between the Made Ground and Head Deposits. These superficial soils were collectively encountered down to depths between 0.7m and 2.6m bgl, and were then underlain by bedrock of the Bognor Sand Member, which extended down to the base of the investigation points, at depths down to 4.0m bgl. The Bognor Sand Member generally comprised slightly clayey fine sand.

Throughout the various phases of investigation, groundwater was recorded at depths ranging between 1.1m and 2.4m bgl depth.

As part of the Forge Environmental Management's investigation, soakage testing was undertaken in 4No. trial pits, ranging in depth from 0.36m to 1.90m. All the soakage tests were undertaken in natural soils, with three being terminated in clay soils and one in sand soils. The soakage tests were run for four to six hours and none of them reached even 25% empty. Therefore, the rate of soakage was too slow for calculation of infiltration rates to be made.

Following on from BRD's investigation work in October 2024, a programme of groundwater monitoring has been undertaken over the 2024/2025 winter period. This monitoring shows the groundwater levels across the site to be as shallow as 1.0m to 1.5m bgl over the wetter months of December 2024 and January 2025, albeit does return to levels of between 1.5m and 3.0m bgl by the beginning of April 2025.

3. GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	Trial pits were selected as they allowed for the formation of the soakage tests. These trial pits were backfilled with 20mm coarse 'no fines' gravel to allow for repeat tests without the trial pit walls collapsing. This methodology is in compliance with BRE365.
DATES OF SITE WORKS	The field works were undertaken on the 1st April 2025, with the soakaway testing being carried out from the 1st to the 3rd April 2025.
EXPLORATORY HOLE LOCATIONS	To provide general information for the ground conditions on site and to inform the proposed drainage strategy, the soakage test pits were positioned at three locations pre-agreed with the Client.

3.2. BRD FIELDWORK

TRIAL PITS	
REFERENCES	TP301 to TP303.
DEPTH RANGE	From 1.80m to 2.10m bgl.
EXCAVATOR	JCB-3CX backhoe excavator.
BACKFILL	All of the trial pits from this investigation were completed as soakage test pits and were installed with 90mm slotted monitoring well / filling pipe and backfilled with 20mm natural gravel aggregate.
SOAKAGE TESTS	Soakage tests in accordance with BRE365 were carried out in all three test locations. Water was supplied via a 4WD vehicle with a water bowser. The water was obtained via a hydrant supply from the Portsmouth Water infrastructure using a hydrant supplied by them. Repeat soakage tests were performed, as dictated by the site conditions encountered.

4. GROUND CONDITIONS

4.1. OVERVIEW

The ground conditions encountered were generally consistent with the published geological maps and previous investigations, with a surface cover of Made Ground generally overlying superficial Head Deposits onto bedrock of the Bognor Sand Member. At TP302, Alluvium was encountered beneath the Made Ground and above the Head Deposits, and at TP301, no superficial deposits were encountered with the Made Ground extending to a greater depth and directly overlying the Bognor Sand Member.

Details of the various stratigraphic units are given in the following sections.

4.2. MADE GROUND

Made Ground was encountered at each test location from ground level down to depths between 0.3m and 1.0m bgl. It generally comprised grey brown sandy coarse sub-angular gravel of concrete and brick, and at one location in the southern area, TP303, included whole bricks.

4.3. SUPERFICIAL DEPOSITS

4.3.1. Alluvium

The Alluvium was encountered at one location in the central western area, TP302, beneath the Made Ground from 1.0m depth down to 1.3m bgl depth. It comprised firm dark grey slightly sandy slightly organic clay.

4.3.2. Head Deposits

The Head Deposits were encountered beneath the Made Ground or Alluvium at two locations, TP302 and TP303, extending down to depths of 1.9m and 1.7m bgl, respectively. These soils generally comprised medium dense grey brown clayey sandy medium to coarse sub-rounded to sub-angular gravel of flint, quartzite and sandstone. However, at TP303, between 0.3m and 1.0m bgl depth, it comprised firm grey brown slightly gravelly slightly sandy clay, with the gravel consisting of quartzite.

4.4. BEDROCK

4.4.1. Bognor Sand Member

Strata of the Bognor Sand Member were encountered at each test location beneath the Made Ground or Head Deposits. These deposits generally comprised medium dense grey brown silty fine sand and extended down to the base of the trial pits, with a maximum proven depth of 2.1m bgl.

4.5. GROUNDWATER BEHAVIOUR

No groundwater seepages were encountered in any of the trial pits formed during this latest investigation.

5. SOAKAWAYS

5.1. SOIL INFILTRATION RATE

Soakage tests in general accordance with BRE365 were undertaken in TP301, TP302 and TP303. Each of the test pits were gravel filled, with three repeat tests run at TP301 and two at TP302 and TP303, due to time constraints and the slow pace of the infiltration.

The records of the soakage tests are presented in Appendix 2. The detailed calculation of the infiltration rate is provided on these records, however, a summary of the results is presented in the table below:

TRIAL PIT	TEST	SOIL INFILTRATION RATE	STRATUM TESTED
TP301	Test 1	2.52×10^{-5} m/s	0.20m-1.00m bgl: Sandy coarse subangular GRAVEL (Made Ground) 1.00m-1.80m bgl: Silty fine SAND (Bognor Sand Member)
	Test 2	2.18×10^{-5} m/s	
	Test 3	2.13×10^{-5} m/s	
TP302	Test 1	2.37×10^{-6} m/s	1.00m-1.30m bgl: Slightly sandy slightly organic CLAY (Alluvium) 1.30m-1.90m bgl: Clayey sandy medium to coarse sub-rounded to sub-angular GRAVEL (Head Deposits) 1.90m-2.10m bgl: Silty fine SAND (Bognor Sand Member)
	Test 2	2.30×10^{-6} m/s	
TP303	Test 1	2.36×10^{-6} m/s	0.30m-1.00m bgl: Slightly gravelly slightly sandy CLAY (Head Deposits) 1.30m-1.70m bgl: Sandy very clayey medium to coarse sub-rounded GRAVEL (Head Deposits) 1.70m-2.10m bgl: Silty fine SAND (Bognor Sand Member)
	Test 2	2.06×10^{-6} m/s	

It should be noted that although the infiltration rates were slow, the soakage tests undertaken within TP302 and TP303 were still compliant with the guidance contained within BRE365 as both tests had soaked to over 50% of the effective soakage depth within 24 hours. As each test took nearly two days to complete, a third test was not attempted as part of these site works, due to time and budget constraints. Whilst a third test was not undertaken at TP302 or TP303, the nature of the ground conditions and repeatability of the first two test results would indicate that a third test is likely to give infiltration rates at similar orders of magnitude.

5.2. SOAKAWAY DESIGN ADVICE

All of the soakage tests from this latest phase of investigation were taken to depths from 1.8m to 2.1m bgl and targeted the silty fine sand of the Bognor Sand Member. The soakage testing from this investigation has recorded infiltration rates between 2.04×10^{-6}m/s and 2.51×10^{-5}m/s, with good repeatability at each test location.

The difference in infiltration between TP301 and TP302 / TP303 is an order of magnitude and does emphasise the difficultly in adopting a representative design value as the soils being tested appeared visually similar. However, the fact that viable infiltration has been confirmed at each test location does indicate that soakaway type drainage or infiltration basins may be possible, depending on design requirements and groundwater levels. Such infiltration does require the

soakage device to penetrate through any surface cover of Head Deposits and fully intercept the deeper silty sands of the Bognor Sand Member. On this basis the lower end of the infiltration rates (i.e. 2 x 10^{-6}m/s) would therefore be applicable for design purposes.

Should traditional soakaways be considered, they should be located at least 5m away from any foundations. Infiltration devices that do not lead to concentrated water inflows, such as permeable pavements, can be located closer than this offset distance subject to careful design and construction.

It should be noted that the previous soakage tests, carried out by Forge Environmental Management, had indicated the soils tested would not be suitable for soakaway drainage. However, three of their four tests were undertaken in clay soils of the Head Deposits and this may explain the apparent lack of infiltration. The one test undertaken within what is assumed to be the Bognor Sand Member (Forge's TP1), did record some infiltration but the rate was too slow to calculate as the test was not run overnight. It may therefore have been that this test would have returned similar infiltration rates to TP302 or TP303 if it was left for 2 days to run.

However, whilst the soakage tests show that infiltration is technically feasible, the groundwater monitoring carried out over the winter months indicates shallow groundwater levels beneath the site during periods of wetter weather. The Environment Agency will object to the use of infiltration devices that lead to the direct input to groundwater and seek that in excess of a 1m thick unsaturated zone is present between the base of the infiltration device and the seasonal high maximum groundwater level. Given the groundwater levels can be as shallow as 1.0m bgl and that the Bognor Sand Member is typically not encountered until deeper depths, this would mean that this unsaturated thickness would not be achievable and would further suggest that infiltration devices are not suitable in practise for this site.

REPORT SPECIFIC REFERENCES

- British Geological Survey sheet 316 “Fareham” Solid and Drift edition (1:50,000) published 1972.
- ‘Ground Investigation Report’, Soiltechnics, ref. STM3168D-GD1, dated May 2016.
- ‘Interpretive Site Investigation and Remedial Strategy Report’, Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1, Dated March 2020.
- ‘Phase 1 Environmental Desk Study – Bartons Road, Havant’, BRD Environmental Ltd, report ref. BRD4469-OR1-B, dated July 2025.
- ‘Phase 2 Geo-Environmental Investigation – Bartons Road, Havant,’ BRD Environmental Ltd, report ref. BRD4469-OR2-C, dated July 2025.

SUPPORTING INFORMATION

SITE CHARACTERISTICS

The site characteristics are collated from various information sources, including but not limited to Ordnance Survey, British Geological Survey (BGS), Environment Agency (EA) and local authorities.

BRD generally commission the Landmark Information Group to produce an Envirocheck Report for study sites and where employed this is included in the Appendices. It should be noted that some of the data provided in the Envirocheck report is not considered within BRD's interpretation for the site characteristics as part of a geotechnical assessment.

HISTORY

Mapped History

The site history summarises the changes in use or layout of the site over time and is largely developed from a study of available Ordnance Survey maps. It should be noted that changes to the site may have occurred between the editions of the maps employed to assess the history of the site. Historical information of relevance within the 250m surrounding the site is also discussed in a separate section. The historical plans referred to in the text are generally included in an Appendix.

Aerial photography

As a minimum, current and historical aerial images of the site and surrounding areas are studied from the Google Earth program. Where additional historic aerial photographs have been purchased then these are referenced within the technical report.

Internet Searches

A simple search of the internet for relevant material relating to the use or history of the site is made. Information obtained from internet searches has been accepted as fact without validation by BRD except for ensuring the source is reputable. It should be recognised that due to programme and budgetary constraints the search conducted may not have revealed all the information available.

GEOLOGY

The geology of the site is assessed by reference to the relevant British Geological Survey (BGS) 1:50,000 scale sheet in Bedrock and Superficial (historically Solid and Drift) edition. Many of these geological maps are relatively old with superseded terminology and descriptions. BRD therefore employ the BGS Open Geoscience website to determine current nomenclature of strata and to assist in determining geological boundaries against current topographic features. BRD also employ BGS Regional Geology Guides to assist in understanding the geological context of the site.

Ground Stability Hazards

Ground stability hazards caused by mining, ground dissolution, landslide potential, collapsible ground and natural cavities are identified by the Envirocheck database search of records held by The Coal Authority, British Geological Survey and studies completed by Ove Arup and Peter Brett Associates.

The Envirocheck database ground stability hazard entries for compressible ground, running sands and shrinking or swelling clays are not discussed directly. This is because these hazards are very common and are considered within the preliminary geotechnical assessment where necessary.

Radon

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every house contains radon, some houses built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken during construction to reduce this risk.

Radon can move through cracks and fissures in the soil into the atmosphere or into buildings via basements and/or underfloor voids. If radon enters the living space of buildings its concentration can potentially increase and provide a risk to human health as the inhalation of the radioactive decay products of radon gas can increase the risk of developing lung cancer.

The maps contained within 'Radon: Guidance on protective measures for new buildings' (2015) identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new buildings together with supplementary advice concerning extensions, conversions and refurbishments. However, some local authorities have local bylaws, that BRD may not be aware of, that insist on radon protection to all new dwellings within their area regardless of the recommendations of the 'Radon: Guidance on protective measures for new buildings' (2015) report.

Basic radon protection measures comprise incorporation of a continuous gas resistant membrane sealed at joints and around service entries into the floor construction and extended across the cavity tray.

Full radon protection measures comprise incorporating a continuous gas resistant membrane into the floor construction together with a ventilated sub-floor void through either the use of suspended floor construction or a 'radon sump'. The membrane is sealed at joints and around service entries into the floor and extended across the cavity tray.

'Radon: Guidance on protective measures for new buildings' (2015) should be referred to for detail on the construction of the protective measures.

GROUND INVESTIGATION

Exploratory holes are logged by an experienced Geo-Environmental Consultant in general accordance with 'Code of practice for site investigations' BS5930:2015, British Standards Institution, 2015. Soil samples for chemical and geotechnical analysis are taken from the exploratory holes at intervals dictated by the nature of the soils and the objectives of the investigation.

Where stated on the logs of inspection pits, trial pits or boreholes (where insitu testing has not been undertaken), the relative density of coarse (sand and gravel) soils is tentative only. Such assessments of density are on the basis of visual inspection only taking into consideration such factors as drilling rates, stability of pit side walls, appearance and behaviour under excavation.

Where Chalk strata is encountered it is logged and graded in general accordance with CIRIA guidance 'C574 - Engineering in Chalk'. It should be recognised that where percussive drilling methods are employed, the structure of the Chalk is destroyed and therefore the grading stated on such logs is either tentative or absent where it is not possible to assess the grade.

Hand Dug Inspection Pits

Hand tools are used to forward shallow inspection pits as a cost effective method of describing and sampling near surface soils. The technique is also used where exposure of existing footings is required. The depth reached by such techniques is a function of the nature of the ground and generally does not exceed 1.5m

Trial Pits

Mechanically excavated trial pits allow detailed inspection of near surface ground due to the large volume of soil exposed. A wheeled backhoe loader is the usual machine for digging trial pits that are typically 3 to 4.5m deep, 0.5m wide and 3m long.

Windowless Sampling Boreholes

This type of borehole is formed by a small tracked dynamic percussion drilling rig with samples retrieved in thin plastic liners within the narrow diameter steel sampling tubes. Borehole depths of up to 5m are typical, but in exceptional circumstances up to 15m depth can be achieved. This is the smallest type of rig that is capable of undertaking Standard Penetration Tests (SPTs).

Hand Held Window Sampling

Hand held window sampling is a useful method of drilling narrow diameter boreholes particularly where access is difficult. Hand held mechanical percussive hammers are used to drive the sampling tube into the ground. The soil samples are collected within the hollow metal sampling tubes and inspected via the open window along one side. Window sampling boreholes can be forwarded to depths of 3m to 6m depending upon ground conditions.

Cable Percussive Boreholes

This form of drilling involves repetitive dropping of a tube into the soil under its own weight from a tripod support. The sample is obtained from the clay cutter head in fine soils or a bailer for wet granular soils. As the borehole progresses SPTs can be undertaken and relatively undisturbed samples can be obtained. Typically these boreholes are 15 to 25m deep, but depths of double that can be achieved in soils, but only thin weak rock layers can be penetrated.

Rotary Boreholes

Where competent rock is required to be drilled then rotary drilling techniques are required. The drilling rigs can vary in size from small tracked units to larger units mounted on four wheel drive trucks. Rotary open hole drilling techniques break the rock into small fragments and so recovery of any samples is limited. In contrast, rotary coring retrieves excellent samples. Some rigs also allow windowless sampling to be undertaken through soil layers. There are no practical limits to the depths that this drilling method can achieve.

Dynamic Probing

Dynamic probing comprises a sectional rod with a sacrificial cone at the base of slightly larger diameter than the rod. The rod is driven into the ground by a constant mass falling through a set distance. The number of blows required to forward the rod per 100mm is then recorded and presented in a graph of N_{10} values. The standard applicable to dynamic probing is "BS EN ISO 22476-2:2005 Incorporating corrigendum no. 1, Geotechnical investigation and testing — Field testing — Part 2: Dynamic probing" BSi, February 2007.

Static Cone Penetration Tests

Cone Penetration Tests (CPT) consist of pushing a conical 60° cone into the ground at a constant rate and recording the force required to do this. Sensors in the cone record other information and this data can be correlated to a number of different geotechnical parameters.

Dynamic Penetrometer

The Transport Research Laboratory Dynamic Cone Penetrometer (TRL DCP) uses an 8 kg hammer dropping through a height of 575mm to drive a 60° cone of 20mm maximum diameter into the ground. The depth driven either per blow or per several blows is recorded. The strength of each of the soil layer encountered is then calculated by converting the penetration rate (mm per blow) into an approximate California Bearing Ratio (CBR) value employing the correlation proposed by TRL.

Gas Monitoring

Gas monitoring is undertaken with a portable gas monitor for oxygen, Methane, Carbon Dioxide, Hydrogen Sulphide and Carbon Monoxide together with recording of atmospheric pressure and any flow rate.

Vapour Monitoring

Headspace tests and monitoring for Volatile Organic Compounds (VOC) or Semi Volatile Organic Compounds (SVOC) is undertaken using a Photo Ionisation Detector (PID). The MiniRAE models used have a 10.6 eV lamp calibrated for isobutylene. The PID is useful tool to indicate the presence of a wide range of volatile compounds, but only provides semi-quantitative data as different compounds provide a different response and thus the reading is not a true reflection of the actual concentration present.

Low PID readings can be recorded in natural uncontaminated organic soils or even as a result of atmospheric pollution. It is generally accepted by consultants and regulators that recorded values in excess 50 parts per million (ppm) represents the presence of organic compound pollutants and in excess of 100 ppm such contamination may be significant.

The headspace test procedure involves the collection of a sample of suspected contaminated soils and placing within a sample bag. A tight seal to the bag is formed with a similar volume of air trapped to that of the soil and the sample is left for fifteen minutes to allow volatilisation of any contaminants. The bag is then pierced by, and sealed around, the sample probe of the PID and a reading taken.

Borehole well monitoring is undertaken by connecting the PID directly to the gas tap on the monitoring well installation.

Groundwater Level Monitoring

Groundwater levels are recorded with an electronic dip meter that has a detector end that is lowered into the borehole well. An audible signal is made when water is reached and the depth recorded from the graduated tape used to lower the detector. Where there is potential for a separate Light Non Aqueous Phase Liquid (LNAPL) to be present floating on the groundwater an oil/water interface meter is used in preference to a conventional dip meter so that any such floating product can be detected.

Geotechnical Sampling

BRD schedule a range of geotechnical testing as appropriate to the identified ground conditions, available budget and the proposed development. Different types of soil samples are obtained as appropriate to the ground conditions and planned testing.

SAMPLE TYPE	SYMBOL USED ON LOGS	DESCRIPTION
Disturbed	D	Small disturbed soil samples of about 1 to 2 kg are collected in plastic bags.
Bulk	B	Large disturbed bulk samples up to about 20 to 30 kg are collected in plastic bags
Undisturbed	U	'Undisturbed' samples generally collected in plastic or metal tubes within cable percussive boreholes of 100mm diameter for samples of fine soils of firm to stiff consistency. Can also be representative of samples taken by cutting plastic sample liners from windowless sampling drilling methods. It is recognised that such samples do not generally meet Eurocode sample quality requirements for the tests commonly employed. However, given the wealth of experience with these sampling methods this continues to be common in United Kingdom practice particularly for less sensitive developments where more expensive sampling techniques are not economically justifiable.
Undisturbed	UT	A thin walled steel sampler developed by Archway Engineering called a UT100 in an attempt to gain better quality samples of soft to firm fine soils when using cable percussive drilling methods.

Contamination Sampling

BRD schedule contamination testing as appropriate to the ground conditions, available budget, potential contaminants and the proposed development. Samples are collected in single use laboratory supplied containers.

Soil samples are retrieved in plastic containers and/or amber glass jars with a lined plastic cap. Contamination samples are indicated by a 'J' on exploratory hole logs.

Water samples are collected in plastic bottles and/or amber glass jars with a lined plastic cap then placed in cool boxes together with freezer packs. Water samples are indicated by a 'W' on exploratory hole records, but generally such samples are not tested as testing from dedicated monitoring wells is preferred for sample quality reasons.

Samples retrieved from the exploratory holes are dispatched to the laboratory by overnight courier. Where samples cannot be transported directly from site they are temporarily stored in the BRD dedicated sample storage facility which includes refrigeration where necessary. The individual accreditation of the test methods is detailed in the laboratory test report.

GEOTECHNICAL ASSESSMENT

Under Eurocode 7 (EC7) the following risk ranking is applied to geotechnical projects:

GEOTECHNICAL CATEGORY	***DESCRIPTION***
1	*Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk. For example, straightforward ground conditions, local experience, no excavation below the water table unless this will be straight forward.*
2	*Conventional types of structures and foundations. No difficult soil or loading conditions. Quantitative geotechnical data and laboratory testing. Routine procedures for field and laboratory testing. Conventional structures and no exceptional geotechnical risk. For example, spread, raft and piled foundations, retaining walls, bridge piers and abutments, embankments, ground anchors, tunnels and excavations.*
3	*Those structures not in Categories 1 and 2 such as very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions. Structures in highly seismic areas. Structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.*

GEOTECHNICAL PARAMETERS

Soakage Tests

Soakage tests comprise the filling of a test pit with water and recording the time taken for the water to drain away. The tests are undertaken in general accordance with 'Digest DG 365: Soakaway design' BRE, Revised 2016. The test pits are usually gravel filled for safety with a slotted vertical pipe through which water observations are made. Water is generally supplied by a tanker to allow fast filling of the pits with water. Compliant tests are filled and allowed to drain near empty three times.

Standard Penetration Tests

The standard penetration test (SPT) determines the resistance of soils at the base of a borehole to the dynamic penetration of a split barrel sampler and the recovering of disturbed samples for identification purposes. In gravelly soils and some soft rocks a solid cone is used in preference to the sampler.

The basis of the test consists in driving a sampler by dropping a hammer of 63.5 kg mass on from a height of 760 mm. The number of blows (N value) necessary to achieve a penetration of the sampler of 300 mm is recorded. The test is described in 'Geotechnical investigation and testing — Field testing — Part 3: Standard penetration test - BS EN ISO 22476-3:2005 Incorporating corrigendum no. 1', BSi, 2007.

The uncorrected N values of the SPT tests are recorded upon the borehole logs together with a record of blows for each 75mm test portion including the seating blows. Where the full test depth cannot be achieved due to refusal on hard stratum, the number of blows and the distance achieved is recorded and the N value given as >50. The abbreviation SPT(c) is used upon the logs indicates that the test was performed with a solid cone rather than a split spoon sampler.

It is necessary to apply a correction to the N values to account for the effects of energy delivery using the equation: $N_{60} = \frac{E_r}{60} N$ *where* E_r *is the energy ratio of the specific test equipment.*

In the case of tests in sand, for the effects of overburden and rod length the equation is modified to $N_{60} = \frac{E_r}{60} \; x \; \lambda \; x \; C_N \; x \; N$ *where* λ *is the correction factor for energy losses due to the rod length and* C_N *is the correction factor for vertical stress due to overburden of the soil.*

Sulphate

In order to compare the laboratory soil test results with 'Concrete in aggressive ground. BRE Special Digest 1: 2005' (BRE, 2005) laboratory results are converted to SO_4 *mg/l. Laboratory results expressed as* SO_3 *g/l and are multiplied by a factor of 1200 to express the results as* SO_4 *mg/l.*

Index Property Tests

In accordance with National House Building Council (NHBC) Standards Chapter 4.2 – Building near trees, the laboratory plasticity indexes are assessed against their volume change potential. The Modified Plasticity Index is defined as the Plasticity Index of the soil multiplied by the percentage of particles with a nominal diameter of less than 425µm. Whilst the NHBC Standards were developed for residential buildings, the advice is equally applicable to a large number of other types of low rise structures.

Hand Shear Vane

The undrained shear strength of the fine (i.e. clay) soils at the site can be established using hand shear vane apparatus. Usually three readings are taken at every depth tested and the uncorrected results recorded on the exploratory point log. Shear vane readings from depths below 1.2m depth in trial pits are from tests performed on excavated soil. In accordance with Eurocode 7 — Geotechnical design — Part 2: Ground investigation and testing EN 1997-2:2007 the results should be corrected. BRD employ only simple correction methods as the more complex correction methodologies imply undue accuracy to a test that has distinct disadvantages and limitations.

Pocket Penetrometers

The Pocket Penetrometer is a lightweight instrument for use by field personnel to check visual classification of soils. It is a simple test and there is inherent uncertainty related to the small volume of soil being tested and so the results should be used with appropriate caution. Pocket penetrometers are calibrated in terms of unconfined compressive strength and once converted to undrained shear strength (divide by two) the results are further reduced by a factor of 1.5 - 2.0 as the device tends to overestimate strengths.

Instrument Reading (uncompressive strength in kg/cm^2)	*Indicative Undrained Shear Strength (kN/m^2)*	*Indicative Consistency*	*Indicative strength*
1.0	*25 – 33*	*Soft*	*Low*
1.5	*38 – 50*	*Soft to firm*	*Low to medium*
2.0	*50 - 67*	*Firm*	*Medium*
2.5	*63 – 83*	*Firm to stiff*	*Medium to high*
3.5	*88 – 116*	*Stiff*	*High*
4.5	*113 – 150*	*Stiff to very stiff*	*High to very high*

APPENDIX 1

Site Location Plan

Not to scale.

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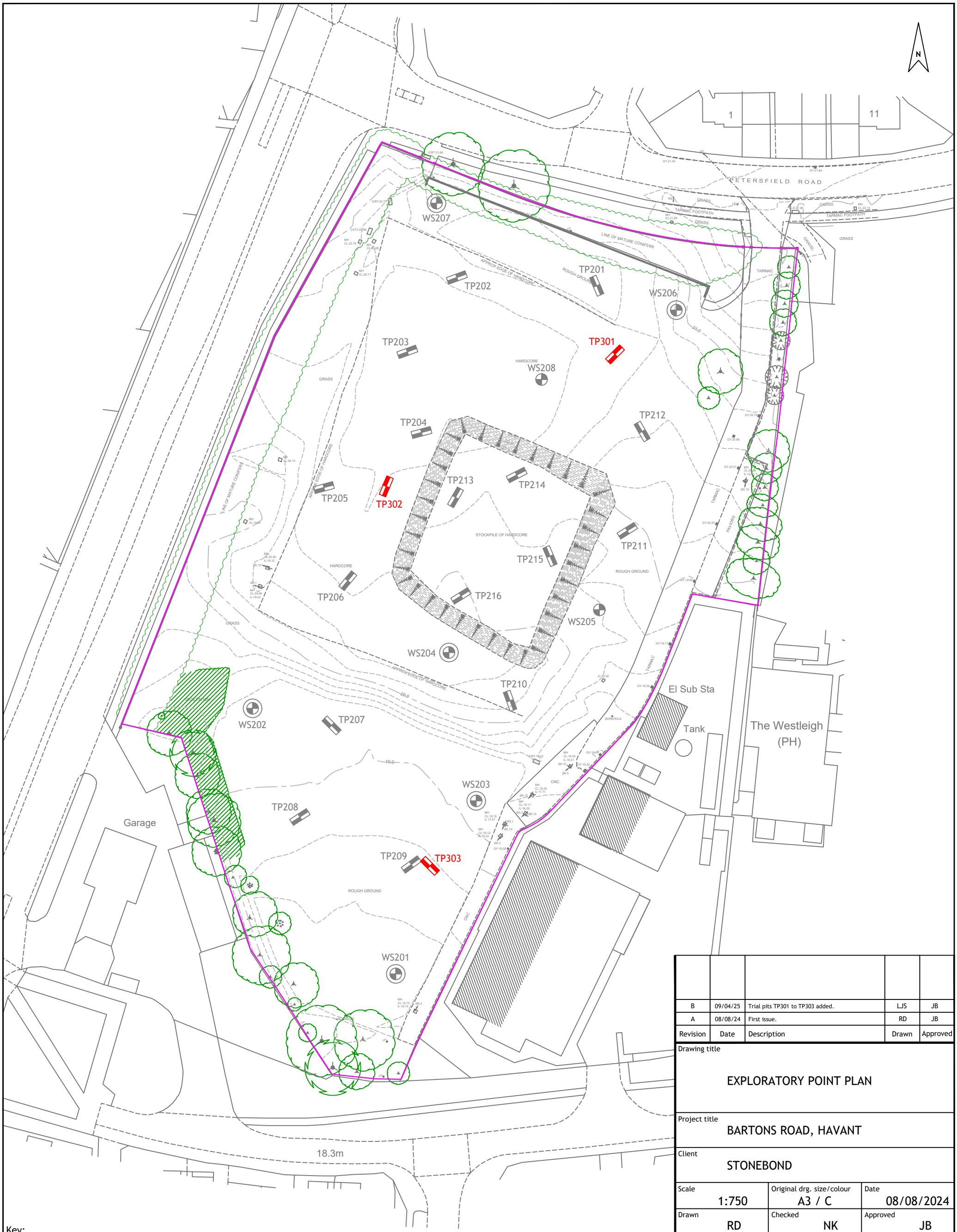
Project Title:	Bartons Road, Havant
Client:	Stonebond
BRD Reference:	BRD4469-OP2-A
Date Issued:	July 2024

BRD
01295 272244
info@brduk.com



Key:

- Previous BRD Windowless Sample Borehole with Monitoring Well Installed
- Previous BRD Windowless Sample Borehole with no Monitoring Well
- BRD Trial Pit (April 2025)
- Previous BRD Trial Pit
- Site Boundary (Approximate Position)

Notes:

All BRD exploratory points located using topographical GPS.

Drawing reproduced from 'Topographical Survey - Land At Petersfield Road, Havant', Land Development Services Ltd, drawing ref: LDS/15748-TP1, dated: 11/11/2019.

Revision	Date	Description	Drawn	Approved
B	09/04/25	Trial pits TP301 to TP303 added.	LJS	JB
A	08/08/24	First issue.	RD	JB

Drawing title: EXPLORATORY POINT PLAN

Project title: BARTONS ROAD, HAVANT

Client: STONEBOND

Scale	Original drg. size/colour	Date
1:750	A3 / C	08/08/2024

Drawn	Checked	Approved
RD	NK	JB

Drawing Number: BRD4469-OD1 Rev: B

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APPENDIX 2

TRIAL PIT RECORD

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469
Logged By:	L Chippington
Date Completed:	01/04/2025
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP301

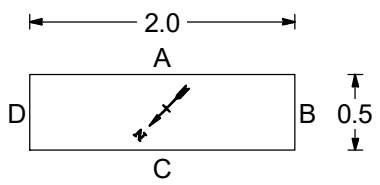
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Grey, sandy, coarse, subangular gravel of concrete.	0.20 (20.50)	MADE GROUND	
			MADE GROUND: Grey brown, sandy, coarse, subangular gravel of concrete and occasional brick, with some cobbles and boulders up to 0.75m diameter.	1 1.00 (19.70)		
1.50	D1		Medium dense, grey and brown, silty fine SAND.	1.80 (18.90)	BOGNOR SAND	
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:
20.700 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.80m bgl for soakage testing.
Roots down to 0.6m depth.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469
Logged By:	L Chippington
Date Completed:	01/04/2025
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP302

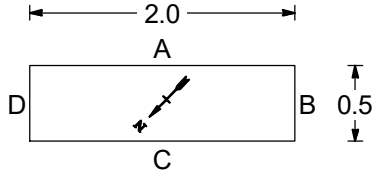
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Grey brown, sandy, coarse, subangular gravel of concrete and brick.	0.30 (20.50)	MADE GROUND	
			MADE GROUND: Brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to coarse, subrounded to subangular flint, brick and concrete. 0.80 m: Becoming clayey.	1 1.00 (19.80)		
			Firm, dark grey, slightly sandy, slightly organic CLAY.	1.30 (19.50)	ALLU	
			Medium dense grey brown, clayey, sandy, medium to coarse, subrounded to subangular GRAVEL of flint.	1.90 (18.90)	HEAD	
2.00	D1		Medium dense, grey and brown, silty fine SAND.	2 2.10 (18.70)	BSM	
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:
20.800 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 2.10m bgl for soakage testing.
No roots encountered.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469
Logged By:	L Chippington
Date Completed:	01/04/2025
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP303

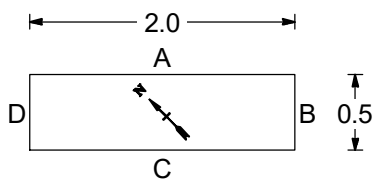
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Brown, sandy, coarse, subangular gravel of brick, concrete and flint. Includes whole bricks.	0.30 (18.50)	MG	
			Firm, grey brown, slightly gravelly, slightly sandy CLAY. Gravel is coarse, subrounded quartzite.	1 1.00 (17.80)	HEAD DEPOSITS	
			Medium dense, grey brown, sandy, very clayey, medium to coarse subrounded GRAVEL of quartzite and sandstone.			
1.80	D1		Medium dense, grey silty, fine SAND.	1.70 (17.10)	BSM	
				2 2.10 (16.70)		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:
18.800 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 2.10m bgl for soakage testing.
Roots down to 0.30m depth.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

Trial Pit Photographs

TP301

Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP8-A
Date Issued: April 2025

BRD
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Trial Pit Photographs

TP302

No Photographs of TP302

01295 272244
info@brduk.com

Trial Pit Photographs

TP303

Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP8-A
Date Issued: April 2025

BRD
01295 272244
info@brduk.com

SOIL INFILTRATION RATE

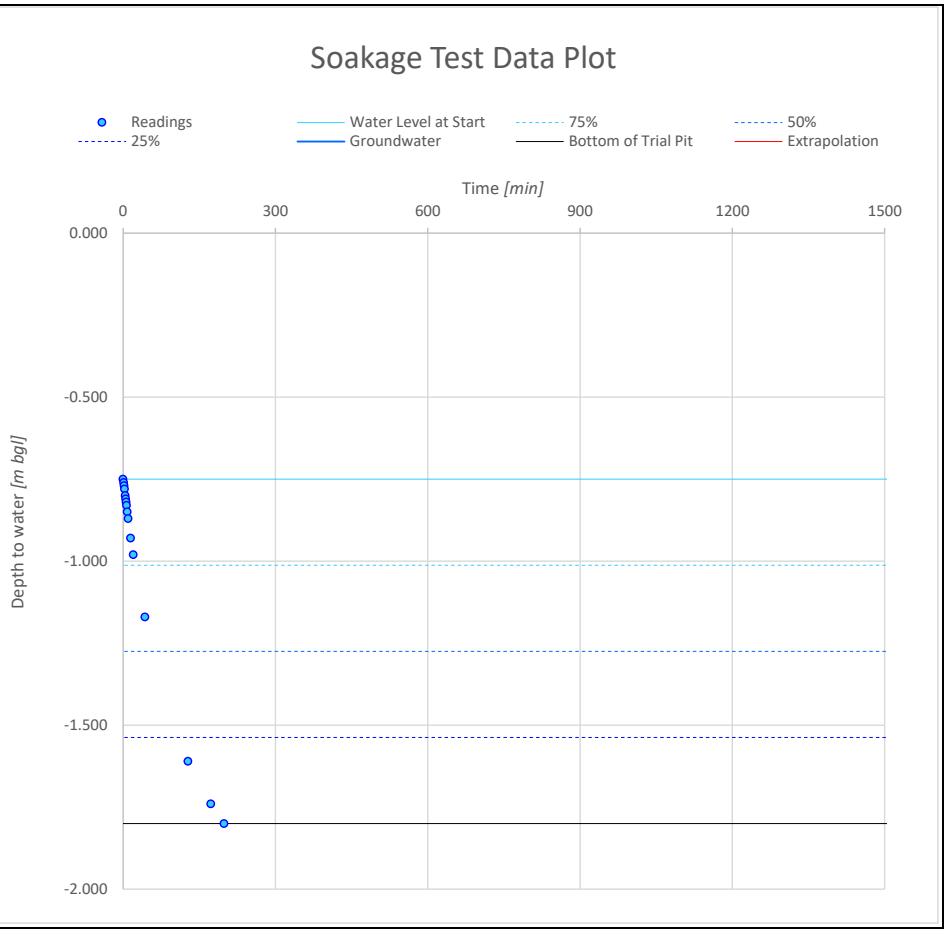
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP301	**Length *[m]* :**	2.00
Test No:	1	**Depth *[m]* :**	1.80
Date:	01/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	0.20	1.00	Sandy coarse sub-angular GRAVEL, inlcuding some cobbles and boulders (Made Ground)
		1.00	1.80	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.750
1	0.760
2	0.770
3	0.780
4	0.800
5	0.810
6	0.820
7	0.830
8	0.850
10	0.870
15	0.930
20	0.980
43	1.170
128	1.610
173	1.740
199	1.800



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.47**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**3.47**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**5.4.E+03**

Soil Infiltration Rate *[m/s]* : 2.52E-05

Remarks:

SOIL INFILTRATION RATE

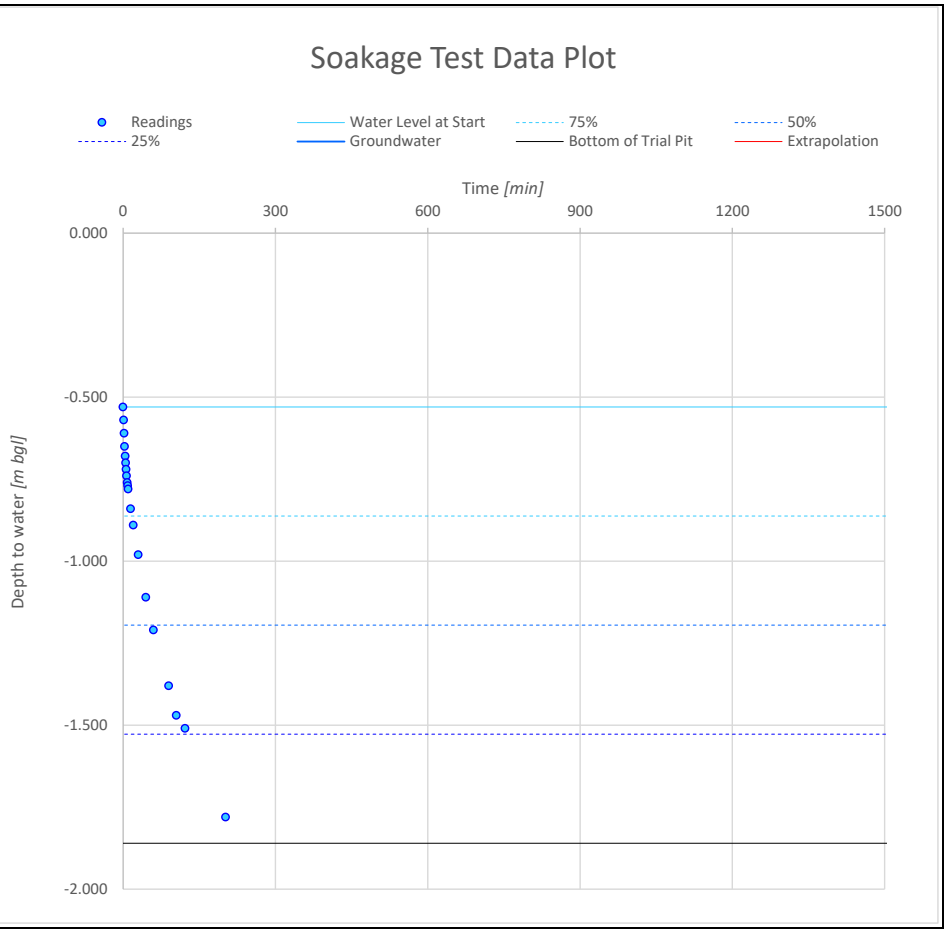
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP301	**Length *[m]* :**	2.00
Test No:	2	**Depth *[m]* :**	1.86
Date:	01/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	0.20	1.00	Sandy coarse sub-angular GRAVEL, inlcuding some cobbles and boulders (Made Ground)
		1.00	1.80	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.530
1	0.570
2	0.610
3	0.650
4	0.680
5	0.700
6	0.720
7	0.740
8	0.760
9	0.770
10	0.780
15	0.840
20	0.890
30	0.980
45	1.110
60	1.210
90	1.380
105	1.470
122	1.510
202	1.780



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.60**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**4.16**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**6.6.E+03**

Soil Infiltration Rate *[m/s]* : 2.18E-05

Remarks:

SOIL INFILTRATION RATE

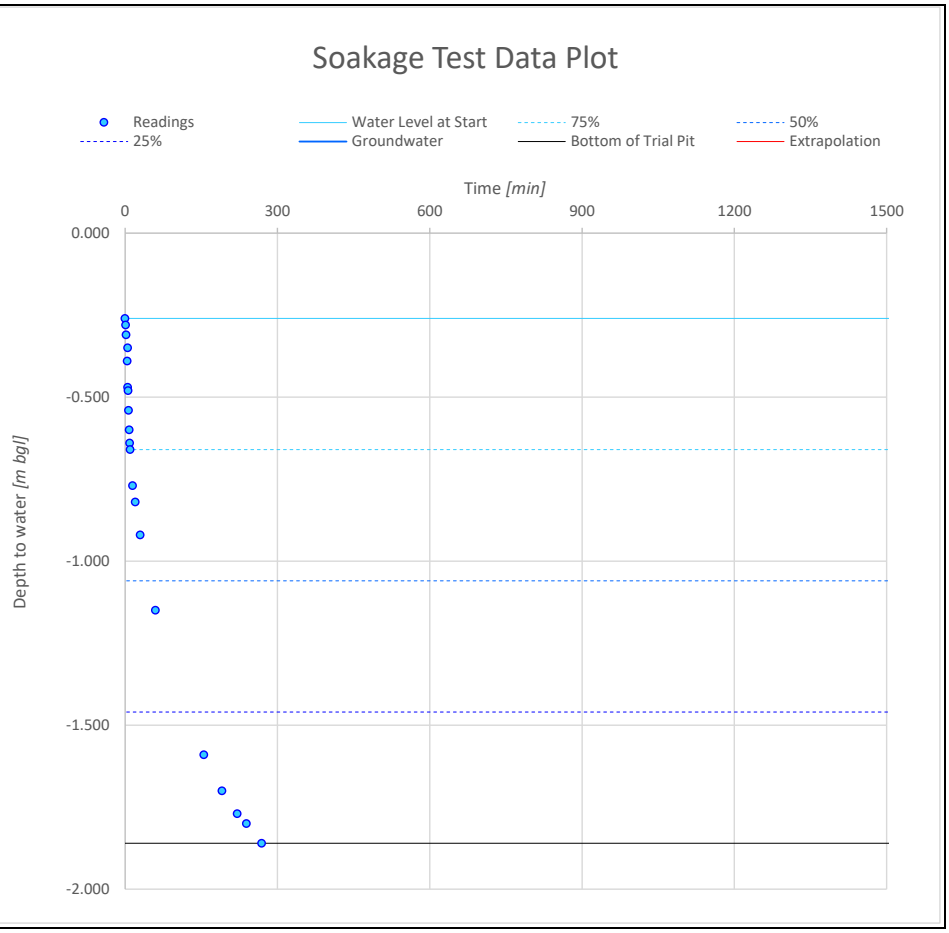
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP301	**Length *[m]* :**	2.00
Test No:	3	**Depth *[m]* :**	1.86
Date:	02/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	0.20	1.00	Sandy coarse sub-angular GRAVEL, inlcuding some cobbles and boulders (Made Ground)
		1.00	1.80	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.260
1	0.280
2	0.310
5	0.350
4	0.390
5	0.470
6	0.480
7	0.540
8	0.600
9	0.640
10	0.660
15	0.770
20	0.820
30	0.920
60	1.150
155	1.590
191	1.700
221	1.770
239	1.800
269	1.860



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.72**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**4.82**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**7.0.E+03**

Soil Infiltration Rate *[m/s]* : 2.13E-05

Remarks:

SOIL INFILTRATION RATE

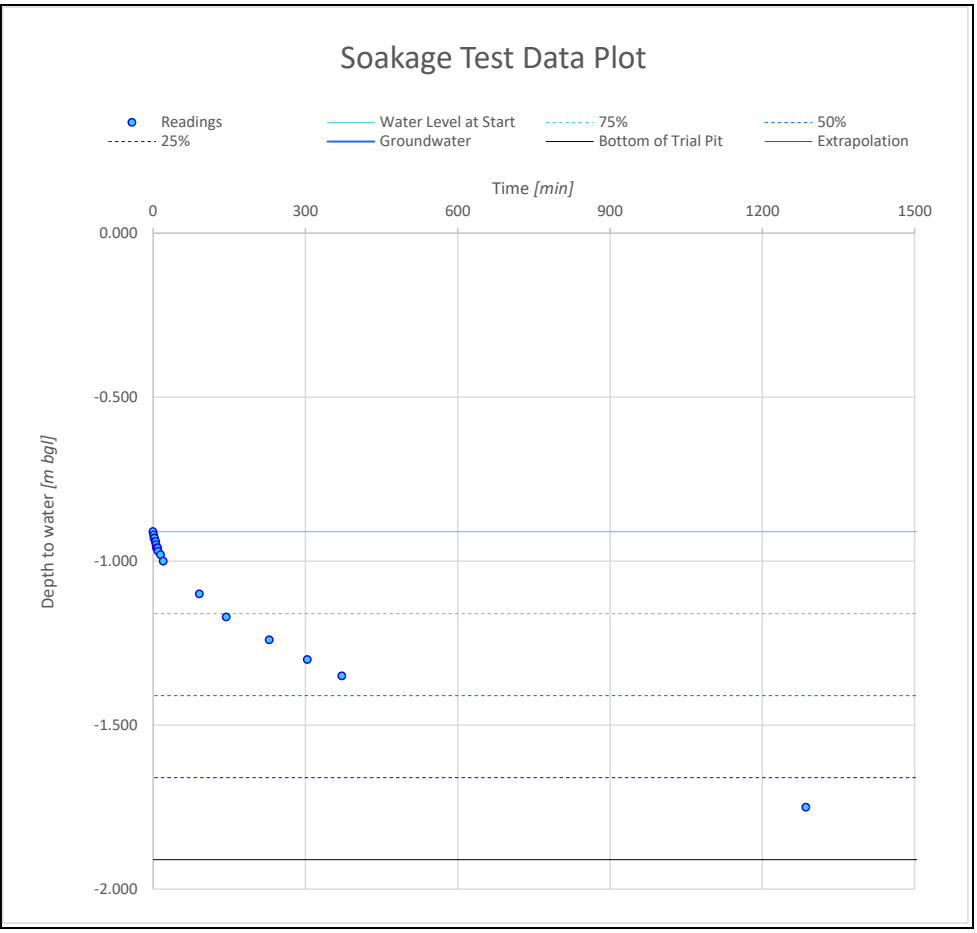
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP302	**Length *[m]* :**	2.00
Test No:	1	**Depth *[m]* :**	1.91
Date:	01 & 02/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	1.00	1.30	Slightly sandy slightly organic CLAY (Alluvium)
		1.30	1.90	Clayey sandy medium to coarse sub-rounded to sub-angular GRAVEL (Head)
		1.90	2.10	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.910
1	0.920
2	0.930
3	0.930
4	0.940
5	0.940
6	0.950
7	0.960
8	0.960
9	0.960
10	0.970
15	0.980
20	1.000
91	1.100
144	1.170
229	1.240
304	1.300
372	1.350
1286	1.750



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.45**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**3.35**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**5.7.E+04**

Soil Infiltration Rate *[m/s]* : 2.37E-06

Remarks:

SOIL INFILTRATION RATE

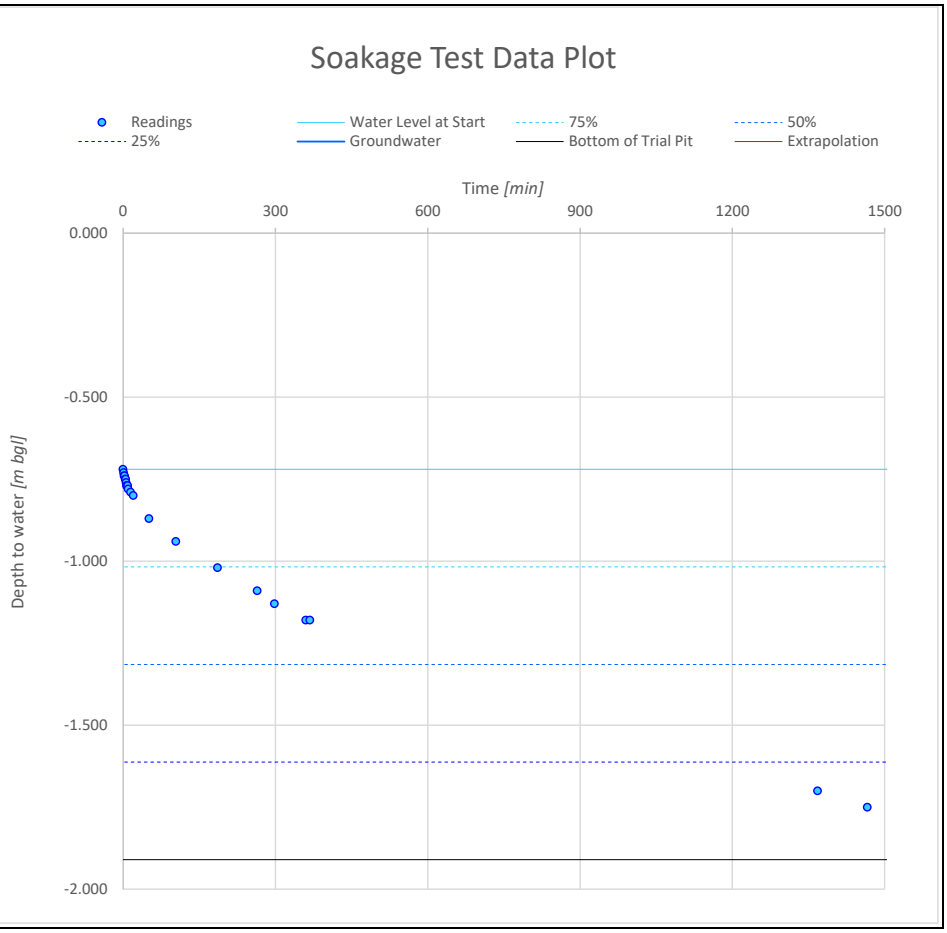
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP302	**Length *[m]* :**	2.00
Test No:	2	**Depth *[m]* :**	1.91
Date:	02 & 03/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	1.00	1.30	Slightly sandy slightly organic CLAY (Alluvium)
		1.30	1.90	Clayey sandy medium to coarse sub-rounded to sub-angular GRAVEL (Head)
		1.90	2.10	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.720
1	0.730
2	0.740
3	0.740
4	0.750
5	0.750
6	0.760
7	0.770
8	0.770
9	0.770
10	0.780
15	0.790
20	0.800
51	0.870
104	0.940
186	1.020
264	1.090
298	1.130
360	1.180
368	1.180
1368	1.700
1466	1.750
1551	1.770
1628	1.790
1678	1.810



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.54**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**3.82**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**6.1.E+04**

Soil Infiltration Rate *[m/s]* : 2.30E-06

Remarks:

SOIL INFILTRATION RATE

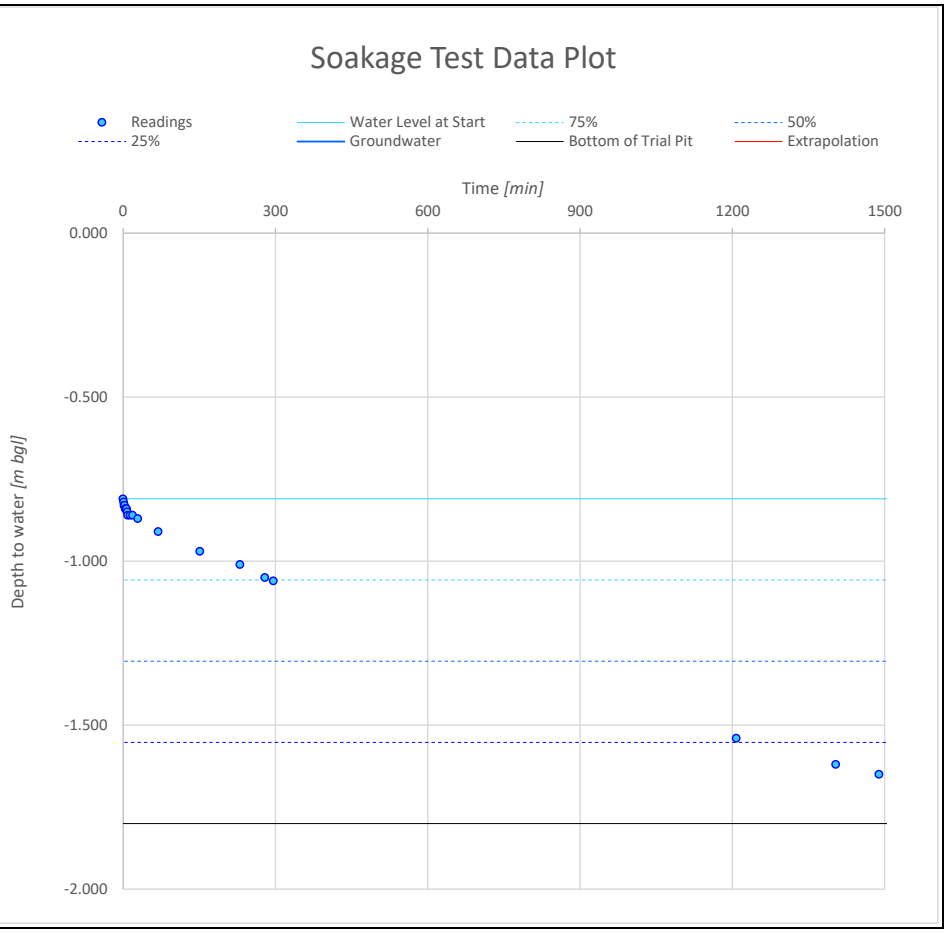
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP303	**Length *[m]* :**	2.00
Test No:	1	**Depth *[m]* :**	1.80
Date:	01 & 02/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	0.30	1.00	Slightly gravelly slightly sandy CLAY (Head Deposits)
		1.00	1.70	Sandy very clayey medium to coarse sub-rounded GRAVEL (Head Deposits)
		1.70	2.10	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.810
1	0.820
2	0.830
3	0.830
4	0.840
5	0.840
6	0.840
7	0.840
8	0.850
9	0.860
14	0.860
19	0.860
29	0.870
69	0.910
151	0.970
230	1.010
279	1.050
296	1.060
1208	1.540
1404	1.620
1489	1.650



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.45**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**3.33**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**5.7.E+04**

Soil Infiltration Rate *[m/s]* : 2.36E-06

Remarks:

SOIL INFILTRATION RATE

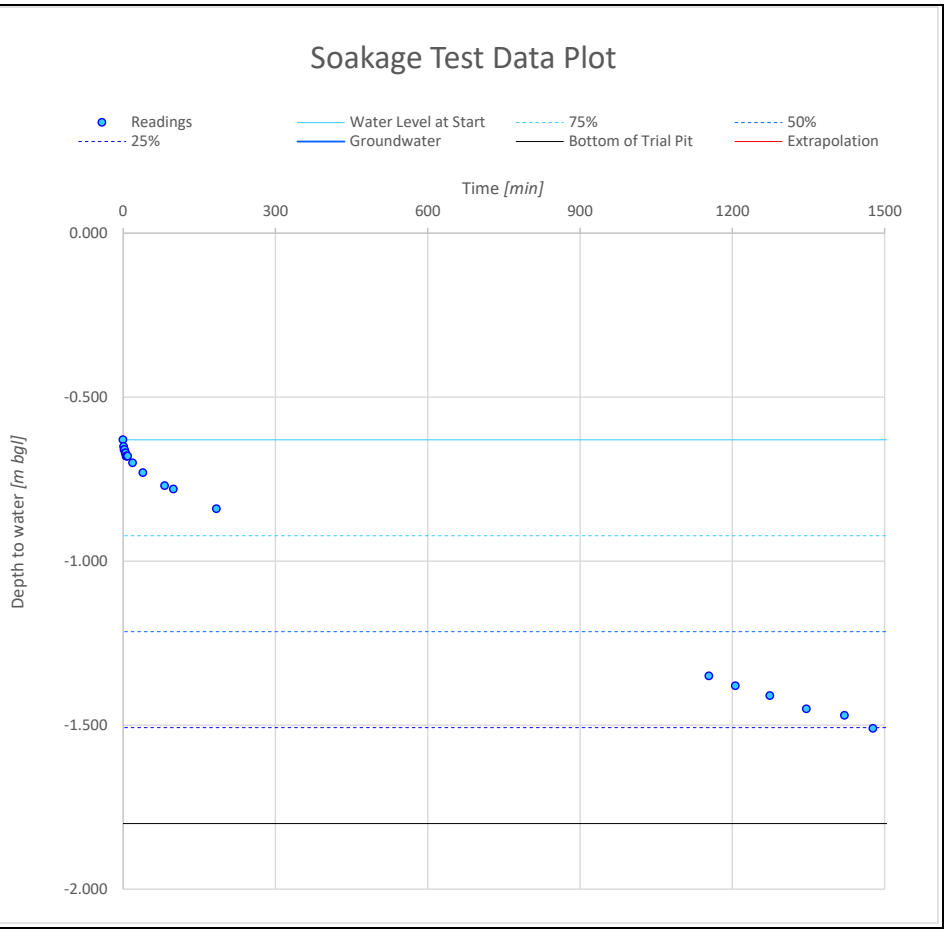
In accordance with BRE Digest 365:2016 - Soakaway Design

Client:	Stonebond
Project Title:	Bartons Road, Havant
Project No:	BRD4469

Trial Pit No:	TP303	**Length *[m]* :**	2.00
Test No:	2	**Depth *[m]* :**	1.80
Date:	02 & 03/04/2025	**Width *[m]* :**	0.45
Logged by:	SW	**Groundwater *[m bgl]* :**	Dry

		from - to *[m bgl]*		**Description**
Ground	**Conditions**	0.30	1.00	Slightly gravelly slightly sandy CLAY (Head Deposits)
		1.00	1.70	Sandy very clayey medium to coarse sub-rounded GRAVEL (Head Deposits)
		1.70	2.10	Silty fine SAND (Bognor Sand Member)

Time	**Water Depth**
[min]	***[m bgl]***
0	0.630
1	0.650
2	0.660
3	0.660
4	0.670
5	0.670
6	0.680
7	0.680
8	0.680
9	0.680
19	0.700
39	0.730
82	0.770
99	0.780
184	0.840
1154	1.350
1206	1.380
1274	1.410
1346	1.450
1421	1.470
1477	1.510



Soil Infiltration Rate [m/s]: $f = \frac{V_{p75_25}}{a_{s50} \times tp_{75-25}}$

with:

V_{p75_25}	as Effective Storage Volume of water between 75% and 25% effective storage depth ***[m³]***	**0.53**
a_{s50}	as Internal Surface Area of the soakage trial pit up to 50% storage depth including the base area ***[m²]***	**3.77**
t_{p75_25}	as Time for the water level to fall from 75% to 25% effective storage depth ***[s]***	**6.8.E+04**

Soil Infiltration Rate *[m/s]* : 2.06E-06

Remarks: