# 4 Fieldwork



## 4.1 General

4.1.1 Fieldwork comprised the following activities, undertaken between 21st January and 8th February 2019: -

- Excavation of twenty exploratory trial pits (TP01-TP20)
- Excavation of twenty-eight exploratory boreholes formed using driven tube sampling equipment (DTS01-DTS13 and DTS15 to DTS29). DTS14 was not undertaken due to time constraints.
- Infiltration testing undertaken in 3 borehole locations (DTS06, DTS13 and DTS19)

4.1.2 A plan of the site showing existing site features and position of exploratory points is presented on Drawings 02. The position of exploratory points relative to site development preliminary proposals is presented on Drawing 03. The position of exploratory points shown on these plans is approximate only.

4.1.3 The extent of fieldwork activities and position of exploratory points were determined by Soiltechnics.

4.1.4 Exploratory points were positioned to avoid known locations of underground services, to avoid possible location of proposed foundations but were also positioned to provide a reasonable coverage of the site. Prior to commencement of exploratory excavations an electronic cable locating tool was used to scan the area of the excavation. If we received a response to this equipment then the excavation would be relocated.

4.1.5 All soils exposed in excavations were described in accordance with BS EN ISO 14688 *'Identification and Classification of soil'* and BS EN ISO 14689 *'Identification and classification of rock'.*

## 4.2 Site restrictions

4.2.1 At the time of our investigation the site was open to the public and generally accessible to mechanical excavators and the driven tube sampler borehole rig. The only exception were areas of the site with excessively steep slopes, the western area of the site (Zone 1) adjacent to the railway, which was fenced off and under construction, and the northern area of Zone 4 which formed part of the adjacent golf course. Locations were also positioned remote from potential service locations.

4.2.2 It should also be noted that in large areas of Zones 1 and 2, suspected Japanese Knotweed was present. Precautions were taken to prevent the spread of associated rhizomes by washing down equipment after each excavation and prior to moving to the next. Furthermore, suspected ACMs were encountered in soils in the landfill area of Zone 1. As such excavations were avoided where possible. However, where excavations were necessary, precautions were taken to prevent the release of possible asbestos fibres into the air, by dampening down and providing suitable welfare facilities in case of exposure.

## 4.3 Exploratory trial pits

4.3.1 Trial pits TP01 to TP20 were excavated to a maximum depth of 4.3m using a 360° tracked or rubber tyred excavator. The excavations were backfilled with excavated material compacted using the back of the excavator bucket. Whilst we attempted to reinstate the excavation to its original condition the soils could not be fully compacted into the trial pit and thus the soils were left proud of the ground surrounding the pit to allow for short-term settlement of the backfill. A Geotechnical Engineer supervised the excavations.

4.3.2 Sampling and logging was carried out as trial pit excavations proceeded but were not entered at depths exceeding 1.2m, or where trial pit sides were deemed unstable. The density of granular soils encountered in excavations was gauged by the ease of excavation.

4.3.3 Soil samples for subsequent laboratory determination of concentration of chemical contaminants were taken from the sides of trial pits using clean stainless-steel equipment and stored in new plastic containers, which were labelled and sealed. Samples from below access depth into trial pits were taken as a sub sample from soil contained in the excavator bucket, discarding any soil, which may have been in contact with the bucket. If as a consequence of visual or olfactory evidence, a sample was suspected to be contaminated by organic material, the sample was stored in an amber glass jar with a PTFE sealing washer.

4.3.4 Soil samples for subsequent laboratory 'classification' testing were taken from the side of trial pits or from bulk samples taken from the excavator bucket. The sample was immediately placed in a plastic bag and subsequently sealed and labelled. Samples for determination of water content were placed in sealable tubs and appropriately labelled. Soil samples were obtained to meet Category A and quality class 3 to 5 as described in BS EN I997-2:2007 (table 3.1) sufficient for laboratory testing being considered. Sample sizes were also appropriate for the laboratory test being considered (refer BS EN I997-2:2007 Annex L).

4.3.5 A pocket penetrometer was used in the cohesive (fine grained) soils encountered. This tool is deemed to measure the apparent ultimate bearing capacity of the soil under test. The pocket penetrometer is calibrated in $kg/cm^2$. The reading can be approximately converted to equivalent undrained shear strength by multiplying the results by a factor of 50. Tests were carried out in the sides of trial pits when access can be safety achieved otherwise testing was carried out on excavated intact clods. Details of pocket penetrometer determinations are tabulated in Appendix C2. An average of measurements taken at a specific depth are recorded on trial pit records. The pocket penetrometer is not covered by British Standards.

4.3.6 A summary of pocket penetrometer results obtained from the cohesive soils encountered in exploratory excavations are presented in graphical format on Drawings 06a to 06f.

4.3.7 Trial pit records are presented in Appendix D.

## 4.4 Boreholes formed using driven tube sampling techniques

4.4.1 Boreholes DTS01 to DTS29 were formed using driven tube sampling equipment to a maximum depth of 5.0m. Driven tube sampling comprises driving 1m long steel sample tubes which are screw coupled together or coupled to extension rods and fitted with a screw on cutting edge. The sample tubes are of various diameters, generally commencing with 100mm and reducing, with depth, to 50mm and include a disposable plastic liner which is changed between sampling locations in order to limit the risk of cross contamination. On completion of excavation the liner containing the sample is cut open and the soil sample logged by a geo-environmental engineer. The sample tubes are considered thick walled with reference to BS EN ISO 22475-1:2006 clause 3.3.11.

4.4.2 Samples for determination concentration of chemical contaminants are taken from samples obtained in the disposable tubes as sub-samples using stainless steel sampling equipment.

4.4.3 Soil samples for subsequent laboratory 'classification' testing were taken from samples obtained in the disposable tubes. The sample was placed in a plastic bag and subsequently sealed and labelled. Samples for determination of water content were placed in sealable tubs and appropriately labelled. These samples were obtained with a view to achieve category B sampling methods to meet quality class 3 (for fine grained soils only) as described in BS EN ISO 22475-1: 2006 (table 3). Sample sizes were appropriate for the laboratory test being considered.

4.4.4 Standard Penetration Testing (SPT) was carried out at regular frequencies in the borehole. The test was carried out in accordance with BS EN ISO 22476-3:2005. Key details of the test, as required by BS EN ISO 22476-3 are recorded in Appendix C1. SPT's were carried out using a solid 60° cone in granular material, this test is reported as SPT(C) or using an open sampler in cohesive material, reported as SPT(S). Summary of standard penetration testing is recorded on borehole logs.

4.4.5 A graphical summary of standard penetration test results is presented on Drawings 07a-07f.

4.4.6 Again, a pocket penetrometer was used in cohesive soils. Details of pocket penetrometer determinations are tabulated in Appendix C2. An average of measurements taken at a specific depth are recorded on borehole records. The pocket penetrometer is not covered by British Standards.

4.4.7 A graphical summary of pocket penetrometer measurements is presented on Drawings 06a to 06f.

4.4.8 Combined gas and groundwater monitoring standpipes were installed in boreholes DTS04, DTS06, DTS13, DTS19, DTS24. The standpipes were installed following the recommendations of BS EN ISO 22475-1:2006 '*Geotechnical Investigation and Testing – Sampling methods and groundwater measurements – Part 1: Technical Principles for execution'* (figure 6) and BS8576:2013 *'Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)'* (figure 7). Details of the standpipe installation are recorded on Drawing 08.

4.4.9 Water levels in the standpipes have been measured during return visits to the site. The water level was measured using a measuring tape calibrated in 1mm intervals with an electronic end piece, which emits an alarm sound in contact with water. Water levels are measured from ground levels at the borehole position. Records of water levels are presented on Appendix K.

4.4.10 A description of measurement of landfill type gases in gas monitoring standpipes is provided in subsequent report paragraphs below.

4.4.11 Indicative soil infiltration testing was carried out in boreholes DTS06 and DTS13. The infiltration testing was carried out generally in accordance with the procedure described in Building Research Establishment (BRE) DG 365 (2016) "*Soakaway Design*". Records of test results and calculations to determine a soil infiltration rate are presented in Appendix C3. It should be noted that testing has not been carried out strictly in accordance with the BRE publication, as this does not specifically provide for calculating an infiltration rate in a borehole. We have adapted the BRE method and calculations in order to provide an indicative infiltration rate.

4.4.12 Permeability testing was carried out in borehole DTS19 following the procedures described in BS EN ISO 22282-2:2012 *'Water permeability tests in a borehole using open systems'*. Records of the test results and calculations to determine the coefficient of permeability (k) are presented in Appendix C3.

4.4.13 Records of boreholes formed using driven tube sampling techniques are presented in Appendix E.

## 4.5 Measurement of landfill type gases in gas monitoring standpipes

4.5.1 The concentrations of landfill type gases collected within gas monitoring standpipes installed in boreholes DTS04, DTS06, DTS13, DTS19, DTS24 was measured using a portable infra-red gas analyser (model GA5000, manufactured by Geotechnical Instruments). Initially the gas analyser was connected to the gas valve on the top of the standpipe to allow the flow rate to be measured. Essentially this is a measurement of gas pressure produced in the standpipe, which is compared with atmospheric pressure at the time of measurement to produce an equivalent gas 'flow' in l/hr. The equipment used is capable of measuring to an accuracy of 0.1l/hr; below this the gas analyser records zero flow. Following BS8485:2015 '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* (clause 6.3.4), we assume flows of 0.1l/hr when the gas analyser reads zero, thus producing a pessimistic gas flow rate in our assessment of ground gases.

4.5.2 Following measurement of 'flow' the gas analyser pumps gases contained in the standpipe through the analyser. Initial readings of gas concentrations are noted manually, followed by subsequent recordings at regular time periods until 'steady state' concentrations are achieved. The analyser records 'peak' and 'steady' concentrations of the following gases:

- Methane ($CH_4$)
- Carbon dioxide ($CO_2$)
- Oxygen ($O_2$)

4.5.3 The ambient atmospheric temperature and barometric pressure was also recorded at the site. To determine if the atmospheric pressure is rising or falling we interrogate the internet on a daily basis.

4.5.4 Methane in concentrations of between 5 to 15% in air is potentially explosive. The 5% methane concentration in air is defined as the Lower Explosive Limited (LEL). The gas analyser measures a percentage of the LEL. For example, 10% LEL equates to 10% of 5%, i.e. 0.5% methane concentration in air.

4.5.5 Records of gas monitoring data are presented in Appendix K.

## 4.6 Sampling strategies

### 4.6.1 Geotechnical

4.6.1.1 In general we adopted a judgemental sampling strategy in relation to geotechnical aspects of the investigation. The location and frequency of sampling was carried out in consideration of the following:

i) Topography
ii) Geology (including Made Ground)

# 6 Ground conditions encountered



## 6.1 Soils / Rocks

6.1.1 The exploratory excavations encountered the following geological formations across the site: -

- Topsoil
- Made Ground
- Weathered Bee Low Limestone Formation
- Weathered Eyam Limestone Formation
- Weathered Bowland Shale Formation

6.1.2 In addition, locally across the main development area, reworked naturally deposited soils were suspected to be present (TP09, DTS18, DTS22 and DTS26).

6.1.2 For clarity we have referred to the composition of soils within each of the Zones as described in Section 3 and presented on Drawing 04.

**6.1.3 Made Ground**

6.1.3.1 Within Zone 1 Made Ground was typically encountered as medium dense, dark brown or dark grey, very gravelly SAND or very sandy GRAVEL. Gravel consisted of coarse angular bricks, concrete, glass, plastic, metal wire, vehicle parts, shoes, paper, timber ceramic tiles, roof tiles and slag, with such deposits encountered to depths beyond 5m. The material was consistent with landfilling as recorded by Envirocheck, which appeared to be of 1950-80s origin.

6.1.3.2 Within Zone 2, the Made Ground was consistent with that encountered in Zone 1 (although not physically recorded as a landfill site), but included increased volumes of slag, brick, coal and glass, and was typically much ashier in composition. It is thought that the deposition of the waste here possibly dates from around the late 1800s to early 1900s based on evidence on newspaper clippings encountered in excavations. Made Ground in Zone 2 typically ranged to between depths of 3.0m to >5m to the east and south, with deposits ranging between 0.8m to 1.5m to the northwest of the area. This is likely to be a result of the terracing that this area of the site has been subject to historically.

6.1.3.3 Made Ground in Zone 4 to the east of the site was similar in composition to that encountered in Zone 2, particularly in the location of the former mere (DTS13 and DTS18). No significant Made Ground was encountered in Zone 3.

**6.1.4 Weathered Bee Low Limestone Formation**

6.1.4.1 Weathered Bee Low Limestone Formation was typically encountered as medium dense orangish brown slightly silty fine SAND or stiff high strength orangish brown sandy CLAY. In the majority of excavations, such deposits extended beyond depths of 5m, however, locally refused at depths of between 1.0m to 3.3m. Refusal is likely to be attributed to encountering more competent deposits of bedrock. Such deposits were only encountered in the eastern part of the site within Zone 4.

6.1.4.2 It should be noted that deposits encountered in borehole DTS18 are suspected to have been reworked, based on their density/strength and depositional characteristics.

**6.1.5 Weathered Eyam Limestone Formation**

6.1.5.1 Weathered Eyam Limestone Formation was encountered in Zone 3 and the eastern most parts of Zone 2 only, locally below Made Ground deposits. Such deposits were typically encountered as medium dense brown SAND or very sandy GRAVEL of sandstone and shale in the northern parts of Zone 3, and across the rest of the areas as firm to stiff low to medium strength sandy gravelly CLAY. Gravel consisted of fine to coarse angular mudstone and limestone. Rare limestone cobbles / boulders were encountered locally. Generally, all excavations refused between depths of 0.88m to 3.9m below surface levels. Again. refusal is likely to be attributed to encountering more competent deposits of bedrock.

**6.1.6 Bowland Shale Formation**

6.1.6.1 Bowland Shale Formation was initially encountered as a weathered material below Made Ground, present in Zone 2 and western parts of Zone 3. Deposits typically comprised of firm to stiff, low to medium strength, light brown mottled dark brown, sandy in places, CLAY. Also, such deposits were encountered as a medium dense orangish brown SAND or loose to medium dense grey GRAVEL of angular limestone, sandstone or shale.

6.1.6.2 Locally, in the areas of TP09, DTS22 and DTS26, deposits of weathered Bowland Shale Formation were suspected to have been reworked, based on their density/strength and depositional characteristics.

6.1.6.3 In one location (DTS10), Bowland Shale was encountered as bedrock comprised of very weak dark grey thickly laminated mudstone. In the majority of excavations, such deposits extended beyond depths of 4-5m, however, locally refused at depths of between 3.3m and 3.45. Excluding DTS10, refusal was likely to be attributed to encountering more competent deposits of bedrock.

### 6.1.7 Summary

6.1.7.1 The following table summarises the geology encountered.

**Table summarising soil types**

| Strata | Depth to top (m) | Depth to bottom (m) | Thickness (m) | Summary description |
|---|---|---|---|---|
| Topsoil (Zone 3, 4) | 0.0 | 0.15 – 0.5 (0.3) | 0.15 – 0.5 (0.3) | Dark brown SAND and CLAY. |
| Made Ground (Zone 1) | 0.0 | >5.45 | Strata not penetrated (>5.45) | Medium dense, dark brown or dark grey, very gravelly SAND or very sandy GRAVEL. Gravel consists of coarse angular bricks, concrete, glass, plastic, metal wire, car parts, shoes, paper, timber, ceramic tiles, roof tiles, slag. |
| Made Ground (Zones 2 & 4) | 0.0 | 0.3 ->5.45 (1.65) | 0.3 – >5.45 (1.65) | Very Loose dark brown or dark grey, very gravelly slightly clayey SAND, or very sandy gravel GRAVEL. Gravel consists of coarse angular ash, slag, coal, shale, bricks, concrete with minor, glass, plastic, metal wire, car parts, shoes, paper, timber, ceramic tiles and roof tiles. Also includes suspected reworked natural soils. |
| Weathered Bee Low Limestone Formation (Zone 4) | 0.3 – 1.6 (1.0) | Strata not penetrated | Strata not penetrated (>5.45) | Medium dense orangish brown gravelly slightly silty fine SAND or stiff high strength orangish brown sandy CLAY. |
| Weathered Eyam Limestone Formation (Zone 3) | 0.2 – 1.5 (0.4) | Strata not penetrated | Strata not penetrated (>5.45) | Firm low strength light brown mottled dark brown CLAY or medium dense orangish brown SAND or medium dense grey GRAVEL of coarse angular limestone or shale. |
| Weathered Bowland Shale Formation (Zone 2, 3) | 0.3 – 3.0 (1.43) | Strata not penetrated | Strata not penetrated (>5.45) | Medium dense brown very sandy GRAVEL or Firm, low strength sandy gravelly CLAY. Gravel consisted of fine to coarse angular mudstone and limestone. |
| Bowland Shale Formation bedrock (Zone 3) | 2.8 (DTS10 only) | Strata not penetrated | Strata not penetrated (>3.45) | Very weak dark grey thickly laminated mudstone |

**Table 6.1.7**

Figures in brackets are average values

6.1.7.2 With the exception of Made Ground, the investigation generally confirmed published geological records.

## 6.4 Groundwater

6.4.1 Groundwater inflows were observed in many of the exploratory excavations. A summary of our observations is tabulated below:

**Table summarising groundwater observations**

| Exploratory point | Date of observation | Depth (m) bgl | Observations |
|---|---|---|---|
| DTS02 | 08/02/2019 | 1.3 | Groundwater encountered at 1.9m, filling borehole to 1.3m in 10 minutes. |
| DTS03 | 08/02/2019 | 2.0 | Groundwater encountered at 2.3m, filling borehole to 2.0m in 10 minutes. |
| DTS04 | 06/02/2019 | 3.0 | Groundwater level remain constant. |
| DTS05 | 06/02/2019 | 3.0 | Groundwater level remain constant. |
| DTS10 | 06/02/2019 | 1.0 | Groundwater level remain constant. |
| DTS29 | 29/01/2019 | 3.0 | Groundwater level remain constant. |
| TP09 | 22/01/2019 | 1.3 | Groundwater seepages encountered at 1.3m and 2.0m. Not sufficient to fill the pit. |
| TP12 | 21/01/2019 | 4.2 | Seepage observed at 4.3m, filling trial pit to 4.2m in 20 minutes. |
| TP20 | 21/02/2019 | 2.3 | Groundwater seepage encountered at 2.3m. Not sufficient to fill the pit. |
| DTS04 | 18/02/2019<br>04/03/2019<br>20/03/2019<br>01/04/2019 | 3.97<br>1.3<br>Dry<br>Dry | Groundwater level measured during monitoring visit. |
| DTS06 | 18/02/2019<br>04/03/2019<br>20/03/2019<br>01/04/2019 | Dry<br>2.7<br>Dry<br>2.62 | Groundwater level measured during monitoring visit. |
| DTS13 | 18/02/2019<br>04/03/2019<br>20/03/2019<br>01/04/2019 | Dry<br>3.98<br>Dry<br>Dry | Groundwater level measured during monitoring visit. |
| DTS19 | 18/02/2019<br>04/03/2019<br>20/03/2019<br>01/04/2019 | 3.16<br>3.05<br>3.1<br>3.1 | Groundwater level measured during monitoring visit. |

**Table 6.4.1**

6.4.2 It should be noted that water levels will vary depending generally on recent weather conditions and only long-term monitoring of levels in standpipes will provide a measure of seasonal variations in groundwater levels.

## 6.5 Evidence of contamination

6.5.1 During the excavation of our exploratory points, other than the presence of Made Ground within Zones 1, 2 and 4, the only other evidence of potential contamination was related to hydrocarbon odours noted within such deposits in trial pit TP05 between depths of 1.9-3.4m.

7.13.4.3 Typically NHBC and Local Authority Building Control would expect to see the use of stiff raft foundations in such areas to resist any loss of ground support due to dissolution. It is understood that due to the severity of the surface levels within Zone 3, the construction of raft foundations is likely to be difficult to successfully achieve. A highly reinforced trench fill/strip foundation is likely to be considered acceptable by the NHBC, subject to further plot specific investigations being undertaken to confirm the competency of underlying soils.

7.13.4.4 As infiltration systems may be utilised at the site, we recommend water is not concentrated in isolated locations but evenly distributed in say level trench type soakaways to minimise the risk of promoting the formation of dissolution features. Again, such soakaways need to be positioned remote from buildings and remote from settlement sensitive features.

7.13.4.5 Water supply pipes need to be watertight and flexible to minimise risks of leaks. Heavy vibration from compaction plant shall not be used.

## 7.14 Infiltration potential

### 7.14.1 Contamination considerations

7.14.1.1 With reference to Environment Agency (EA) publication '*Groundwater protection: Policy and practice (GP3) Section G,* 2012, outside of SPZ1, the EA will support sustainable drainage systems for new discharges to ground. This is subject to an appropriate risk assessment to demonstrate that ground conditions are suitable and infiltration systems do not present an unacceptable risk of promoting mobilisation of contaminants or creating new pathways for contaminant migration.

7.14.1.2 The permeability of the near surface weathered Eyam Limestone, Bowland shale and Bee low Limestone Formation in combination with the site located over Secondary A (Bowland Shale) and principal aquifers (limestone deposits) suggests the site is sensitive to migration of contaminants. The site is not located within or close to a source protection zone. Providing that surface water is restricted from freely migrating though Made Ground deposits, the risk of infiltration systems promoting mobilisation of contaminants at the site is considered low. All discharges to groundwater are subject to compliance with the Water Framework Directive (2000/60/EC) and Groundwater Daughter Directive (2006/118/EC).

### 7.14.2 Requirements for use of infiltration systems

7.14.2.1 It is a requirement under H3 (3) of the current building regulations to discharge stormwater collected by a development to soakaways as a priority (as opposed to water courses and sewers)

### 7.14.3 Infiltration measurements

7.14.3.1 The permeability of the weathered Bee Low Limestone and weathered Eyam Limestone Formations was measured in boreholes DTS06 and DTS13 respectively, following the principles described in Building Research Establishment (BRE) Digest 365 (2016) "*Soakaway Design*". Tests were carried out between depths of 1.87m and 3.0m in DTS06 (deposits of clay) and 1.75m and 3.89m in DTS13 (deposits of clay), providing infiltration rates of 3.81 x $10^{-6}$ m/s in DTS06 and between 2.67 x $10^{-4}$ m/s and 4.72 x $10^{-5}$ m/s in DTS13. Records of testing and calculations are presented in Appendix C3.

7.14.3.2 It should be noted that testing has not been strictly carried out in accordance with the BRE publication, as the minimum size of the test hole (BRE 365 states that the trial pit should be 0.3 to 1 m wide and 1 to 3 m long and should have vertical sides trimmed square) could not be achieved in the borehole, however the test provides an indication of the likely permeability of the soils under test. Further on-site testing is recommended using machine dug trial pits to allow test procedures to conform with the requirements of BRE digest 365. We can carry out such testing on further instructions.

7.14.3.3 The indicative permeability of weathered Bowland Shale Formation deposits was measured using falling head tests carried out in borehole DTS19 (gravels) following the Hvorslev method as defined in BS EN ISO 22282-2:2012. Records of the test results and calculations to determine the soil infiltration rate is presented in Appendix C3. The testing provided an indicative permeability between 2.94 x $10^{-6}$ m/s to 3.12 x $10^{-6}$ m/s.

### 7.14.4 Design of infiltration systems

7.14.4.1 With regard to the deposits of reworked weathered Bee Low Limestone Formation (refer to Section 7.15 for further details), there is evidence of possible voiding and poor compaction within soils. Such deposits will exhibit a varying degree of permeability and potentially will be able to dispose of stormwater using infiltration systems. Such a method of stormwater disposal does have the following potential drawbacks: -

- Water freely/directly discharged into the reworked soils could cause collapse of air voids contained in these deposits, which promotes compaction of the soils around the soakaway causing depression of the general area around the soakaway as well as potentially affecting pipe runs leading to the soakaway.

- Water freely/directly discharged into soils close to cutting slopes could promote instability of such slopes. Typically, railway companies (possible adjacent land owners) restrict the use of soakaways close to their land boundaries.

7.14.4.2 Naturally deposited soils exhibit some variation in composition across the site and thus likely permeability. On this basis the use of trench type soakaways will increase the likelihood of locating more permeable soils along its length and by evenly distributing stormwater along their length minimise the risk of promoting formation of solution cavities.

7.14.4.3 Testing completed to date should be considered preliminary only and we recommend further, more intensive, on site testing is carried out targeting this part of the investigation allowing detailed design of infiltration systems to be progressed if such systems are to be adopted.

7.14.4.4 If infiltration systems are adopted as a means of stormwater disposal (including permeable pavement construction), we recommend approval for the use of soakaways is sought from the Environment Agency. It should be noted that the Groundwater Regulations 1998 require that list 1 substances (e.g. Hydrocarbons) are to be prevented from entering groundwater receptors and list 2 substances (e.g. metals) are also restricted. Typically, the Environment Agency will require details of the proposed soakaway systems, showing pollution prevention measures. They will also require geological and geo-hydrological information, (contained in this report) as well as the risks of chemical contaminants in the ground affecting water resources. It is also typical requirement that there is an 'unsaturated zone' between the base of the soakaway system and the groundwater table (saturated zone) providing attenuation capacity.

## 7.15 Pavement foundations

### 7.15.1 Criteria for design of the pavement foundation

7.15.1.1 The thickness of the pavement foundation (typically unbound granular materials- or sub-base and capping materials) is derived from a combination of the following:

- Number of passes of standard (80kN) axles from construction traffic (HGV). i.e. construction traffic loading which the foundation is required to carry.
- The location of the water table.
- Weather conditions at the time of construction.
- The strength of the subgrade, determined by measurement of the California Bearing Ratio (CBR).

7.15.1.2 For road designs meeting the requirements of the Highways Agency, then subgrade CBR will derive a foundation layer thickness relating to differing subgrade stiffness's. (refer interim advice note 73/06).

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**Key**

- TP — Approximate location of trial pit formed by machine excavation
- DTS — Approximate location of borehole formed by Driven Tube Sampling techniques
- DTS — Approximate location of borehole formed by Driven Tube Sampling techniques with standpipe installation
- Approximate site boundary
- Water course OS map
- Nestle water pipe easement
- Japanese Knotweed mitigation area
- Inaccessible at time of investigation due to rail construction site
- Access not available at time of investigation

Grassed fields
New drain from rail site exhibiting orange staining
Grassed fields
DTS01
Shrubs
DTS02
TP01
DTS03
Trees (~15m-20m in height)
Rail construction site
Mature woodland
DTS04
Grassing land
Golf course
DTS27
TP02
TP03
Heras fence line
DTS05
Dense vegetation with mature trees (10m-15m in height)
Grassing land
DTS06
TP05
DTS12
Chicken coop
DTS07
Residential housing
TP18
DTS09
Agricultural supply yard
Brick and stone retaining structure
DTS08
Grass track
Agricultural sales building
DTS10
Trees (10m in height)
Nunsfield
Nunsfield farm
TP04
Asphaltic concrete track
House
Fencing line
Dense vegetation
DTS28
DTS29
Disused ground
DTS11
Static caravan
Partially wooded plateau with signs of rail structure below ground level
TP06
Golf course
TP09
DTS16
DTS17
Wooden bridge
Grassing land
Semi mature wood
TP14
DTS15
DTS19
TP11
TP08
Fencing line
TP15
TP10
Ex-house plots
Foothpath
Dense vegetation
Allotment Gardens
Open public space
DTS13
TP17
DTS20
Allotment gardens
DTS18
Footpath
TP16
Former pub building
TP13
Graveyard
Existing shed
Demolished shed
Golf course
Residential housing
TP07
DTS21
TP19
Open public space (surfaced in grass)
Dense vegetation
Shack
Residential housing
DTS22
DTS23
Recreation Ground
TP20
Asphaltic concrete
Recreation ground (surrounded by rough grass land)
DTS24
Play area
TP12
Trees (~5m in height)
Residential housing
Trees (~15m-20m in height)
Garages
DTS25
DTS26
Residential housing
HOGSHAW

| Title | Scale | Drawing number |
|---|---|---|
| Plan showing existing site features and location of exploratory points | 1:1250 at A1 | 02 |

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environmental and geotechnical consultants

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- Access not available at time of investigation
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Nestle water pipe easement

Grassed fields
Grassed fields
Golf course
Residential housing
Agricultural supply yard
Grass track
Agricultural sales building
Nunsfield farm
House
Asphaltic concrete track
Golf course
A6 Fairfield Road
Dense vegetation
Disused ground
Semi mature wood
Railway line
Allotment gardens
Former pub building
Golf course
Open public space
*(surfaced in grass)*
Residential housing
Residential housing
Residential housing
Residential housing
Residential housing
Residential housing
Play area
Garages
HOGSHAW

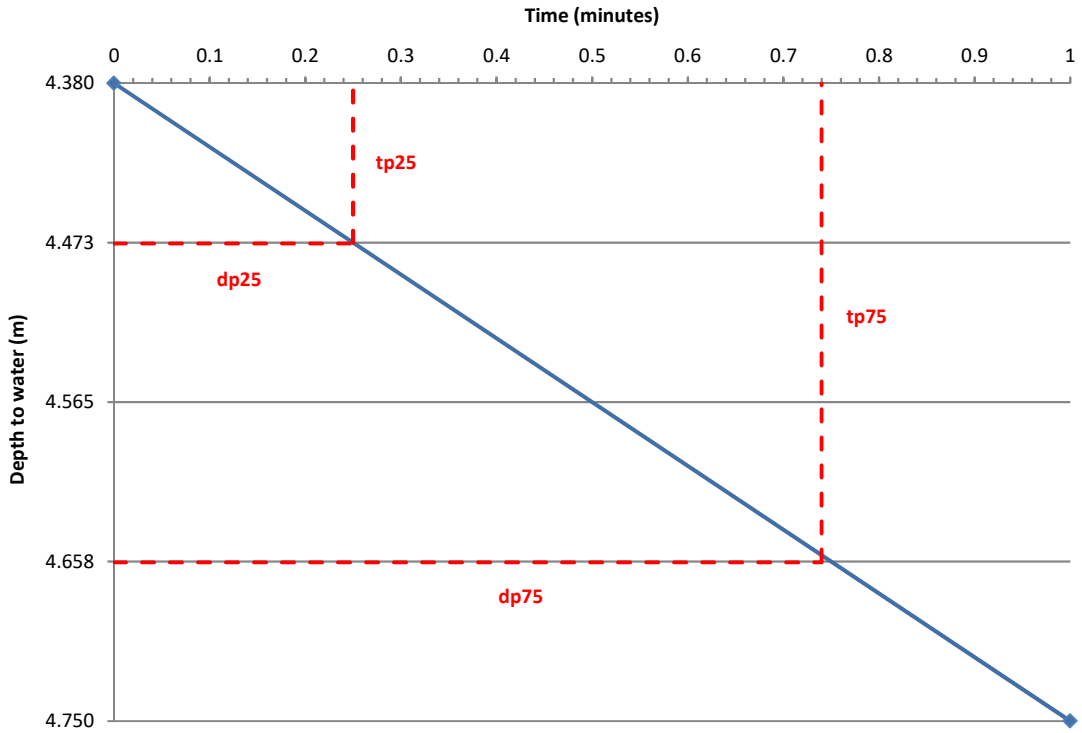
DTS01 DTS02 TP01 DTS03 DTS04 DTS27 TP02 TP03 DTS05 DTS06 TP05 DTS07 DTS12 TP18 DTS08 DTS09 DTS10 TP04 DTS29 DTS28 DTS11 TP06 TP09 DTS16 DTS17 DTS15 TP14 DTS19 TP15 TP11 TP10 TP08 DTS13 DTS18 TP17 DTS20 TP16 TP13 TP07 DTS21 TP19 DTS22 DTS23 TP20 DTS24 TP12 DTS25 DTS26

| Title | Scale | Drawing number |
|---|---|---|
| Plan showing development proposals, location of exploratory points and zonal assessment | 1:1250 at A1 | 04 |

Report Ref: ST04642M-G01
Revision: 02

August 2019

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 4.38 | | |
| 1 | 4.75 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00058m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.03973m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.49 (minutes)***

= ***29.4 (seconds)***

$f$ = **4.97E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

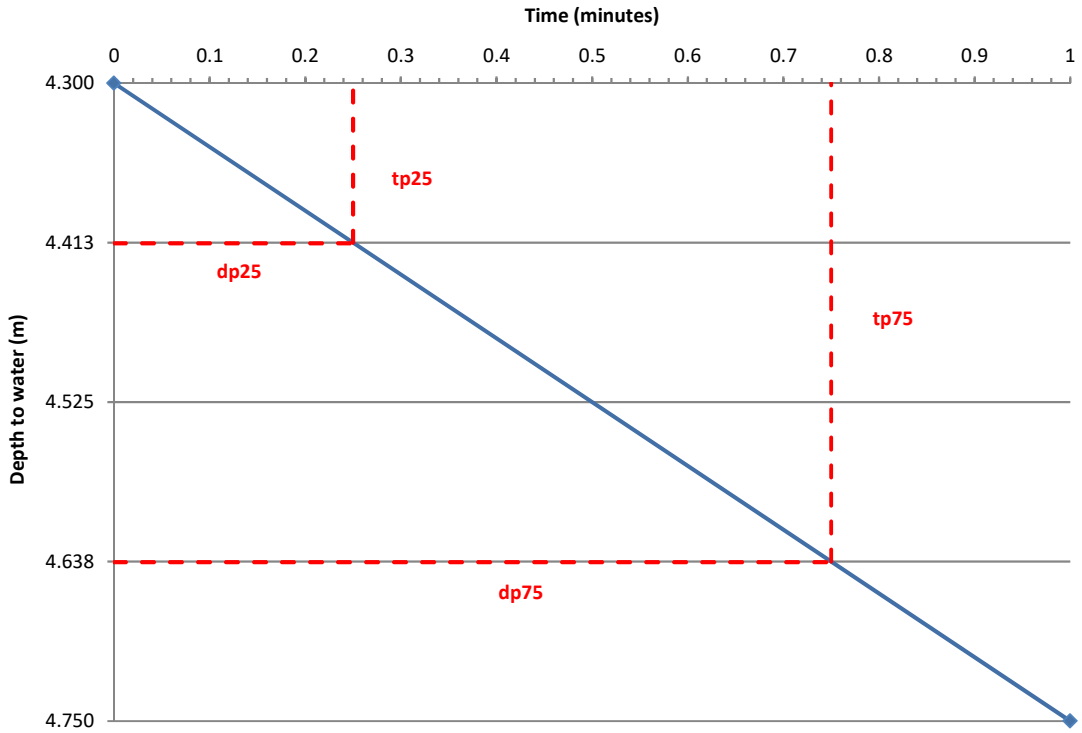
Depth of borehole at start of test (m)
4.75

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS107 | 1 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 4.3 | | |
| 1 | 4.75 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.0007m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.04765m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.5 (minutes)***

= ***30 (seconds)***

**$f$ = 4.90E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

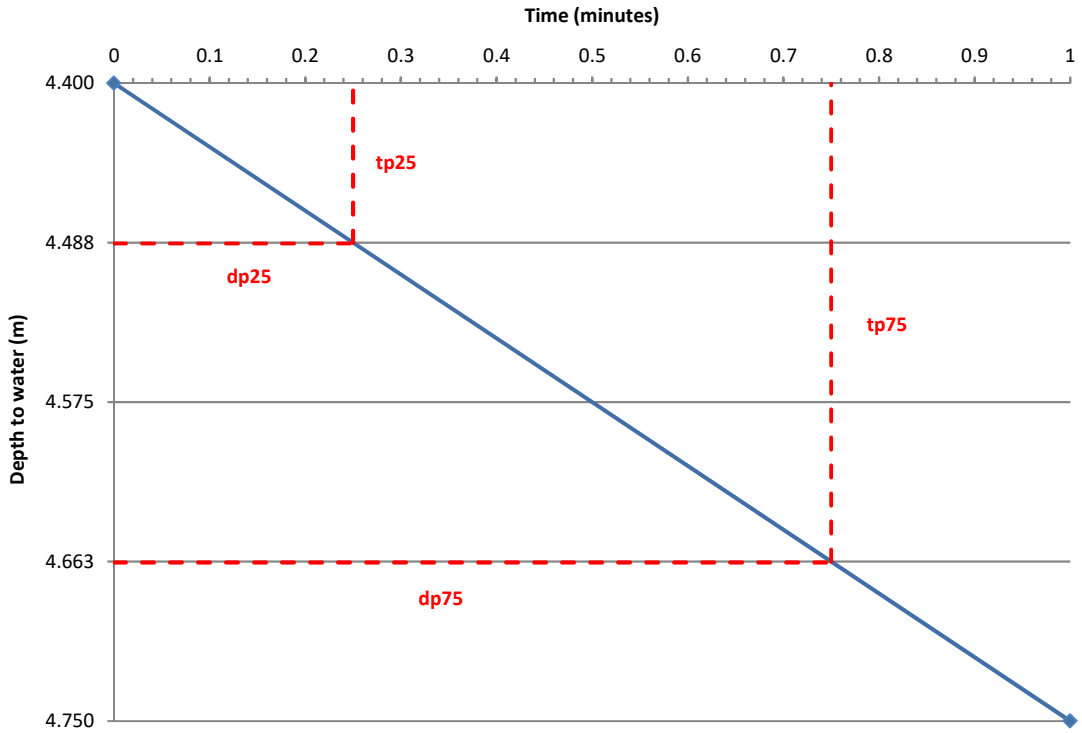
Depth of borehole at start of test (m)
4.75

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS107 | 2 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 4.4 | | |
| 1 | 4.75 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00055m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.03775m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.5 (minutes)***

= ***30 (seconds)***

***f*** **= 4.86E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

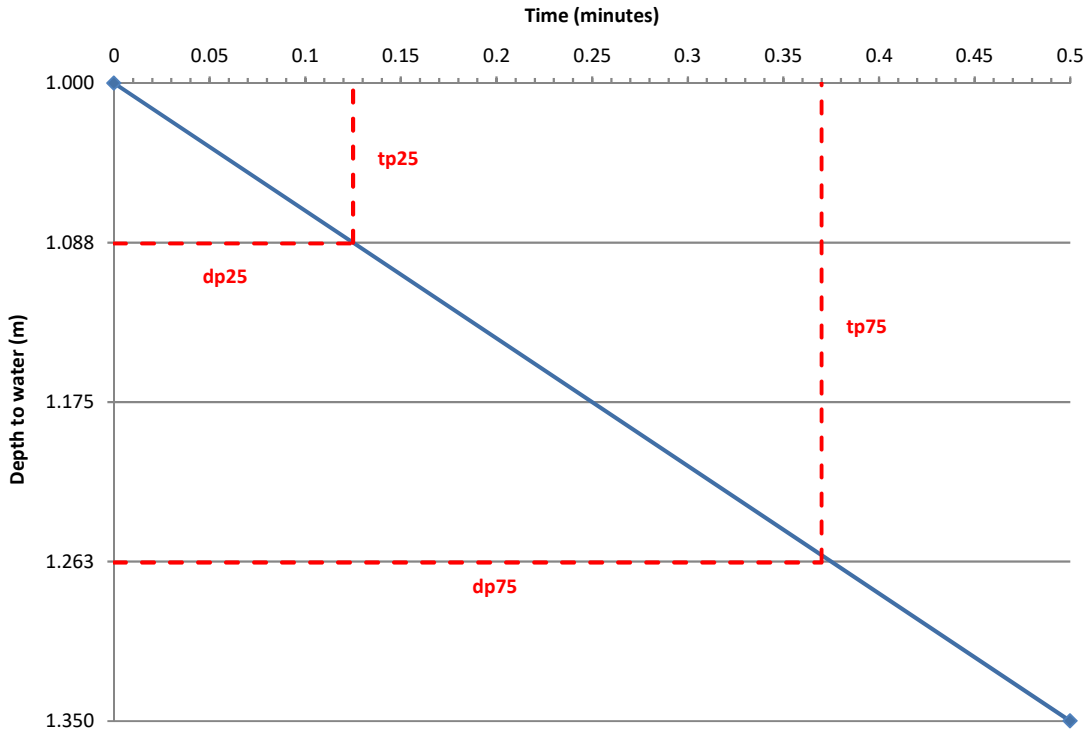
Depth of borehole at start of test (m)
4.75

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS107 | 3 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 1 | | |
| 0.5 | 1.35 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00055m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.03775m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.245 (minutes)***

= ***14.7 (seconds)***

**$f$ = 9.91E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

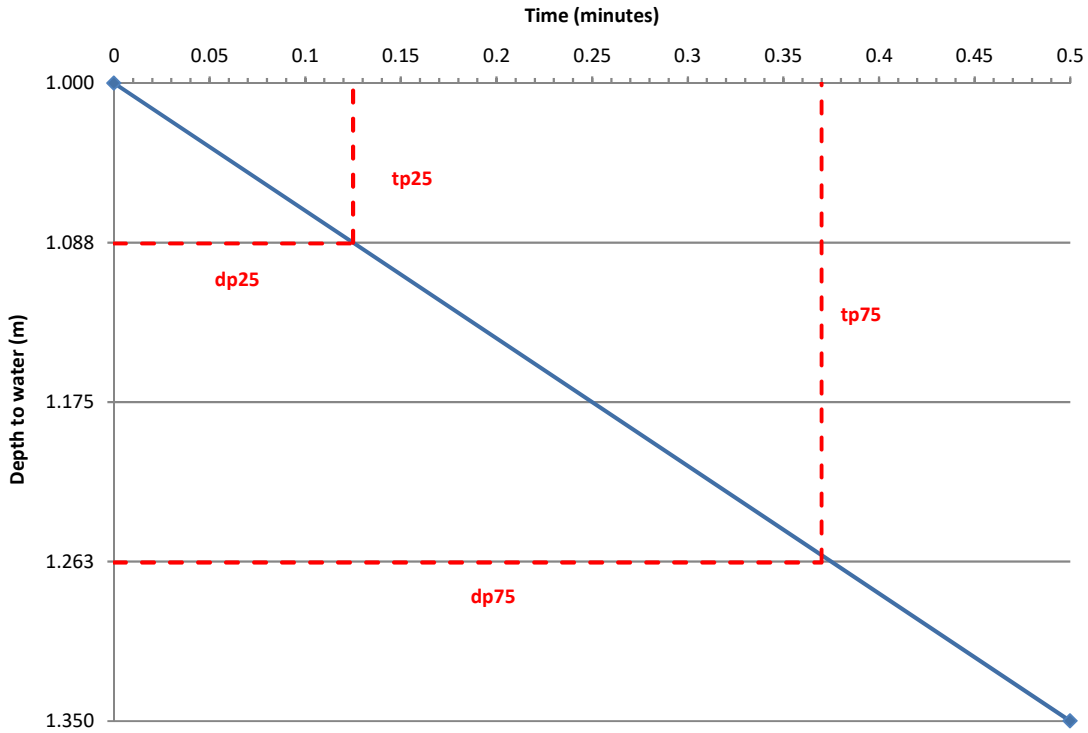
Depth of borehole at start of test (m)
1.35

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS109 | 1 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 1 | | |
| 0.5 | 1.35 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00055m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.03775m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.245 (minutes)***

= ***14.7 (seconds)***

***f*** **= 9.91E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

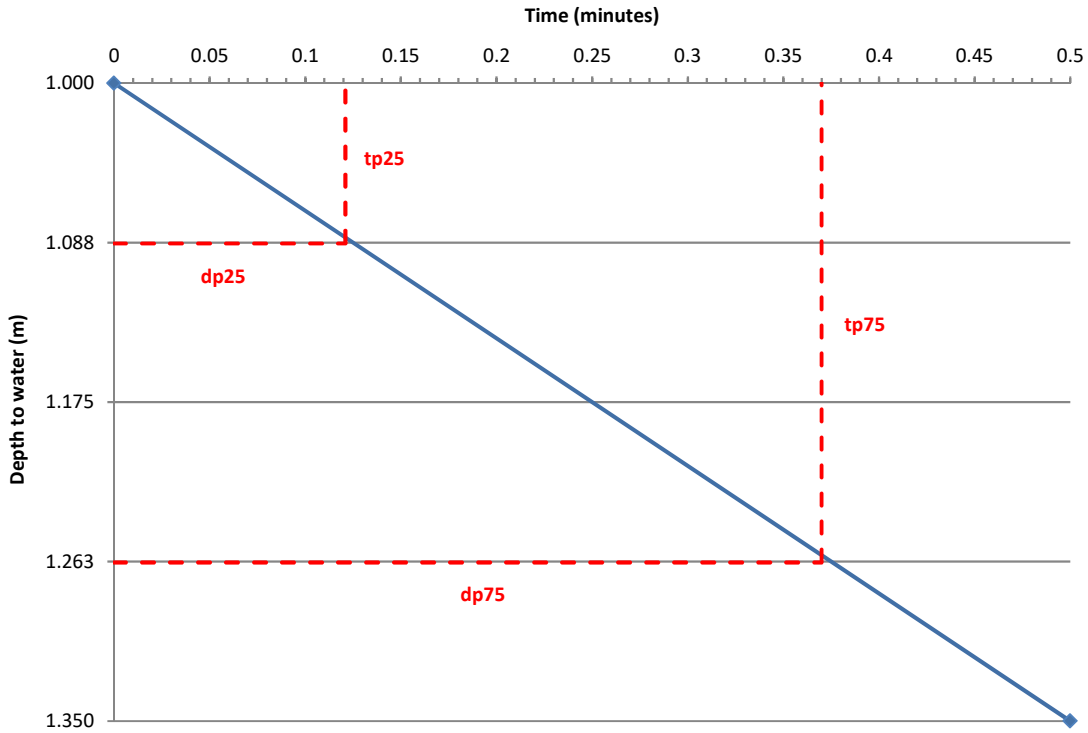
Depth of borehole at start of test (m)
1.35

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS109 | 2 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 1 | | |
| 0.5 | 1.35 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00055m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.03775m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.249 (minutes)***

= ***14.94 (seconds)***

**$f$ = 9.75E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

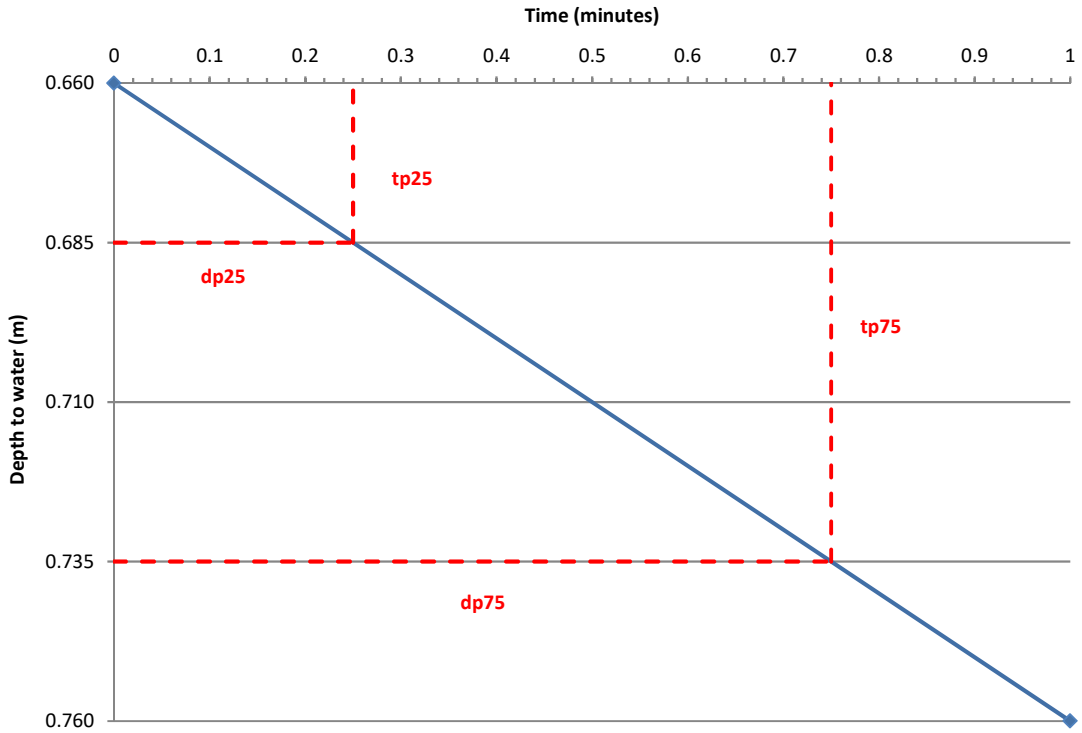
Depth of borehole at start of test (m)
1.35

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS109 | 3 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 0.66 | | |
| 1 | 0.76 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00016m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.01301m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.5 (minutes)***

= ***30 (seconds)***

***f*** **= 4.10E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

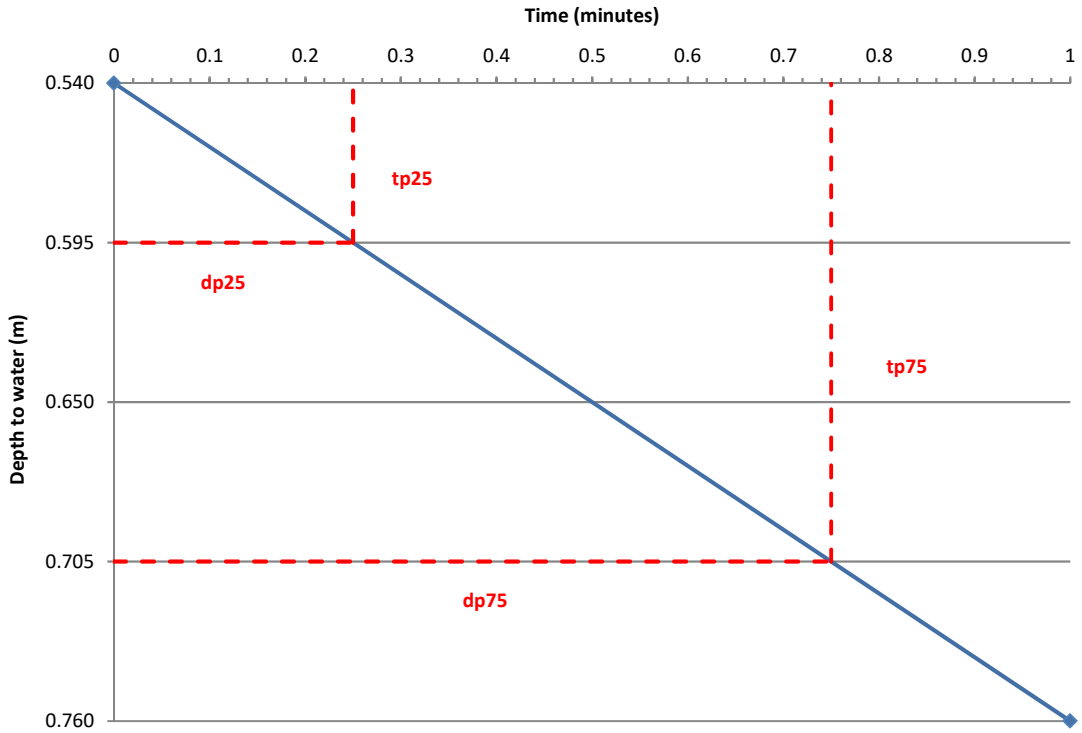
Depth of borehole at start of test (m)
0.76

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS111 | 1 | 13/03/2019 |

## Plot showing time against depth to water:




## Test observations:

| TIME (mins) | DEPTH TO WATER (m) | TIME (mins) | DEPTH TO WATER (m) |
|---|---|---|---|
| 0 | 0.54 | | |
| 1 | 0.76 | | |

## Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

$V_{p75-25}$ = *effective storage volume of water in the borehole between 75% ($d_{p75}$) and 25% ($d_{p25}$) effective depth*

= ***0.00034m³***

$a_{p50}$ = *the internal surface area of the borehole up to 50% effective depth and including the base area*

= ***0.02489m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

= ***0.5 (minutes)***

= ***30 (seconds)***

**$f$ = 4.55E-04 m/s**

Groundwater observations
No groundwater encountered.

Geology unit under test
Possible Reworked Weathered Bee Low Limestone Formation

Depth of borehole at start of test (m)
0.76

Title
Soil infiltration test (following principles of BRE Digest 365 2016)

| Diameter | Co-ordinates | Ground level |
|---|---|---|
| 0.063m | - | N/A |

| Borehole no. | Cycle number | Date of excavation |
|---|---|---|
| DTS111 | 2 | 13/03/2019 |

Proposed residential development
Nunsfield Road, Buxton

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass over dark brown SAND with frequent rootlets.<br>(TOPSOIL) | | | | | | | | | |
| | 0.20 | 309.40 | | | | | 0.20 | | D |
| Medium dense brown slightly clayey silty very sandy GRAVEL with rare cobbles. Gravel and cobbles consist of medium to coarse angular mudstone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | 0.50 | | D |
| | 0.70 | 308.90 | | | | | | | |
| Soft very low strength brown gravelly slightly sandy CLAY. Gravel consists of medium to coarse angular mudstone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | PP 0.80 | PP=17 | 0.80 | | D |
| | 1.00 | 308.60 | | | | | | | |
| Soft light grey gravelly CLAY. Gravel consists of fine to medium angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | | | |
| | 1.20 | 308.40 | | | | | 1.20 | | D |
| TRIAL PIT TERMINATED AT 1.20m | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Trial pit terminated due to obstruction. Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>1.30m x 1.50m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>24/01/2019 |
| **Level (m OD)**<br>309.60 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 1 |
| **Co-ordinates**<br>406640mE, 374562mN | **Checked by**<br>SD | **TP01** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
Nunsfield Road, Buxton

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto dark brown SAND with frequent rootlets.<br>(TOPSOIL - MADE GROUND) | | | | | | | | | |
| | 0.20 | 300.39 | | | | | 0.20 | | D |
| Medium dense brown slightly gravelly slightly silty SAND. Gravel consists of fine angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | 0.30 | | D |
| | | | | | | | 0.50 | | D |
| | | | | | | | 0.80 | | D |
| | 1.10 | 299.49 | | | | | | | |
| Stiff high strength very dark grey gravelly slightly sandy CLAY. Gravel consists of fine to medium angular mudstone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | PP 1.20 | PP=100 | 1.20 | | D |
| | | | | | PP 1.50 | PP=100 | | | |
| | | | | | | | 1.80 | | D |
| | | | | | PP 1.90 | PP=100 | | | |
| | 2.20 | 298.39 | | | | | | | |
| Dense very dark grey slightly sandy GRAVEL. Gravel consists of medium to coarse angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | 2.50 | | D |
| | 2.60 | 297.99 | | | | | | | |
| TRIAL PIT TERMINATED AT 2.60m | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>0.90m x 2.20m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>24/01/2019 |
| **Level (m OD)**<br>300.59 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 1 |
| **Co-ordinates**<br>406582mE, 374502mN | **Checked by**<br>SD | **TP02** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
Nunsfield Road, Buxton

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass over dark brown SAND with frequent rootlets.<br>(TOPSOIL) | | | | | | | | | |
| | 0.20 | 318.81 | | | | | 0.20 | | D |
| Loose brown very sandy GRAVEL. Gravel consists of medium to coarse angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | 0.50 | | D |
| | 0.70 | 318.31 | | | | | | | |
| Soft very low to low strength gravelly slightly sandy CLAY. Gravel consists of medium to coarse angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | PP 0.80 | PP=25 | 0.80 | | D |
| | | | | | | | 1.20 | | D |
| | | | | | PP 1.30 | PP=17 | | | |
| | | | | | PP 1.40 | PP=17 | | | |
| TRIAL PIT TERMINATED AT 1.70m | 1.70 | 317.31 | | | | | 1.70 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due competency of deposits (likely bedrock). Collapse of trial pit sides from 0.4m to 0.7m depth on eastern wall widening trial pit by 0.3m.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>1.20m x 2.70m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>24/01/2019 |
| **Level (m OD)**<br>319.01 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 1 |
| **Co-ordinates**<br>406722mE, 374495mN | **Checked by**<br>SD | **TP03** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
Nunsfield Road, Buxton

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto dark brown SAND with frequent rootlets.<br>(TOPSOIL) | | | | | | | | | |
| | 0.20 | 311.06 | | | | | 0.20 | | D |
| Medium dense greyish brown slightly clayey silty sandy GRAVEL with occasional cobbles. Gravel and cobbles consist of coarse angular limestone.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | 0.50 | | D |
| | 0.80 | 310.46 | | | | | 0.80 | | D |
| Very weak greyish brown LIMETSONE.<br>(WEATHERED EYAM LIMESTONE FORMATION) | | | | | | | | | |
| | 1.00 | 310.26 | | | | | | | |
| TRIAL PIT TERMINATED AT 1.00m | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>1.00m x 2.10m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>24/01/2019 |
| **Level (m OD)**<br>311.26 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 1 |
| **Co-ordinates**<br>406581mE, 374368mN | **Checked by**<br>SD | **TP04** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
Nunsfield Road, Buxton

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Rough vegetation over loose dark brown very gravelly SAND. Gravel consists of glass, brick, concrete, plastic, plastic bottles, metal, wire, car parts, shoes, paper, timber, ceramic tiles and roof tiles. Hydrocarbon odour observed between 1.9m and 3.4m depth. (MADE GROUND) | | | | | | | 0.30 | | D |
| | | | | | | | 0.50 | | D |
| | | | | | | | 0.80 | | D |
| | | | | | | | 1.20 | | D |
| | | | | | | | 1.80 | | D |
| | | | | | | | 2.50 | | D |
| CONTINUED ON NEXT SHEET | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Collapse of trial pit sides from surface to 1.9m depth on eastern wall widening trial pit by 0.25m.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 1.30m x 3.10m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 23/01/2019 |
| **Level (m OD)** 301.00 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406520mE, 374449mN | **Checked by** SD | **TP05** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Rough vegetation over loose dark brown very gravelly SAND. Gravel consists of glass, brick, concrete, plastic, plastic bottles, metal, wire, car parts, shoes, paper, timber, ceramic tiles and roof tiles. Hydrocarbon odour observed between 1.9m and 3.4m depth. (MADE GROUND) | | | | | | | | | |
| TRIAL PIT TERMINATED AT 3.40m | 3.40 | 297.60 | | | | | 3.40 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Collapse of trial pit sides from surface to 1.9m depth on eastern wall widening trial pit by 0.25m.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 1.30m x 3.10m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 23/01/2019 |
| **Level (m OD)** 301.00 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406520mE, 374449mN | **Checked by** SD | **TP05** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto dark brown very clayey SAND.<br>(TOPSOIL) | | | | | | | 0.30 | | D |
| | 0.40 | 304.29 | | | | | | | |
| Stiff high strength brown sandy slightly silty CLAY.<br>(WEATHERED BOWLAND SHALE FORMATION) | | | | | | | 0.50 | | D |
| | | | | | PP 0.60 | PP=142 | | | |
| | | | | | | | 0.80 | | D |
| | | | | | PP 0.90 | PP=126 | | | |
| | | | | | | | 1.20 | | D |
| | | | | | PP 1.50 | PP=117 | | | |
| | 1.70 | 302.99 | | | | | | | |
| Medium dense dark brown to dark grey slightly clayey slightly sandy GRAVEL. Gravel consists of fine to coarse angular mudstone.<br>(WEATHERED BOWLAND SHALE FORMATION) | | | | | | | 1.80 | | D |
| | | | | | | | 2.50 | | D |
| CONTINUED ON NEXT SHEET | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Collapse of trial pit sides from 0.0m to 1.9m depth widening trial pit by 0.25m each side.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>0.70m x 3.00m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>21/01/2019 |
| **Level (m OD)**<br>304.69 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 2 |
| **Co-ordinates**<br>406574mE, 374318mN | **Checked by**<br>SD | **TP06** |

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Medium dense dark brown to dark grey slightly clayey slightly sandy GRAVEL. Gravel consists of fine to coarse angular mudstone. (WEATHERED BOWLAND SHALE FORMATION) | | | | | | | 3.50 | | D |
| TRIAL PIT TERMINATED AT 4.00m | 4.00 | 300.69 | | | | | 4.00 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Collapse of trial pit sides from 0.0m to 1.9m depth widening trial pit by 0.25m each side.

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 0.70m x 3.00m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 21/01/2019 |
| **Level (m OD)** 304.69 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406574mE, 374318mN | **Checked by** SD | **TP06** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto brown slightly clayey SAND.<br>(TOPSOIL - MADE GROUND) | 0.20 | 323.80 | | | | | 0.20 | | D |
| Medium dense dark brown mottled orangish and reddish brown very gravelly SAND. Gravel consists of fine to coarse glass, brick, plastic, metal pipe, timber, shoes, slag, coal, clinker, tiles, car parts, wire and porcelain.<br>(MADE GROUND) | | | | | | | 0.30 | | D |
| | | | | | | | 0.50 | | D |
| | | | | | | | 0.80 | | D |
| | | | | | | | 1.20 | | D |
| Medium dense orangish brown clayey very silty very gravelly SAND. Gravel consists of fine to medium sub-angular limestone and mudstone.<br>(WEATHERED BEE LOW LIMESTONE FORMATION) | 1.60 | 322.40 | | | | | 1.80 | | D |
| *...from 2.5m depth, becoming grey.* | | | | | | | 2.60 | | D |
| CONTINUED ON NEXT SHEET | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title**<br>Trial pit record | **Dimensions (w x l)**<br>1.30m x 2.40m | |
| **Method**<br>Tracked excavator | **Logged by**<br>TO | **Date(s)**<br>24/01/2019 |
| **Level (m OD)**<br>324.00 | **Compiled by**<br>SA | **Sheet number**<br>Sheet 1 of 2 |
| **Co-ordinates**<br>406756mE, 374261mN | **Checked by**<br>SD | **TP08** |

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Medium dense orangish brown clayey very silty very gravelly SAND. Gravel consists of fine to medium sub-angular limestone and mudstone. (WEATHERED BEE LOW LIMESTONE FORMATION) | | | | | | | | | |
| | 3.20 | 320.80 | | | | | 3.20 | | D |
| Medium dense grey GRAVEL. Gravel consists of medium to coarse angular limestone. (WEATHERED BEE LOW LIMESTONE FORMATION) | 3.30 | 320.70 | | | | | | | |
| TRIAL PIT TERMINATED AT 3.30m | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 1.30m x 2.40m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 24/01/2019 |
| **Level (m OD)** 324.00 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406756mE, 374261mN | **Checked by** SD | **TP08** |

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto dark brown very clayey SAND. (TOPSOIL) | | | | | | | | | |
| | 0.30 | 308.18 | | | | | 0.30 | | D |
| Stiff high strength brown sandy slightly silty CLAY. (WEATHERED EYAM LIMESTONE FORMATION) | | | | | PP 0.40 | PP=100 | | | |
| | | | | | | | 0.50 | | D |
| | | | | | PP 0.70 | PP=104 | | | |
| | | | | | | | 0.80 | | D |
| Medium dense dark brown to dark grey clayey silty slightly sandy GRAVEL with some cobbles. Gravel and cobbles consist of fine to coarse angular limestone and mudstone. (WEATHERED EYAM LIMESTONE FORMATION) | 1.00 | 307.48 | | | | | | | |
| TRIAL PIT TERMINATED AT 1.20m | 1.20 | 307.28 | | | | | 1.20 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 1.00m x 2.10m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 23/01/2019 |
| **Level (m OD)** 308.48 | **Compiled by** SA | **Sheet number** Sheet 1 of 1 |
| **Co-ordinates** 406563mE, 374267mN | **Checked by** SD | **TP11** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| STRATA | | | | WATER STRIKES | IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|
| DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto brown slightly clayey SAND. (TOPSOIL) | | | | | | | | | |
| | 0.30 | 322.67 | | | | | 0.30 | | D |
| Medium dense orangish brown slightly clayey SAND with frequent cobbles of grey limestone. (WEATHERED BEE LOW LIMESTONE FORMATION) | | | | | | | 0.50 | | D |
| | | | | | | | 0.80 | | D |
| TRIAL PIT TERMINATED AT 1.00m | 1.00 | 321.97 | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Trial pit terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

| | | |
|---|---|---|
| **Title** Trial pit record | **Dimensions (w x l)** 1.20m x 2.30m | |
| **Method** Tracked excavator | **Logged by** TO | **Date(s)** 24/01/2019 |
| **Level (m OD)** 322.97 | **Compiled by** SA | **Sheet number** Sheet 1 of 1 |
| **Co-ordinates** 406811mE, 374196mN | **Checked by** SD | **TP13** |

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass over dark brown slightly clayey SAND. (TOPSOIL) | | | | | | | | | | | | | |
| | Medium dense brown slightly clayey SAND. (WEATHERED EYAM LIMESTONE FORMATION) | 0.30 | 301.69 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | | | 0.80 | | D |
| | | | | | | C 1.00-1.45 | (4) 11 | | | | | | | |
| | | | | | | | | | | | | 1.20 | | D |
| | | | | | | | | | | | | 1.80 | | D |
| | Medium dense brown GRAVEL. Gravel consists of medium angular sandstone. (WEATHERED EYAM LIMESTONE FORMATION) | 1.90 | 300.09 | | | C 2.00-2.45 | (3) 12 | | | | | | | |
| | Medium dense dark grey to dark brown GRAVEL. Gravel consists of angular shale. (WEATHERED EYAM LIMESTONE FORMATION) | 2.30 | 299.69 | | | | | | | | | 2.50 | | D |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

Groundwater encountered at 1.9m depth, filling borehole to 1.3m in 10 minutes.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 30 |
| 1.00 - 2.00 | 80 |
| 2.00 - 3.00 | 80 |
| 3.00 - 3.90 | 80 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 301.99 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406582mE, 374554mN | **Checked by** SD | **DTS02** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Medium dense dark grey to dark brown GRAVEL. Gravel consists of angular shale. (WEATHERED EYAM LIMESTONE FORMATION)<br>*...from 3m depth, becoming very dense.* | | | | | C 3.00-3.08 | (25 blows for 40mm penetration ) then 50 blows for 40mm penetration | | | | | 3.50 | | D |
| | BOREHOLE TERMINATED AT 3.90m | 3.90 | 298.09 | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

Groundwater encountered at 1.9m depth, filling borehole to 1.3m in 10 minutes.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 30 |
| 1.00 - 2.00 | 80 |
| 2.00 - 3.00 | 80 |
| 3.00 - 3.90 | 80 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 301.99 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406582mE, 374554mN | **Checked by** SD | **DTS02** |

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass onto dark brown slightly clayey SAND with occasional gravel of fine angular bricks. (MADE GROUND) | | | | | | | | | | | | | |
| | Stiff medium strength brown slightly sandy CLAY. (WEATHERED EYAM LIMESTONE FORMATION) | 0.30 | 320.45 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | PP 0.50 | PP=54 | 0.50 | | D |
| | Brown coarse SAND. (WEATHERED EYAM LIMESTONE FORMATION) | 0.80 | 319.95 | | | | | | | | | 0.80 | | D |
| | Stiff medium strength brown gravelly sandy CLAY. Gravel of fine to medium angular limestone and sandstone. (WEATHERED EYAM LIMESTONE FORMATION) | 1.00 | 319.75 | | | C 1.00-1.45 | (5) 14 | | | | | | | |
| | | | | | | | | | | PP 1.30 | PP=58 | 1.20 | | D |
| | | | | | | | | | | PP 1.70 | PP=63 | 1.80 | | D |
| | | | | | | C 2.00-2.21 | (16) then 50 blows for 60mm penetration | | | | | | | |
| | | | | | | | | | | PP 2.20 | PP=58 | | | |
| | BOREHOLE TERMINATED AT 2.30m | 2.30 | 318.45 | | | | | | | | | 2.30 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

Groundwater encountered at 2.3m depth, filling borehole to 2.0m in 10 minutes.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 100 |
| 1.00 - 2.00 | 100 |
| 2.00 - 2.30 | 100 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 320.75 | **Compiled by** SA | **Sheet number** Sheet 1 of 1 |
| **Co-ordinates** 406734mE, 374550mN | **Checked by** SD | **DTS03** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| WELL | STRATA DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | WATER STRIKES | SPT TESTING TYPE / DEPTH (m) | SPT TESTING RESULT | SPT TESTING CASING DEPTH (m) | SPT TESTING WATER LEVEL (m) | OTHER IN SITU TESTING TYPE / DEPTH (m) | OTHER IN SITU TESTING RESULT | SAMPLING FROM (m) | SAMPLING TO (m) | SAMPLING TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grass over dark brown slightly clayey SAND.<br>(TOPSOIL - MADE GROUND) | | | | | | | | | | | | | |
| | Stiff very high strength brown mottled grey very gravelly very sandy CLAY. Gravel consists of fine to medium angular limestone and sandstone.<br>(MADE GROUND) | 0.30 | 301.36 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | PP 0.50 | PP=192 | 0.50 | | D |
| | Very loose to loose dark grey slightly clayey GRAVEL. Gravel consists of plastic, shale, slag, coal, timber, pottery and bricks.<br>(MADE GROUND) | 0.70 | 300.96 | | | | | | | | | 0.80 | | D |
| | *...between 1m and 4m depth, 5% recovery.* | | | | | C 1.00-1.45 | (5) 2 | | | | | | | |
| | | | | | | | | | | | | 1.80 | | D |
| | | | | | | C 2.00-2.45 | (3) 3 | | | | | | | |
| | | | | | | | | | | | | 2.50 | | D |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Combined gas and water monitoring standpipe installed.

**Groundwater observations**

Groundwater encountered at 3m depth. Water level remained constant.

**Recovery details**

| Range (m) | Recovery (%) |
|---|---|
| 0.00 - 1.00 | 90 |
| 1.00 - 2.00 | 5 |
| 2.00 - 3.00 | 5 |
| 3.00 - 4.00 | 5 |
| 4.00 - 5.00 | 30 |

**Title**

Driven tube sampler record

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 06/02/2019 |
| **Level (m OD)** 301.66 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406539mE, 374528mN | **Checked by** SD | **DTS04** |

**Report ref:** STQ4642M-G01 **Revision:** 0

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Very loose to loose dark grey slightly clayey GRAVEL. Gravel consists of plastic, shale, slag, coal, timber, pottery and bricks. (MADE GROUND) | | | | ▼ | C 3.00-3.45 | (1) 5 | | | | | 3.50 | | D |
| | | | | | | C 4.00-4.45 | (5) 6 | | | | | 4.50 | | D |
| | BOREHOLE TERMINATED AT 5.00m | 5.00 | 296.66 | | | C 5.00-5.45 | (0) 5 | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Combined gas and water monitoring standpipe installed.

**Groundwater observations**

Groundwater encountered at 3m depth. Water level remained constant.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 90 |
| 1.00 - 2.00 | 5 |
| 2.00 - 3.00 | 5 |
| 3.00 - 4.00 | 5 |
| 4.00 - 5.00 | 30 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 06/02/2019 |
| **Level (m OD)** 301.66 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406539mE, 374528mN | **Checked by** SD | **DTS04** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | WATER STRIKES | SPT TESTING TYPE / DEPTH (m) | SPT TESTING RESULT | SPT TESTING CASING DEPTH (m) | SPT TESTING WATER LEVEL (m) | OTHER IN SITU TESTING TYPE / DEPTH (m) | OTHER IN SITU TESTING RESULT | SAMPLING FROM (m) | SAMPLING TO (m) | SAMPLING TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grass over dark brown slightly clayey SAND. (TOPSOIL) | | | | | | | | | | | | | |
| | Firm medium strength brown gravelly CLAY. Gravel consists of medium to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) | 0.30 | 308.79 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | PP 0.50 | PP=50 | 0.50 | | D |
| | | | | | | | | | | | | 0.80 | | D |
| | | | | | | C 1.00-1.45 | (0) 0 | | | PP 1.00 | PP=54 | | | |
| | | | | | | | | | | PP 1.20 | PP=0 | 1.20 | | D |
| | | | | | | | | | | PP 1.40 | PP=50 | | | |
| | | | | | | | | | | PP 1.80 | PP=50 | 1.80 | | D |
| | | | | | | C 2.00-2.45 | (13) 27 | | | | | | | |
| | | | | | | | | | | PP 2.20 | PP=63 | | | |
| | | | | | | | | | | | | 2.50 | | D |
| | | | | | | | | | | PP 2.70 | PP=50 | | | |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Combined gas and water monitoring standpipe installed. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

No groundwater encountered.

**Recovery details**

| Range (m) | Recovery (%) |
|---|---|
| 0.00 - 1.00 | 100 |
| 1.00 - 2.00 | 30 |
| 2.00 - 3.20 | 60 |

**Title**

Driven tube sampler record

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 309.09 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406639mE, 374479mN | **Checked by** SD | **DTS06** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Firm medium strength brown gravelly CLAY. Gravel consists of medium to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) | | | | | S 3.00-3.21 | (25) then 50 blows for 60mm penetration | | | | | | | |
| | BOREHOLE TERMINATED AT 3.20m | 3.20 | 305.89 | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Combined gas and water monitoring standpipe installed. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

No groundwater encountered.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 100 |
| 1.00 - 2.00 | 30 |
| 2.00 - 3.20 | 60 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 309.09 | **Compiled by** SA | **Sheet number** Sheet 2 of 2 |
| **Co-ordinates** 406639mE, 374479mN | **Checked by** SD | **DTS06** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass over dark brown slightly clayey SAND. (TOPSOIL) | | | | | | | | | | | | | |
| | Stiff medium strength brown gravelly CLAY. Gravel consists of medium to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) | 0.30 | 301.69 | | | | | | | PP 0.40 | PP=50 | 0.30 | | D |
| | | | | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | PP 0.60 | PP=54 | | | |
| | | | | | | C 0.80-0.88 | (25 blows for 60mm penetration ) then 50 blows for 20mm penetration | | | | | 0.80 | | D |
| | BOREHOLE TERMINATED AT 0.88m | 0.88 | 301.11 | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

**Title**
Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 0.80 | 100 |

**Method**
Driven tube sampler

**Logged by**
TO

**Date(s)**
08/02/2019

**Level (m OD)**
301.99

**Compiled by**
SA

**Sheet number**
Sheet 1 of 1

**Co-ordinates**
406569mE, 374447mN

**Checked by**
SD

**DTS07**

**Report ref:** STQ4642M-G01

**Revision:** 0

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Rough vegetation over loose dark brown to brown very clayey sandy GRAVEL. Gravel consists of fine to medium angular bricks, slag, coal, wood, glass, textile, sandstone and shale. (MADE GROUND) | | | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | | | 0.80 | | D |
| | | | | | | C 1.00-1.45 | (3) 7 | | | | | | | |
| | | | | | | | | | | | | 1.20 | | D |
| | | | | | | | | | | | | 1.80 | | D |
| | | | | | | C 2.00-2.45 | (1) 1 | | | | | | | |
| | | | | | | | | | | | | 2.50 | | D |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to obstruction.

**Groundwater observations**

No groundwater encountered.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 40 |
| 1.00 - 2.00 | 40 |
| 2.00 - 3.00 | 60 |
| 3.00 - 4.00 | 60 |
| 4.00 - 5.00 | 70 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 29/01/2019 |
| **Level (m OD)** 300.57 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406513mE, 374408mN | **Checked by** SD | **DTS08** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Rough vegetation over loose dark brown to brown very clayey sandy GRAVEL. Gravel consists of fine to medium angular bricks, slag, coal, wood, glass, textile, sandstone and shale. (MADE GROUND) | | | | | C 3.00-3.45 | (25) 36 | | | | | 3.50 | | D |
| | *...between 3m and 4m depth, becoming dense.* | | | | | C 4.00-4.45 | (4) 15 | | | | | 4.50 | | D |
| | BOREHOLE TERMINATED AT 5.00m | 5.00 | 295.57 | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to obstruction.

**Groundwater observations**

No groundwater encountered.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 40 |
| 1.00 - 2.00 | 40 |
| 2.00 - 3.00 | 60 |
| 3.00 - 4.00 | 60 |
| 4.00 - 5.00 | 70 |

**Method**: Driven tube sampler
**Logged by**: TO
**Date(s)**: 29/01/2019
**Level (m OD)**: 300.57
**Compiled by**: SA
**Sheet number**: Sheet 2 of 2
**Co-ordinates**: 406513mE, 374408mN
**Checked by**: SD

**DTS08**

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass onto firm dark brown slightly CLAY. (TOPSOIL) | | | | | | | | | | | 0.30 | | D |
| | Stiff dark grey CLAY. (WEATHERED EYAM LIMESTONE FORMATION) | 0.50 | 313.33 | | | S 0.50-0.52 | (25 blows for 20mm penetration ) | | | | | 0.50 | | D |
| | BOREHOLE TERMINATED AT 0.60m | 0.60 | 313.23 | | | | | | | | | 0.60 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

**Title**
Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 0.60 | 100 |

**Method**
Driven tube sampler

**Logged by**
TO

**Date(s)**
08/02/2019

**Level (m OD)**
313.83

**Compiled by**
SA

**Sheet number**
Sheet 1 of 1

**Co-ordinates**
406629mE, 374422mN

**Checked by**
SD

**DTS09**

**Report ref:** STQ4642M-G01

**Revision:** 0

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| WELL | STRATA DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | WATER STRIKES | SPT TESTING TYPE / DEPTH (m) | SPT TESTING RESULT | SPT TESTING CASING DEPTH (m) | SPT TESTING WATER LEVEL (m) | OTHER IN SITU TESTING TYPE / DEPTH (m) | OTHER IN SITU TESTING RESULT | SAMPLING FROM (m) | SAMPLING TO (m) | SAMPLING TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vegetation over dark brown very clayey SAND. (TOPSOIL) | | | | | | | | | | | | | |
| | Stiff medium strength brown very sandy CLAY. (WEATHERED BOWLAND SHALE FORMATION) | 0.30 | 301.18 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | PP 0.50 | PP=71 | 0.50 | | D |
| | Medium dense dark grey GRAVEL. Gravel consists of fine angular mudstone. (WEATHERED BOWLAND SHALE FORMATION) | 0.80 | 300.68 | | | | | | | | | 0.80 | | D |
| | | | | | | C 1.00-1.45 | (6) 17 | | | | | | | |
| | | | | | | | | | | | | 1.20 | | D |
| | | | | | | | | | | | | 1.80 | | D |
| | *...below 2m depth, becoming dense.* | | | | | C 2.00-2.45 | (11) 33 | | | | | | | |
| | | | | | | | | | | | | 2.50 | | D |
| | Very weak dark grey thickly laminated MUDSTONE. | 2.80 | 298.68 | | | | | | | | | | | |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

Groundwater encountered at 1m depth. Water level remained constant.

**Recovery details**

| Range (m) | Recovery (%) |
|---|---|
| 0.00 - 1.00 | 100 |
| 1.00 - 2.00 | 80 |
| 2.00 - 3.00 | 100 |

**Title**

Driven tube sampler record

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 06/02/2019 |
| **Level (m OD)** 301.48 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406524mE, 374385mN | **Checked by** SD | **DTS10** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
Nunsfield Road, Buxton

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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Very weak dark grey thickly laminated MUDSTONE. (WEATHERED BOWLAND SHALE FORMATION) | 3.00 | 298.48 | | | C 3.00-3.45 | (15) 40 | | | | | 3.00 | | D |
| | BOREHOLE TERMINATED AT 3.00m | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

Groundwater encountered at 1m depth. Water level remained constant.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 100 |
| 1.00 - 2.00 | 80 |
| 2.00 - 3.00 | 100 |

**Method**
Driven tube sampler

**Logged by**
TO

**Date(s)**
06/02/2019

**Level (m OD)**
301.48

**Compiled by**
SA

**Sheet number**
Sheet 2 of 2

**Co-ordinates**
406524mE, 374385mN

**Checked by**
SD

**DTS10**

**Report ref:** STQ4642M-G01

**Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass over dark brown slightly sandy CLAY. (TOPSOIL) | | | | | | | | | | | 0.30 | | D |
| | Stiff medium strength brown to grey very gravelly slightly sandy CLAY. Gravel consists of fine to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) | 0.50 | 316.51 | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | PP 0.80 | PP=58 | 0.80 | | D |
| | | | | | | S 1.00-1.45 | (6) 19 | | | | | | | |
| | | | | | | | | | | PP 1.20 | PP=63 | 1.20 | | D |
| | | | | | | S 1.50-1.72 | (17) then 50 blows for 75mm penetration | | | | | | | |
| | BOREHOLE TERMINATED AT 1.72m | 1.72 | 315.29 | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**
Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**
No groundwater encountered.

**Title**
Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 100 |
| 1.00 - 1.50 | 100 |

**Method**
Driven tube sampler

**Logged by**
TO

**Date(s)**
08/02/2019

**Level (m OD)**
317.01

**Compiled by**
SA

**Sheet number**
Sheet 1 of 1

**Co-ordinates**
406660mE, 374339mN

**Checked by**
SD

**DTS11**

**Report ref:** STQ4642M-G01

**Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass over dark brown slightly clayey SAND. (TOPSOIL) | | | | | | | | | | | 0.30 | | D |
| | Stiff medium strength brown gravelly slightly sandy CLAY. Gravel consists of medium to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) | 0.40 | 317.61 | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | | | 0.80 | | D |
| | | | | | | S 1.00-1.45 | (6) 19 | | | PP 1.00 | PP=50 | | | |
| | | | | | | | | | | | | 1.20 | | D |
| | | | | | | | | | | PP 1.40 | PP=54 | | | |
| | | | | | | | | | | PP 1.80 | PP=50 | 1.80 | | D |
| | Stiff brown gravelly slightly sandy CLAY. Gravel consists of medium to coarse angular limestone. (WEATHERED EYAM LIMESTONE FORMATION) *...between 1.9m and 2.2m depth, very weak light grey limestone cobble encountered.* | 1.90 | 316.11 | | | S 2.00-2.45 | (17) then 50 blows for 446mm penetration | | | | | | | |
| | BOREHOLE TERMINATED AT 2.44m | 2.45 | 315.56 | | | | | | | | | 2.40 | | D |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Borehole terminated due to competency of deposits (likely bedrock).

**Groundwater observations**

No groundwater encountered.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 90 |
| 1.00 - 2.00 | 40 |
| 2.00 - 2.40 | 60 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 08/02/2019 |
| **Level (m OD)** 318.01 | **Compiled by** SA | **Sheet number** Sheet 1 of 1 |
| **Co-ordinates** 406691mE, 374450mN | **Checked by** SD | **DTS12** |

**Report ref:** STQ4642M-G01 **Revision:** 0

Proposed residential development
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| WELL | STRATA | | | | WATER STRIKES | SPT TESTING | | | | OTHER IN SITU TESTING | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DEPTH (m) | REDUCED LVL (m OD) | LEGEND | | TYPE / DEPTH (m) | RESULT | CASING DEPTH (m) | WATER LEVEL (m) | TYPE / DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| | Grass onto dark brown clayey SAND. (TOPSOIL - MADE GROUND) | | | | | | | | | | | | | |
| | Loose dark brown mottled orangish brown clayey very gravelly SAND. Gravel consists of fine angular slag, brick, coal and glass. (MADE GROUND) | 0.30 | 322.96 | | | | | | | | | 0.30 | | D |
| | | | | | | | | | | | | 0.50 | | D |
| | | | | | | | | | | | | 0.80 | | D |
| | | | | | | C 1.00-1.45 | (3) 3 | | | | | | | |
| | | | | | | | | | | | | 1.20 | | D |
| | Stiff high strength orangish brown sandy CLAY. (WEATHERED BEE LOW LIMESTONE FORMATION) | 1.30 | 321.96 | | | | | | | | | | | |
| | | | | | | | | | | PP 1.50 | PP=100 | | | |
| | | | | | | | | | | | | 1.80 | | D |
| | | | | | | S 2.00-2.45 | (7) 16 | | | PP 2.00 | PP=104 | | | |
| | | | | | | | | | | PP 2.50 | PP=117 | 2.50 | | D |
| | CONTINUED ON NEXT SHEET | | | | | | | | | | | | | |

**Key**

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

**Notes**

Backfilled with arisings. Combined gas and water monitoring standpipe installed.

**Groundwater observations**

No groundwater encountered.

**Title**

Driven tube sampler record

| Recovery details | |
|---|---|
| Range (m) | Recovery (%) |
| 0.00 - 1.00 | 90 |
| 1.00 - 2.00 | 70 |
| 2.00 - 3.00 | 100 |
| 3.00 - 4.00 | 100 |
| 4.00 - 5.00 | 90 |

| | | |
|---|---|---|
| **Method** Driven tube sampler | **Logged by** TO | **Date(s)** 31/01/2019 |
| **Level (m OD)** 323.26 | **Compiled by** SA | **Sheet number** Sheet 1 of 2 |
| **Co-ordinates** 406827mE, 374235mN | **Checked by** SD | **DTS13** |

**Report ref:** STQ4642M-G01 **Revision:** 0