



**Report prepared at**  
12 Shaftsbury Road  
Reading  
RG30 2QP

**On behalf of**  
Elegant Homes

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**Prepared by**  
Aviron Associates Limited

## Report Quality Management

|                                  |                                            |                    |             |
|----------------------------------|--------------------------------------------|--------------------|-------------|
| <b>Project Name</b>              | 12 Shaftesbury Road, Reading, RG30 2QP     |                    |             |
| <b>Project Title</b>             | Phase II Geo-Environmental Risk Assessment |                    |             |
| <b>Client</b>                    | Elegant Homes                              |                    |             |
| <b>Project Number</b>            | 17-229.02                                  |                    |             |
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## 1.0 PROJECT AND SITE INFORMATION

### 1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Elegant Homes (the “Client”) to undertake a Ground Investigation and Phase II Geo-Environmental Risk Assessment (GERA) of the following premises:

**12 Shaftesbury Road, Reading, RG20 2QP** (hereafter referred to as the “site”).

The purpose of this Phase II GERA is to report on a ground investigation as indicated within the recommendations of Aviron’s previously issued Phase I GERA (reference 17-229.01, dated July 2017). The ground investigation and risk assessment shall further evaluate the potential for land contamination risk to human health, controlled waters and the wider environment.

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

### 1.2 THE SITE

Table 1.2 provides a summary of site details and surrounding area.

**Table 1.2 : Site Details**

|                             |                                                                                                                                                                                                                                                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site Location</b>        | The site is located on Shaftesbury Road within a predominantly residential area of Reading, approximately 130 metres (m) to the north-west of Reading West railway station.                                                                         |
| <b>National Grid Ref.</b>   | Centred at approximately 468992, 173849.                                                                                                                                                                                                            |
| <b>Current Land Use</b>     | The site comprises number 12 Shaftesbury Road, a single storey building most recently in use as the County School of Performing Arts, with a single storey workshop to the rear.<br><b>Figure 1</b> is presented as an existing Site Layout Plan.   |
| <b>Surrounding Land Use</b> | The site is surrounded by residential property, with a workshop to the north and shopfronts along Oxford Road further to the north-east.                                                                                                            |
| <b>Proposed Land Use</b>    | The proposed development comprises the demolition of the existing buildings and the construction of four new residential dwellings with private gardens and associated car parking.<br><b>Figure 2</b> is presented as a Proposed Development Plan. |

### 1.3 PREVIOUS REPORTS AND INITIAL SITE CONCEPTUALISATION

Prior to reviewing this report the following pertinent report, which has been prepared by Aviron, should be reviewed;

- Phase I Geo-Environmental Risk Assessment (GERA), reference 17-229.01, Dated August 2016.

Table 1.3.1 is presented as the potential sources of risk identified within the Preliminary Risk Assessment (PRA), presented within the Phase I GERA.

**Table 1.3.1 : Potential Sources**

| Source            | Description                                                       | Comments                                                                             | On/off-site |
|-------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------|
| 1. Workshop/Depot | Activities may have contaminated on-site soils. Metals, PAH, TPH. | For last 25 years or so. However, no evidence of surface staining upon hardstanding. | On          |

Table 1.3.2 is presented as the initial conceptual site model prepared as part of the PRA.

**Table 1.3.2 : Initial Conceptual Site Model (for plausible pollutant linkage pathways)**

| Source                                      | Receptor             | Pathway        | Probability | Consequence | Risk & Justification                                                                                                                                                                                                                                                               |
|---------------------------------------------|----------------------|----------------|-------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source 1<br>Potentially Contaminated Soils. | Construction workers | Direct contact | Unlikely    | Minor       | Low<br><br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing. Risk exposure only short term.                                       |
|                                             | End users            | Direct contact | Likely      | Medium      | Moderate<br><br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing.                                                                 |
|                                             | Soft landscaping     | Root uptake    | Likely      | Medium      | Moderate<br><br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing, which is also considered physically unsuitable for plant growth |

|  |                                                              |                                                                            |        |        |                                                                                                                                                                                                                |
|--|--------------------------------------------------------------|----------------------------------------------------------------------------|--------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Water supply pipes                                           | Direct contract                                                            | Likely | Medium | Moderate<br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing. |
|  | Buildings & infrastructure                                   | Direct contract                                                            | Likely | Medium | Moderate<br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing. |
|  | Groundwater<br>Secondary (A) aquifer above principal aquifer | Vertical migration through hydrogeology. Potable GW abstraction 641m north | Likely | Medium | Moderate<br>Potentially historical contaminative uses including workshop and depot. No current 'surface' evidence of contamination, however, potentially contaminated Made Ground may exist beneath surfacing. |

The Phase I GERA report recommended the completion of a ground investigation, which should:

- 📍 Assess made ground and near surface natural strata quality across the site. It is recommended at least five locations are chosen to provide suitable spatial coverage given the size of the site and the presence of proposed soft landscaping/gardens.
- 📍 Soil contaminants of concern identified below should be analysed.
- 📍 Aviron's "Suite 1" of laboratory analysis shall be applied to future site investigations which includes; arsenic, barium, cadmium, total chromium, copper, nickel, zinc, lead, mercury, selenium, water soluble boron, to cyanide, total sulphate, water soluble sulphide, speciated PAH, total phenols, pH.  
**To assess commonly encountered soil contaminants.**
- 📍 Total Petroleum Hydrocarbons (TPH CWG) including BTEX and MTBE. **To assess commonly encountered fuel/oil/lubricant soil contaminants.**
- 📍 Asbestos.

## **2.0 GROUND INVESTIGATION WORK**

### **2.1 METHOD STATEMENT AND GROUND INVESTIGATION APPROACH**

A method statement detailing how the ground investigation was to be conducted was produced in accordance with current statutory guidance, best practices and the Client's instructions.

A health and safety plan was completed before site work commenced. Ground investigation staff were briefed on the potential contaminants likely to be encountered, and the appropriate personal protective equipment (PPE) to be adopted for this type of investigation.

The ground investigation was conducted in accordance with British Standards; BS5930:2015 'Code of Practice for Ground Investigation' and BS10175:2011 'Investigation of Potentially Contaminated sites'. Laboratory testing was conducted in accordance with BS1377:1990 'Methods of test for soils for Civil Engineering Purposes'.

The investigation focused on the following objectives as set out in Section 1.3 of this report was completed as follows on 20 and 21 July 2017.

### **2.2 GROUND INVESTIGATION METHODS**

A combination of machine excavated trial pits and window sample drilling was employed in order to assess the ground conditions at the site.

An Exploratory Hole Location Plan is enclosed as **Figure 3**.

#### **2.2.1 Trial Pits**

Trial Pits TP1 and TP2 were completed using a JCB mini-tracked excavator on 20 July 2017.

Trial pits were completed to evaluate shallow soil conditions and enable soil infiltration testing within the overlying natural strata. Soil samples were also collected from arisings for geochemical laboratory tests to screen the overlying Made Ground. Environmental soil sampling and testing is discussed within section 3.0.

Soil infiltration tests were also undertaken in TP1 and TP2 on 20 July 2017 in general accordance with BRE Digest D365, 2016, Soakaway Design at depths of between 1.80m and 2.00m below ground level (bgl).

Table 2.2.1 discusses the rationale of trial pit positioning.

**Table 2.2.1 : Rationale of Trial Pit Positioning**

| Location | Rationale                                                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TP1      | In the west of the site in existing hardstanding in area proposed for rear gardens and soakaway drainage.<br><i>Infiltration test BRE D365 at 2.00m bgl.</i>       |
| TP2      | In the north-west of the site in existing hardstanding in area proposed for rear gardens and soakaway drainage.<br><i>Infiltration test BRE D365 at 1.80m bgl.</i> |

Trial pitting using a mini-digger fitted with a breaker was used to complete the works to enable inspection of in-situ soils and prove the natural strata to depths of up to 2.0m below ground level (bgl).

### 2.2.1 Window Sample Drilling

Window sample boreholes WS1 to WS4 were drilled using a Dando Terrier drilling rig on 21 July 2017 to depths of up to 4.0m below ground level (bgl).

The window sample boreholes were spatially located across the site in order to profile ground conditions for the benefit of foundation design targeting the proposed development buildings. Table 2.2.2 discusses the rationale of window sample positioning.

**Table 2.2.2 : Rationale of Window Sample Positioning**

| Location                     | Rationale                                                                                                                                        |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| WS1                          | Positioned in the east of the site for spatial coverage and around the corners of the plots.<br><i>- within existing hard surfacing.</i>         |
| WS2                          | Positioned in the centre-north of the site for spatial coverage and around the corners of the plots.<br><i>- within existing hard surfacing.</i> |
| WS3                          | Positioned in the centre-west of the site for spatial coverage and around the corners of the plots.<br><i>- within existing hard surfacing.</i>  |
| WS4 (Hand dug due to access) | Positioned in the south of the site for spatial coverage and around the corners of the plots.<br><i>- within existing informal surfacing.</i>    |

Standard Penetration Tests were undertaken at 1m intervals to 4m bgl within the boreholes in accordance with BS EN SO 22476-3 "Standard Penetration Test 2005".

Soil samples were also collected from arisings for geochemical laboratory tests to screen the overlying Made Ground and natural strata. Environmental soil sampling and testing is discussed within section 3.0. Soil samples were also collected for geotechnical laboratory tests to determine material properties of soils and further discussed within section 3.0.

It is considered the completion of six intrusive locations is suitably robust to appraise a small development site with limited garden and soft landscaping areas.

## 2.3 GROUND CONDITIONS

Exploratory Hole Logs are presented within **Appendix I**.

Detailed strata descriptions are shown on the respective exploratory logs though in general ground conditions comprise;

-  Surfacing of Concrete to depths of between 0.10m and 0.15 bgl at all locations with the exception of WS4.
-  MADE GROUND; generally comprising sandy, gravelly CLAY containing brick fragments to depths of between 0.20m and 0.50m bgl.
-  HEAD DEPOSITS; overlying natural soils comprising firm and locally soft and very soft orange, brown, sandy, gravelly CLAY to depths of between 0.80m and 2.10m bgl.
-  HEAD DEPOSITS; firm and locally soft very sandy silty CLAY to depths of between 1.60m and 3.80m bgl.
-  HEAD DEPOSITS; underlying strata comprising dense and locally very dense very sandy GRAVEL to the termination depths of WS1, WS2, WS3, TP1 and TP2 of between 1.80m and 4.00m bgl.

### 2.3.1 Field Observations

No visual or olfactory evidence, including soil staining of abnormal odours, was observed within the trial pit or window sample borehole arisings.

No significant roots or rootlets were observed.

Groundwater was not encountered.

## 3.0 LABORATORY ANALYSIS

### 3.1 SOIL GEOCHEMICAL TESTING

The following soil samples were collected on and submitted for geochemical analysis;

**Table 3.1 : Soil Geochemical Testing**

| Location   | Position                                  | Strata Sampled | Analysis Scheduled                 |
|------------|-------------------------------------------|----------------|------------------------------------|
| TP1 (0.2m) | External yard and proposed rear garden    | Made Ground    | Suite 1 + SOM + TPH CWG + Asbestos |
| TP1 (0.6m) | External yard and proposed rear garden    | Clay           | Suite 1 + TPH CWG                  |
| TP2 (0.2m) | External yard and proposed rear garden    | Made Ground    | Suite 1 + SOM + TPH CWG + Asbestos |
| WS1 (0.4m) | External yard and corner of proposed plot | Clay           | Suite 1 + SOM + TPH CWG + Asbestos |
| WS2 (0.4m) | External yard and corner of proposed plot | Made Ground    | Suite 1 + SOM + TPH CWG + Asbestos |
| WS3 (0.3m) | External yard and proposed rear garden    | Made Ground    | Suite 1 + SOM + TPH CWG + Asbestos |
| WS4 (0.4m) | Frontage to site and proposed frontage.   | Made Ground    | Suite 1 + SOM + Asbestos           |

-  Aviron's '**Suite 1**' includes the following parameters; arsenic, barium, cadmium, total chromium, copper, nickel, zinc, lead, mercury, selenium, water soluble boron, total cyanide, total sulphate, water soluble sulphate (SO<sub>4</sub>), total sulphur, speciated PAH, total phenols and pH.
-  **SOM** (Soil Organic Matter) analysis is completed to enable correct guidance value selection for TPH and PAH.
-  The **TPH CWG** (Total Petrol Hydrocarbon Criteria Working Group) suite of analysis contains aromatic and aliphatic TPH speciation, Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Methyl Tert-Butyl Ether (MTBE).
-  **Asbestos** analysis provides a screening for asbestos fibres, typically within overlying Made Ground.

The aforementioned analytical suites were chosen to provide a suitable screening in accordance with the potential contaminants identified within the Phase I GERA.

Soil samples for environmental quality analysis were sent to Chemtest Limited.

### 3.2 SOIL GEOTECHNICAL TESTING

A programme of geotechnical laboratory testing was undertaken at K4 Soils Laboratory and Chemtest Limited. Testing was completed on the fine (clay) and coarse (sand) soils encountered beneath the site.

The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of testing used are provided in table 3.2.

**Table 3.2 : Soil Geotechnical Testing**

| Test                                                                            | Standard                                   | Number of Samples               |
|---------------------------------------------------------------------------------|--------------------------------------------|---------------------------------|
| Moisture Content and Atterberg Limits                                           | BS1377:1990:Part 2:Clause 3.2, 4.3 and 5.0 | 4                               |
| Particle Size Distribution (PSD)                                                | BS1377:1990:Part 2:Clause 9                | 3                               |
| Aviron LC Suite<br>- pH, water soluble sulphate, total sulphate & total sulphur | UKAS accredited (Chemtest Limited)         | 10 (incl. 7 within the Suite 1) |

The purpose of the moisture content and Atterberg limits testing is to determine the volume change potential of fine soils (clay) and the potential for desiccation to have occurred.

Generally the objective of PSD analysis is to determine the grading of coarse soils (sand, gravel).

The purpose of the LC Suite is to enable classification of buried concrete.

### 3.3 SAMPLING PROTOCOL

All soil samples were collected from bored and excavated arisings using a trowel and following Aviron's standard protocols for soil sampling. To avoid cross contamination, the sampling equipment was cleaned using de-ionised water after each sample was retrieved.

Where water is sampled, a clean bailer is used to sample the groundwater at each location. In order to obtain a representative sample five bailer volumes of water are purged from each monitoring well prior to collecting a sample for testing.

Clean latex gloves were used each time a sample was collected, and all samples were placed into clean sterilised containers for submission to the UKAS/MCERTS accredited laboratory.

All sample containers were labelled on-site immediately prior to filling. These samples were identified by a label placed on the body of each container and the following information was recorded:

- 
-  Site name.
  -  Date collected.
  -  Unique sample number.
  -  Soil or water sample depth.

Samples for geochemical analysis were then placed into a cool box containing ice packs to maintain refrigerated conditions following collection and transport to the laboratory. Ice packs were changed every twenty-four hours where necessary to maintain cool conditions and suppression of volatiles.

## 4.0 ENVIRONMENTAL INTERPRETATIVE GUIDANCE

### 4.1 GENERIC RISK ASSESSMENT

The purpose of a generic risk assessment is to determine the suitability of the site for the proposed development or is to be used as screening criteria to determine whether a site is contaminated, as defined under Part IIA of the EPA 1990. Parameter concentrations measured in the soil through laboratory analysis have been compared with guidance values which are appropriate to the receptor under consideration.

### 4.2 GUIDANCE USED FOR ASSESSING SOIL CONTAMINATION

The 'Contaminated Land Exposure Assessment' (CLEA) Soil Guideline Values (SGVs) are used for generic assessment purposes for a limited number of chemical determinants. The SGVs have been derived using a combination of toxicological data and assumptions of the land-use (pathways), building stock and soils.

The CLEA Model (version 1.06) developed by the Environment Agency can be used to derive generic guidance values for a number of chemical determinants for which SGVs are still awaited, using published TOX reports.

For chemical determinants where there are no available SGV, Aviron have applied;

- 🌱 "The LQM/CIEH S4ULs for Human Health Risk Assessment" published December 2014. LQM acknowledgement for use of S4ULs.
- 🌱 Category 4 Screening Levels (C4SLs) published September 2014 by CL:AIRE. Specifically the C4SL is used for the assessment of lead soil contamination.

Both guides used the CLEA Model (v1.06, adopted by LQM) together with published chemical physical-chemical data and toxicological information to derive acceptable contaminant concentrations to be used as a screening tool to determine the limit where there would be minimal impact to human health.

LQM acknowledgement for use of S4ULs: ***"Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3275. All rights reserved".***

## 5.0 ASSESSMENT OF SOIL RESULTS

For the purpose of this assessment current CLEA SGVs, C4SLs and LQM S4ULs 1% SOM for residential with homegrown produce shall be applied. This is on the basis gardens shall be private.

Laboratory certificates of analysis for soil samples are presented in **Appendix II**.

### 5.1 HEAVY METALS

During this assessment all heavy metals and metalloids have recorded acceptable concentrations within the overlying Made Ground and underlying natural Clay when compared to the relevant residential end use criterion.

No further consideration of metals and metalloids soil contamination is required.

### 5.2 POLY-CYCLIC AROMATIC HYDROCARBONS

During this assessment all PAH species have been recorded at acceptable concentrations within the overlying Made Ground and underlying natural Clay when compared to the residential LQM/CIEH 1% SOM S4ULs. Furthermore the majority of PAH concentrations were below the laboratory method limit of detection (LOD).

No further consideration of PAH soil contamination is considered necessary.

### 5.3 TOTAL PETROLEUM HYDROCARBONS

During this assessment all aromatic and aliphatic TPH species have been recorded at acceptable concentrations within the overlying Made Ground and underlying natural Clay when compared to the residential LQM/CIEH 1% SOM S4ULs. Furthermore all concentrations were recorded below the laboratory method LOD.

During this assessment BTEX have been recorded at acceptable concentrations within the soil samples submitted where all concentrations have been recorded below the laboratory method LOD.

All concentrations of MTBE were recorded below the laboratory method LOD.

No evidence of hydrocarbon soil contamination was observed during the site inspection or within the arisings.

No further consideration of TPH, BTEX or MTBE soil contamination is considered necessary.

---

#### **5.4 TOTAL CYANIDE**

Total cyanide was not detected at concentrations above the laboratory method LOD of 0.5mg/kg.

No further consideration of cyanide contamination should be made.

#### **5.5 PHENOLS**

Total phenols were not detected at concentrations above the laboratory method LOD of 0.3mg/kg.

No further consideration of phenols contamination should be made.

#### **5.6 ASBESTOS**

Six soil samples were collected for asbestos identification. All samples tested did not recorded any asbestos fibres within.

## 6.0 ENVIRONMENTAL RISK SUMMARY

### 6.1 CONTAMINATION RISK FROM SOIL TO HUMAN HEALTH – CONSTRUCTION WORKERS

Concentrations of soil determinants are unlikely to present a short term exposure risk to adult construction workers, specifically from the dermal contact, ingestion and inhalation pathways. Nonetheless construction workers should ensure suitable PPE is worn which would include;

- 🧤 Gloves to prevent dermal contact with contaminated soils. It is advised that disposable latex gloves are worn beneath the outer 'work' gloves. This shall prevent skin contact with any contaminated soils which may come into contact with the 'work' gloves.
- 🧤 To prevent ingestion of contaminated soils construction workers should avoid putting hands or objects in their mouth whilst on-site.
- 🧤 To prevent ingestion of contaminated soils prior to eating or drinking construction workers should ensure their hands are properly washed, rinsed and dried. The use of latex gloves shall restrict any contaminated soils from coming into contact with the skin.
- 🧤 To prevent inhalation of contamination soils construction workers should wear dust masks on dry and windy days. On damp or wet still days the risk of dust inhalation is low.

### 6.2 CONTAMINATION RISK FROM SOIL TO HUMAN HEALTH – END USERS

No visual or olfactory evidence of soil contamination was observed during the site investigation.

The overlying unit of Made Ground beneath the concrete surfacing is 'thin' and typically appears as re-worked Clay prior to casting of the overlying Slab. No visual evidence of contamination was observed upon the slab or within the excavated arisings.

A soil sampling and geochemical testing scheme of the in-situ Made Ground and natural Clay was completed as part of this assessment which recorded concentrations of a wide variety of determinants below the relevant residential end use criteria.

As a result of this a **VERY LOW** risk is considered to human health from potential soil contaminants.

### 6.3 CONTAMINATION RISK FROM SOIL TO HUMAN HEALTH – DOMESTIC WATER SUPPLY

The geochemical laboratory results should be provided to the local water authority to ensure the correct materials are chosen for water supply pipes. Following the formal withdrawal of WRAS Guidance Note No.

9-04-03 (October 2002) The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land the UK Water Industry Research Ltd (UKWIR) report entitled "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Reference 10/WM/03/21; ISBN: 1 84057 5697) should be consulted.

Generally all services should be placed within dedicated runs backfilled with clean imported material.

No concentrations of determinants have been identified which are expected to necessitate additional protection of water supply materials. It is recommended this is confirmed by the local water authority prior to installation of new infrastructure.

#### **6.4 CONTAMINATION RISK FROM SOILS TO CONTROLLED WATERS**

Geological mapping indicated the site to be underlain by superficial geology which is listed as a secondary and secondary (a) aquifer following by solid geology listed as a principal aquifer.

Groundwater was not encountered to 4m bgl.

In consideration of the absence of soil contaminants from the investigation undertaken it is not considered that on-site soils will present a risk to controlled waters.

It is not considered the site presents a risk to controlled waters and a **VERY LOW** risk in this respect is assigned.

#### **6.5 RISK FROM GROUND GAS**

Section 3 of CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings' provides a flow chart to overview the risk potential. It is not considered there are any potential risks to the new development from hazardous ground gas within influencing distance of the site. This is due to the proximity to the site and the surrounding infrastructure between the site and any potential off-site sources. As such no further assessment in terms of ground gas risk is considered necessary.

The ground investigation recorded 'clean' soil conditions which are not considered to present a gaseous risk or conducive to gaseous migration (Clay).

A **VERY LOW** risk is assigned in this regard.

#### **6.6 CONTAMINATION RISK FROM GROUNDWATER**

It is not considered contaminated groundwater exists beneath the site based on the ground conditions, overlying Clay geology, absence of groundwater to 4m bgl and geochemical soil results.

## 6.7 CONCEPTUAL SITE MODEL

Following interpretation of the laboratory results, site dynamics and the aforementioned risk assessment a refined conceptual model has been prepared and is presented in table 6.7.

**Table 6.7 : Refined Conceptual Site Model (for plausible pollutant linkage pathways)**

| Source                                             | Receptor                                                  | Pathway                                                                    | Probability | Consequence | Risk & Justification                                                                                 |
|----------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------|-------------|-------------|------------------------------------------------------------------------------------------------------|
| <b>Source 1</b><br>Potentially Contaminated Soils. | Construction workers                                      | Direct contract                                                            | Unlikely    | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |
|                                                    | End users                                                 | Direct contract                                                            | Likely      | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |
|                                                    | Soft landscaping                                          | Root uptake                                                                | Likely      | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |
|                                                    | Water supply pipes                                        | Direct contract                                                            | Likely      | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |
|                                                    | Buildings & infrastructure                                | Direct contract                                                            | Likely      | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |
|                                                    | Groundwater Secondary (A) aquifer above principal aquifer | Vertical migration through hydrogeology. Potable GW abstraction 641m north | Likely      | Minor       | Very Low<br>Concentrations of wide range of determinants within in-situ soils tested are acceptable. |

The overall environmental risk classification for the site is **VERY LOW**.

No further assessment, other than the reporting and management of any previously un-identified contamination is considered necessary.

## **7.0 GEOTECHNICAL DESIGN**

This section provides geotechnical design in connection with the proposed development as described previously and considers the GEO Limit State: failure or excessive deformation of the ground, in accordance with EN 1997 Eurocode 7: Geotechnical Design (and the UK National Annex to Eurocode 7).

It is assumed for the purposes of this assessment that the finished floor levels of the proposed development buildings are approximately the same as the ground level at the locations of each of the exploratory holes undertaken.

The locations of any underground services or engineering works and former foundations are unknown and therefore have not been fully taken into account in the following assessment. It has been assumed that any such works will not compromise foundations and ground stability.

The assessment of the stability of any slopes or retaining structures across or adjacent the site, the requirement for additional retaining structures and the requirements for cut and fill that may be required to facilitate construction is outside the scope of this report.

Where applicable the following assessment includes an allowable bearing resistance assuming conventional construction only and no allowances have been made for interaction between existing adjacent foundations and proposed foundations.

Eurocode 7 Section 2.1 Basis for Geotechnical Design indicates that for each geotechnical design situation it shall be verified that no limit state is exceeded. Geotechnical design requirements have been established by three Geotechnical Categories, 1, 2 and 3. For the purpose of this assessment the development is Geotechnical Category 1: which includes small relatively simple structures; satisfy fundamental requirements on the basis of experience and qualitative geotechnical investigation; and with negligible risk.

It is assumed for this assessment that a characteristic action of 100kN/m run is applied vertically to strip foundations of width 1.00m constructed on firm CLAY at depths of between 1.40m and 2.50m bgl. It is assumed that the 'characteristic action' comprises a vertical permanent action. Further information regarding the permanent actions and variable actions (making up the characteristic action) applied to the foundations may be required along with confirmation of the foundation type and foundation dimensions.

### **7.1 EXCAVATION CONDITIONS**

Excavation of the materials encountered during the ground investigation should be achieved using conventional hydraulic excavation techniques.

From the ground investigation undertaken excavations in the natural fine soils (clay) are expected to remain stable in the short term. However due to very sandy strata encountered locally, and in order to facilitate construction, potentially with excavation depths of 2.50m bgl likely to be required, care should be taken to ensure that instability of excavations does not affect existing structures and services (e.g. foundations, roads, boundary walls or buildings) both on and off-site, and temporary support is expected to be required in order to achieve this.

Further advice should therefore be sought from the appointed structural engineer and specialist contractor regarding temporary works.

No groundwater was encountered during the ground investigation works of 20 and 21 July 2017 to depths of up to 4.00m bgl. Dewatering is therefore unlikely to be required in excavations above these depths.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times.

## **7.2 EXISTING SERVICES/SUBSTRUCTURES**

Due to the built up nature of the site and site environs, existing services or sub-structures should be anticipated. Where foundations or obstructions are encountered during excavations for the proposed foundations, then all new foundations should be extended downwards to fully penetrate all redundant former construction.

## **7.3 BEARING STRATA**

Low shear strength CLAY strata noted locally across the site in the upper 1.40-2.50m are not considered suitable for conventional shallow construction. The firm CLAY strata noted beneath at depths of between 1.40m bgl (WS1) and 2.50m bgl (WS3) may provide the required bearing resistance associated with the construction of the proposed development buildings on conventional shallow foundations and a bearing resistance at these depths is provided below pending confirmation of the required foundation actions, foundations widths, foundation depths and tolerable settlement.

### 7.3.1 Atterberg Limits Tests and Material Properties (Geotechnical Parameters)

Atterberg limits tests conducted on the fine soils (CLAY) between depths of 1.00m and 3.00m bgl indicate that the strata beneath the site comprise inorganic clays of low plasticity (CL), with a modified plasticity index of between 2% and 9%. For the purposes of this assessment and in accordance with NHBC Standards 2017, Chapter 4.2, Building Near Trees, the CLAY strata across the site are classified as being of negligible volume change potential (VCP), are therefore non-plastic where the modified plasticity index was determined to be <10%.

For design purposes a characteristic value of undrained shear strength ( $C_{u,k}$ ) of 50kN/m<sup>2</sup> has been determined for the firm CLAY at the anticipated foundation depth of between 1.40m and 2.50m bgl. The characteristic value of undrained shear strength was derived using the results of the empirical relationships between  $C_u$  and the SPT N-value and plasticity index after Stroud M.A. (The Standard Penetration Test in Insensitive Clays and Soft Rocks, Proceedings of the European Symposium on Penetration Testing, 2, 367-376 (1975)). A characteristic SPT N-value of 8 has been used at foundation formation level of between 1.40m and 2.50m bgl and  $f_1$  of 6.0 (plasticity index <15%).

Please note that when using this data for design purposes, the effects of eccentric loading are taken into account, and that the design action is limited to account for maximum tolerable settlement beneath the structures and adjacent properties.

Certifications of analysis of material property tests are presented within **Appendix III**.

### 7.4 TREE INFLUENCE ON FOUNDATIONS

When considering the influence of trees on foundations, the material properties of the strata beneath the site and the distance and species of the trees to the foundations are the determining factors.

For the purposes of this assessment the CLAY strata anticipated at foundation formation across the site are classified as being of negligible volume change potential, or non-plastic, and an adjustment to foundation depths due to the influence of trees is therefore not required.

## 7.5 FOUNDATION TYPE, DEPTH AND BEARING RESISTANCE

Low shear strength CLAY strata noted locally across the site in the upper 1.40-2.50m are not considered suitable for conventional shallow construction.

### 7.5.1 Trench Fill Foundations

Conventional trench fill foundations 1.00m wide may be acceptable for the proposed development buildings founding in the firm CLAY strata encountered beneath the site at depths of between 1.40m bgl (WS1) and 2.50m bgl (WS3).

Using the vertical characteristic action of 100kN/m run, and Design Approach 1 of Eurocode 7 (checking for a limit state of rupture or excessive deformation), Combination 1 and Combination 2 are both satisfied where the vertical design action ( $V_d$ ) is less than the design value of the vertical bearing resistance ( $R_d$ ) in each case. The GEO limit state requirement is therefore satisfied.

It is assumed that the footings are of width 1.0m and thickness up to 2.5m. The actions are assumed to be vertical and it is also assumed that the base of the foundation and the ground surface are horizontal. The vertical design action includes the trench fill foundation, and also accounts for overburden.

The total settlement beneath the trench fill foundations are anticipated to be approximately 25mm.

The following allowable bearing resistance in Table 7.5.1 of **100kN/m<sup>2</sup>** would apply to trench fill foundations 1.00m wide constructed on firm **CLAY** strata encountered at depths of between 1.40m bgl and 2.50m bgl, where the serviceability state is satisfied with settlement restricted to **25mm**.

**Table 7.5.1 : Allowable Bearing Resistance**

| Exploratory Hole Location | Strata Type | Depth BGL (m) | Bearing Resistance (kN/m <sup>2</sup> ) | Settlement (mm) |
|---------------------------|-------------|---------------|-----------------------------------------|-----------------|
| WS1                       | Firm CLAY   | 1.40          | 100                                     | 25              |
| WS2                       | Firm CLAY   | 1.80          | 100                                     | 25              |
| WS3                       | Firm CLAY   | 2.50          | 100                                     | 25              |
| WS4                       | Firm CLAY   | 2.50          | 100                                     | 25              |

Please note that the proposed foundations in the area of WS4 are assumed to extend to 2.50m bgl, similar to WS3, since hand excavation in the area of WS4 was limited to a maximum depth of 1.20m bgl.

Increasing foundation widths (>1.0m) to accommodate increased line actions will result in an increase in the total settlement anticipated.

Should the allowable bearing pressure be insufficient to support the proposed development buildings or the depth to competent strata at 2.50m bgl is uneconomic for conventional construction, consideration should be given to piled foundations.

Notwithstanding the above it is recommended that the formation beneath each section of the proposed re-development works is inspected to assess the competency of the bearing strata prior to pouring of foundation concrete. The formation should not be allowed to soften due to surface water or rainwater ingress prior to pouring of foundation concrete. It is assumed that groundwater will not rise above the foundation formation depth of 2.50m bgl.

It should be noted that the design actions and design layout/dimensions of the proposed works have not been supplied and the above bearing resistance accounts for conventional construction only. The moments resulting in eccentricity of loadings, and the settlement, sliding and overturning and the requirements for propping (struts) would need to be considered in the design of any retaining structures.

It should also be noted that the above recommendations have been made using data in trial pits TP1-TP2 and window sample boreholes WS1-WS4 completed.

#### **7.5.2 Piled Foundations**

Should the bearing resistance supplied above be insufficient for the proposed development buildings or the depth to competent strata is uneconomic for conventional shallow construction, consideration should be given to supporting the proposed development buildings on piled foundations. Likewise a piled foundation solution may need to be considered if deep excavation stability is considered to significantly impact construction.

The advice of a piling specialist should be sought to determine the working loads of their proprietary techniques when considering the ground conditions encountered and the health and safety requirements and constraints of working within the confines of the site and adjacent neighbouring properties.

### **7.6 FLOOR SLABS**

It is anticipated at this stage that the floor slabs of the proposed development buildings will be suspended on ground beams.

## 7.7 CONCRETE CLASSIFICATION

In accordance with Building Research Establishment (BRE) Special Digest 1: 2005 - Concrete in Aggressive Ground, the following laboratory test data has been used to derive classifications for buried concrete (Table C1, natural ground locations) beneath the site:

|                                                                                                                  |                       |
|------------------------------------------------------------------------------------------------------------------|-----------------------|
|  Soluble Sulphate (2:1 extract) | – 0.01g/l to 0.016g/l |
|  pH                             | – 7.7 to 8.4          |
|  Total Sulphate SO <sub>4</sub> | – 0.01 – 0.051%       |
|  Total Sulphur                  | – 0.014 – 0.032%      |
|  Total Potential Sulphate       | – 0.042 – 0.096%      |
|  Oxidisable Sulphate            | < 0.3%                |

The Design Sulphate Class for concrete within the site is DS-1. Assuming foundations are constructed above the groundwater level, the Aggressive Chemical Environment for Concrete (ACEC) Class is AC-1s.

It should be noted that additional considerations for the determination of concrete class and appropriate aggregate use are set out in BRE Special Digest 1. These are considerations specific to the soil type, the proposed development and the type of concrete foundations to be used at the site.

Laboratory results for the pH and sulphate testing are included within **Appendix II**.

## 7.8 SOAKAWAYS

Soil infiltration tests were completed within trial pits TP1 and TP2 at depths of 2.00m and 1.80m bgl respectively, in general accordance with Building Research Establishment (BRE) Digest D365, February 2016, Soakaway Design.

Excavation of the trial pits was completed at a steady rate and the trial pits were rapidly filled with pumped tankered water.

Utilising the time and water resources for a day of infiltration testing, pit TP1 was filled twice and pit TP2 once.

The subsequent fall in water level was observed over a time period specified within the table of results.

The soil infiltration rate calculated for the trial pits is as follows:

**Table 7.8 : Soil Infiltration Test Results**

| TP1 – 2.00m bgl       |                       |              |
|-----------------------|-----------------------|--------------|
| Test 1 (m/s)          | Test 2 (m/s)          | Test 3 (m/s) |
| 8.66x10 <sup>-5</sup> | 9.16x10 <sup>-5</sup> | N/A          |
| TP2 – 1.80m bgl       |                       |              |
| Test 1 (m/s)          | Test 2 (m/s)          | Test 3 (m/s) |
| 2.57x10 <sup>-5</sup> | N/A                   | N/A          |

Soakaway drainage is considered suitable for the proposed development. Soakaways shall need to be located at least 1.5m from structures.

Calculation sheets for the soakaway tests are presented within **Appendix IV**.

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

This Ground Investigation and Phase II Geo-Environmental Risk Assessment has provided an assessment of the site's geo-environmental setting, previous assessments and an evaluation of ground conditions.

The ground investigation comprised the completion of two mechanically excavated trial pits and four window sample boreholes to depths up to 4.0m bgl.

To summarise the findings of this assessment;

### 8.1 ENVIRONMENTAL

-  The site inspection revealed the site to be of a reasonable standard of 'ground keeping'. No evidence of potential soil contaminants were observed.
-  The site investigation undertaken has revealed a 0.1m thick surfacing of concrete upon a thin mantle of re-worked Clay (Made Ground) circa 0.1m to 0.5m thick. Beneath the Made Ground are natural Head Deposits of sandy, gravelly Clay, proven to 3.8m bgl upon Terrace Gravels.
-  No visual or olfactory evidence of soil contamination was observed.
-  The assessment has provided an assessment of ground conditions and a suitably robust frequency of investigation which has found the overlying Made Ground and underlying near surface natural Clay to be geochemically acceptable for the proposed residential development. All soil determinants were recorded at acceptable concentrations when compared to the appropriate residential end use values.
-  No remediation works are considered necessary.
-  It is also not considered the site is at significant risk from hazardous ground gas ingress given the absence of nearby significant gaseous sources of risk.
-  The site in isolation is not considered to present a risk to controlled waters based on the soil results obtained and the natural ground conditions encountered.
-  ***Should any suspected contamination (which has not yet been discovered) be encountered during groundworks, works should cease and advice from Aviron or an environmental/contamination consultant be sought.***
-  ***Any Topsoil imported on to site to complete gardens should be independently sampled and***

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***laboratory tested to ensure it is chemically suitable for use.***

 In conclusion a VERY LOW environmental risk is considered and no further assessment is considered necessary.

## **8.2 GEOTECHNICAL**

Should it be deemed suitable to construct conventional trench fill foundations these will need to be cast at depths of between 1.40m and 2.50m bgl. At such depths the firm CLAY strata is likely to provide the required bearing resistance to support the proposed development buildings.

However, it is likely that deeper excavations will be unstable when cut through the very sandy CLAY units, and as such and in consideration of buildability issues, a piled foundation solution may be the most practical option.

Soakaway drainage may be effective subject to design requirements.

## 9.0 PROJECT INSTRUCTION AND LIMITATIONS

### 9.1 SCOPE OF WORKS

The following scope of work was undertaken to an agreed brief and involves the following;

- ✚ Mechanical excavation of two trial pits to circa 2.00m bgl to enable soils sampling and infiltration testing.
- ✚ Window sample drilling to depths of up to 5.00m bgl including standard penetration testing (SPTs) at 1.00m intervals.
- ✚ Log the strata within each exploratory hole noting any water strikes.
- ✚ Collect disturbed soil samples from exploratory holes and submit for geochemical laboratory testing.
- ✚ All soil samples shall be collected in accordance with the instruction and ground conditions and submitted to UKAS/MCERTS accredited laboratories for testing.
- ✚ Prepare an interpretative Phase II ERA report to interpret ground conditions with respect to potential environmental risks.

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

### 9.2 PUBLISHED GUIDANCE

This report follows the technical approach presented in Contaminated Land Report 11 (CLR11) "Model Procedures for the Management of Land Contamination" prepared by the Environment Agency in 2004. CLR11 provides guidance on the application of management processes when assessing potentially contaminated land.

This project and report have been designed to fulfil the information requirements set out in the Environment Agency Guidance on Requirements for Land Contamination Reports prepared by the Environment Agency in 2005.

Notwithstanding the above this report is additionally prepared in accordance with current guidance notes, standards and practices as set out by the Environment Agency and statutory organisations in order to establish potential and significant pollutant linkages as defined in Part IIA of the Environmental Protection Act 1990.

### **9.3 LIMITATIONS**

Aviron's scope of work has been designed to meet the timeframe and budgets. As such it may follow that further work would be prudent upon evaluation of the ground conditions. The scope of work provided shall provide a view of site conditions and understanding of potential geo-environmental risks and possible mitigation procedures.

The information used in this report has been derived from the site investigation, which in turn were based on known current and historical land uses identified at the site and surrounding area, available to Aviron at the time of the investigation.

Intrusive points chosen relate to the data collected and the risk assessment will rely on these points only. It therefore follows that some areas of the site will not be examined. It is always possible that some areas not investigated may contain conditions which would be impossible to determine due to lack of evidence or time and budget restrictions.

Should changes in legislation, statutory requirements or industry practices occurred following issue of this report, this report should be viewed in light of these changes.

Should a notable time period elapse between the date issue of this report and the date of application of this report changes to site dynamics may occur and in particular the site inspection notes may no longer be applicable should any change of use occur to the site in the interim.

## 10.0 REFERENCES AND OTHER SOURCES OF INFORMATION

Aviron Associates Limited. Phase I Geo-Environmental Risk Assessment. August 2017. Ref; 17-229.01.

British Geological Survey Website. [www.bgs.ac.uk](http://www.bgs.ac.uk)

BRE Special Digest 1:2005. Concrete in Aggressive Ground

BS1377-1:2016. Methods of test for soils for Civil Engineering Purposes

BS5930:2015. British Standards Institute. Code of Practice for Ground Investigations

BS8002:1994. British Standards Institute. Code of Practice for Earth Retaining Structures

BS10175: 2011. British Standards Institute. Investigation of Potentially Contaminated Land - Code of Practice

BS EN ISO 14688-1:2002 Geotechnical investigation and testing – Identification and Classification of Soil – Identification and Description

BS EN ISO 14688-2:2004 Geotechnical investigation and testing – Identification and Classification of Soil – Principles for a Classification

BS EN ISO 22475-1:2006 Geotechnical investigation and testing - Sampling Methods and Groundwater Measurements

BS EN ISO 22476-3:2005 Standard Penetration Test

BS EN 1997-1:2004 Eurocode 7 Geotechnical Design Part 1 General Rules

BS EN 1997-2:2007 Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing

(NA to) BS EN 1997-1:2004UK National Annex to Eurocode 7 Geotechnical Design Part 1 General Rules

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DEFRA and Environment Agency. 2004. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11

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Jardine, Maswose, Burland. 1985. Field and Laboratory Measurements of Soil Stiffness. Proceedings of the 11<sup>th</sup> International Conference on Soil Mechanics and Foundation Engineering, San Francisco

LQM/CIEH: Paul Nathanail, Caroline McCaffrey, Andy Gillett, Richard Ogden and Judith Nathanail. 2014. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. ISBN 978-0-9931084-0-2. "Copyright Land Quality Management Limited reproduced with permission; Publication number S4UL3275. All rights reserved"

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Peck, Hanson and Thornburn. 1967. Foundation Engineering.

Somerville, S. H. 1986. Control of groundwater for temporary works, CIRIA Report 113.

SP1010 - Development of Category 4 Screening Levels for Land Affected by Contamination. Final Project Report (Revision 2). Contaminated Land : Applications In Real Environmental (CL:AIRE). September 2014

SR2: Human health toxicological assessment of contaminants in soil, Science Report SC050021/SR2, Environment Agency, August 2008

SR7: Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values, Science Report SC050021/SR7, Environment Agency, November 2008

Stroud M.A. 1975. The Standard Penetration Test in Insensitive Clays and Soft Rocks, Proceedings of the European Symposium on Penetration Testing, 2, 367-376

Vesic. 1973. Analysis of Ultimate Loads of Shallow Foundations

## Figures

- 1 Existing Site Layout Plan
- 2 Proposed Development Plan
- 3 Exploratory Hole Location Plan



# Legend

— Indicative Boundary

## Notes

## Figure 1

### Drawing Title

Existing Site Layout Plan

**Project Number** 17-229.02

### Project Title

12 Shaftsbury Road, Reading, RG30 2QP

**Drawn by** JB

**Checked by** OB

**Scale** NTS





# Legend

— Indicative Boundary

## Notes

## Figure 2

### Drawing Title

Proposed Development Plan

**Project Number** 17-229.02

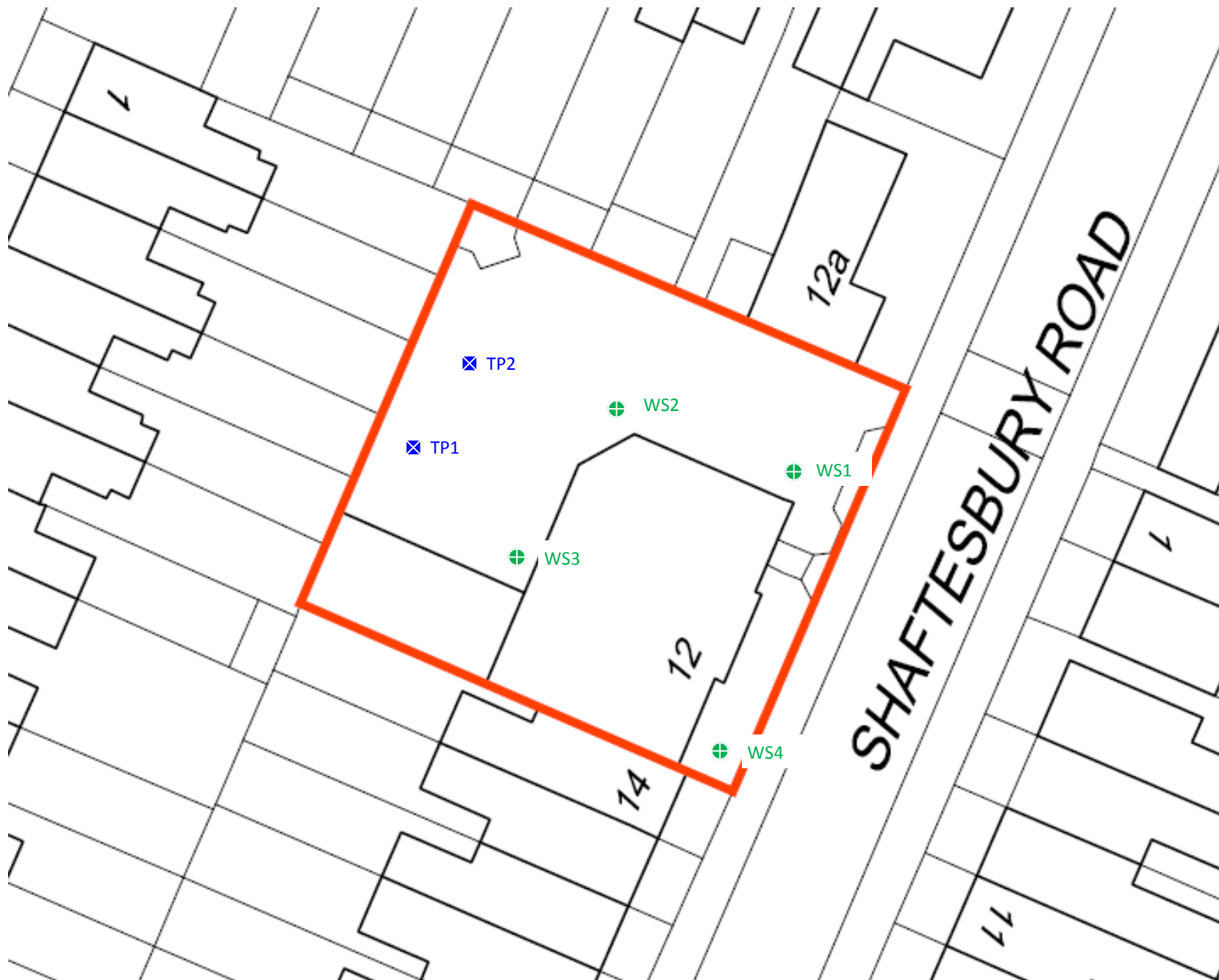
**Project Title**  
12 Shaftsbury Road, Reading, RG30 2QP

**Drawn by** JB

**Checked by** OB

**Scale** NTS





## Legend

- Indicative Boundary
- X Trial Pit Location
- + Window Sample Borehole

## Notes

## Figure 3

### Drawing Title

Exploratory Hole Location Plan

**Project Number** 17-229.02

**Project Title**  
12 Shaftesbury Road, Reading, RG30 2QP

**Drawn by** JB

**Checked by** OB

**Scale** NTS



## **Appendices**

- I        Exploratory Hole Logs
- II       Contamination Laboratory Results
- III      Geotechnical Laboratory Results
- IV      Soil Infiltration Test Results

## Appendix

### I Exploratory Hole Logs



# Trial Pit Log

Trialpit No

**TP 1**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02Co-ords: -  
Level:Date  
20-07-2017

Location: Reading RG30 1QP

Dimensions  
(m):

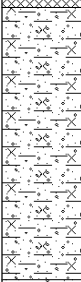
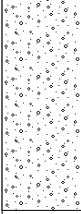
0.9

Depth  
2.00

0.45

Scale  
1:25Logged  
dn

Client:

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                                   |  |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                                       |  |
|                 | 0.20                        | ES   |         | 0.10         |              |   | CONCRETE                                                                                              |  |
|                 |                             |      |         | 0.40         |              |   | MADE GROUND brown silty sandy gravelly clay with brick fragments                                      |  |
|                 | 0.60                        | ES   |         |              |              |   | Firm orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint |  |
|                 |                             |      |         | 1.30         |              |  | Yellow brown coarse sandy fine to coarse sub-angular to rounded GRAVEL of flint                       |  |
|                 |                             |      |         | 2.00         |              |                                                                                    | End of pit at 2.00 m                                                                                  |  |

Remarks: Groundwater not encountered. Soakage test carried out

Stability:





# Trial Pit Log

Trialpit No

**TP 2**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02Co-ords: -  
Level:Date  
20-07-2017

Location: Reading RG30 1QP

Dimensions  
(m):

0.9

Depth  
1.80

0.45

Scale  
1:25Logged  
dn

Client:

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                            | Stratum Description                                                                                   |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                   |                                                                                                       |   |
|                 | 0.20                        | ES   |         | 0.10         |              |  | CONCRETE                                                                                              |   |
|                 |                             |      |         | 0.30         |              |  | MADE GROUND brown silty sandy gravelly clay with brick fragments                                      |   |
|                 |                             |      |         |              |              |  | Firm orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint |   |
|                 |                             |      |         | 0.80         |              |  | Yellow brown coarse sandy fine to coarse sub-angular to rounded GRAVEL of flint                       | 1 |
|                 |                             |      |         | 1.80         |              |                                                                                   | End of pit at 1.80 m                                                                                  | 2 |
|                 |                             |      |         |              |              |                                                                                   |                                                                                                       | 3 |
|                 |                             |      |         |              |              |                                                                                   |                                                                                                       | 4 |
|                 |                             |      |         |              |              |                                                                                   |                                                                                                       | 5 |

Remarks: Groundwater not encountered. Soakage test carried out

Stability:





# Borehole Log

Borehole No.

**WS 1**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02

Co-ords:

Hole Type  
WS

Location: Reading RG30 1QP

Level:

Scale  
1:50

Client:

Dates: 21-07-2017

Logged By  
dn

| Well | Water Strikes | Sample and In Situ Testing |          |                            | Depth (m) | Level (m) | Legend | Stratum Description                                                                                   |    |
|------|---------------|----------------------------|----------|----------------------------|-----------|-----------|--------|-------------------------------------------------------------------------------------------------------|----|
|      |               | Depth (m)                  | Type     | Results                    |           |           |        |                                                                                                       |    |
|      |               | 0.10<br>0.20               |          |                            |           |           |        | CONCRETE                                                                                              |    |
|      |               | 0.40<br>0.50               | ES       | HVP=29                     |           |           |        | MADE GROUND brown silty sandy gravelly clay with brick fragments                                      |    |
|      |               | 0.75<br>0.75               | D        | HVP=35                     |           |           |        | Firm orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint |    |
|      |               | 1.00<br>1.00               | ES       |                            |           |           |        |                                                                                                       | 1  |
|      |               | 1.20<br>1.25               | SPT<br>D | N=6 (1,2/2,2,1,1)          |           |           |        |                                                                                                       |    |
|      |               |                            |          | HVP=42                     | 1.40      |           |        |                                                                                                       |    |
|      |               |                            |          |                            | 1.60      |           |        | Yellow brown very sandy silty CLAY                                                                    |    |
|      |               | 2.00<br>2.00               | D<br>SPT | N=46<br>(9,10/11,11,12,12) |           |           |        | Very dense light brown coarse sandy fine to coarse sub-angular to rounded GRAVEL of flint             | 2  |
|      |               | 3.00<br>3.00               | D<br>SPT | 50 (12,13/50 for 245mm)    | 3.00      |           |        | End of Borehole at 3.00m                                                                              | 3  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 4  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 5  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 6  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 7  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 8  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 9  |
|      |               |                            |          |                            |           |           |        |                                                                                                       | 10 |

Remarks

Groundwater not encountered





# Borehole Log

Borehole No.

**WS 2**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02

Co-ords:

Hole Type  
WS

Location: Reading RG30 1QP

Level:

Scale  
1:50

Client:

Dates: 21-07-2017

Logged By  
dn

| Well | Water Strikes | Sample and In Situ Testing |      |                         | Depth (m) | Level (m) | Legend | Stratum Description                                                                                   |    |
|------|---------------|----------------------------|------|-------------------------|-----------|-----------|--------|-------------------------------------------------------------------------------------------------------|----|
|      |               | Depth (m)                  | Type | Results                 |           |           |        |                                                                                                       |    |
|      |               |                            |      |                         | 0.10      |           |        | CONCRETE                                                                                              |    |
|      |               | 0.40                       | ES   |                         | 0.50      |           |        | MADE GROUND brown silty sandy gravelly clay with brick fragments                                      |    |
|      |               |                            |      |                         |           |           |        | Firm orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint |    |
|      |               | 1.00                       | D    | HVP=45                  |           |           |        |                                                                                                       | 1  |
|      |               | 1.00                       | SPT  | N=8 (2,2/2,2,2,2)       |           |           |        |                                                                                                       |    |
|      |               | 1.50                       | ES   | HVP=38                  |           |           |        |                                                                                                       |    |
|      |               | 1.50                       |      |                         | 1.80      |           |        | Yellow brown very sandy silty CLAY                                                                    | 2  |
|      |               | 2.00                       | D    |                         |           |           |        |                                                                                                       |    |
|      |               | 2.00                       | SPT  | N=10 (4,3/3,2,3,2)      |           |           |        |                                                                                                       |    |
|      |               |                            |      |                         | 2.60      |           |        |                                                                                                       |    |
|      |               | 3.00                       | D    |                         | 3.00      |           |        | Very dense light brown coarse sandy fine to coarse sub-angular to rounded GRAVEL of flint             | 3  |
|      |               | 3.00                       | SPT  | N=50 (6,6/50 for 235mm) |           |           |        | End of Borehole at 3.00m                                                                              |    |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 4  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 5  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 6  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 7  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 8  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 9  |
|      |               |                            |      |                         |           |           |        |                                                                                                       | 10 |

Remarks

Groundwater not encountered





# Borehole Log

Borehole No.

**WS 3**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02

Co-ords:

Hole Type  
WS

Location: Reading RG30 1QP

Level:

Scale  
1:50

Client:

Dates: 21-07-2017

Logged By  
dn

| Well | Water Strikes | Sample and In Situ Testing |      |                         | Depth (m) | Level (m) | Legend | Stratum Description                                                                                      |    |
|------|---------------|----------------------------|------|-------------------------|-----------|-----------|--------|----------------------------------------------------------------------------------------------------------|----|
|      |               | Depth (m)                  | Type | Results                 |           |           |        |                                                                                                          |    |
|      |               | 0.15                       |      |                         | 0.15      |           |        | CONCRETE                                                                                                 |    |
|      |               | 0.30                       | ES   |                         | 0.40      |           |        | MADE GROUND brown silty sandy gravelly clay with brick fragments                                         |    |
|      |               | 0.50                       |      | HVP=0                   |           |           |        | Very soft brown silty very sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint | 1  |
|      |               | 1.00                       | D    |                         |           |           |        |                                                                                                          |    |
|      |               | 1.00                       |      | HVP=5                   |           |           |        |                                                                                                          |    |
|      |               | 1.00                       | SPT  | N=0 (0,0/0,0,0,0)       |           |           |        |                                                                                                          |    |
|      |               | 2.00                       | D    |                         | 2.10      |           |        |                                                                                                          | 2  |
|      |               | 2.00                       | ES   |                         |           |           |        | Yellow brown very sandy silty CLAY                                                                       |    |
|      |               | 2.00                       |      | HVP=0                   |           |           |        |                                                                                                          |    |
|      |               | 2.00                       | SPT  | N=5 (1,1/1,1,1,2)       |           |           |        |                                                                                                          |    |
|      |               | 3.00                       | D    |                         |           |           |        |                                                                                                          | 3  |
|      |               | 3.00                       | SPT  | N=8 (2,3/2,2,2,2)       |           |           |        |                                                                                                          |    |
|      |               | 4.00                       |      |                         | 3.80      |           |        | Very dense light brown coarse sandy fine to coarse sub-angular to rounded GRAVEL of flint                | 4  |
|      |               |                            | SPT  | N=50 (6,7/50 for 235mm) | 4.00      |           |        | End of Borehole at 4.00m                                                                                 |    |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 5  |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 6  |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 7  |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 8  |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 9  |
|      |               |                            |      |                         |           |           |        |                                                                                                          | 10 |

## Remarks

No discernible groundwater strike but strata wet throughout borehole





# Borehole Log

Borehole No.

**WS 4**

Sheet 1 of 1

Project Name: 12 Shaftsbury Road

Project No.  
17-229.02

Co-ords:

Hole Type  
WS

Location: Reading RG30 1QP

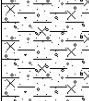
Level:

Scale  
1:50

Client:

Dates: 21-07-2017

Logged By  
dn

| Well | Water Strikes | Sample and In Situ Testing |      |         | Depth (m) | Level (m) | Legend                                                                            | Stratum Description                                                                                   |    |
|------|---------------|----------------------------|------|---------|-----------|-----------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----|
|      |               | Depth (m)                  | Type | Results |           |           |                                                                                   |                                                                                                       |    |
|      |               | 0.60                       | ES   |         | 0.50      |           |  | MADE GROUND dark brown sandy gravelly humic clay with brick fragments                                 |    |
|      |               |                            |      |         | 1.20      |           |  | Firm orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint | 1  |
|      |               |                            |      |         |           |           |                                                                                   | End of Borehole at 1.20m                                                                              | 2  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 3  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 4  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 5  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 6  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 7  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 8  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 9  |
|      |               |                            |      |         |           |           |                                                                                   |                                                                                                       | 10 |

Remarks

Excavated by hand. Groundwater not encountered



## **Appendix**

### **III Contamination Laboratory Results**



2183

# Final Report

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**Report No.:** 17-19190-1

**Initial Date of Issue:** 02-Aug-2017

**Client** Aviron Associates Ltd

**Client Address:** Badgemore House  
Badgemore Park  
Gravel Hill  
Reading  
Henley on Thames  
RG9 4NR

**Contact(s):** Gavin Roberts  
James Burkitt

**Project** 17-229 Shaftsbury Road

**Quotation No.:** **Date Received:** 24-Jul-2017

**Order No.:** **Date Instructed:** 24-Jul-2017

**No. of Samples:** 10

**Turnaround (Wkdays):** 7 **Results Due:** 01-Aug-2017

**Date Approved:** 02-Aug-2017

**Approved By:**



**Details:** Martin Dyer, Laboratory Manager

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## Results - Soil

Project: 17-229 Shaftsbury Road

| Client: Aviron Associates Ltd       | Chemtest Job No.:    |      |       |       | 17-19190             | 17-19190             | 17-19190    | 17-19190             | 17-19190             | 17-19190             | 17-19190    | 17-19190    | 17-19190    |
|-------------------------------------|----------------------|------|-------|-------|----------------------|----------------------|-------------|----------------------|----------------------|----------------------|-------------|-------------|-------------|
| Quotation No.:                      | Chemtest Sample ID.: |      |       |       | 487893               | 487894               | 487895      | 487896               | 487897               | 487898               | 487899      | 487900      | 487901      |
| Order No.:                          | Client Sample Ref.:  |      |       |       | TP2                  | TP1                  | TP1         | WS01                 | WS02                 | WS03                 | WS1         | WS2         | WS3         |
|                                     | Sample Type:         |      |       |       | SOIL                 | SOIL                 | SOIL        | SOIL                 | SOIL                 | SOIL                 | SOIL        | SOIL        | SOIL        |
|                                     | Top Depth (m):       |      |       |       | 0.20                 | 0.20                 | 0.60        | 0.40                 | 0.40                 | 0.30                 | 1.00        | 1.50        | 2.00        |
|                                     | Date Sampled:        |      |       |       | 20-Jul-2017          | 20-Jul-2017          | 20-Jul-2017 | 21-Jul-2017          | 21-Jul-2017          | 21-Jul-2017          | 21-Jul-2017 | 21-Jul-2017 | 21-Jul-2017 |
|                                     | Asbestos Lab:        |      |       |       | COVENTRY             | COVENTRY             |             | COVENTRY             | COVENTRY             | COVENTRY             |             |             |             |
| Determinand                         | Accred.              | SOP  | Units | LOD   |                      |                      |             |                      |                      |                      |             |             |             |
| ACM Type                            | U                    | 2192 |       | N/A   | -                    | -                    |             | -                    | -                    | -                    |             |             |             |
| Asbestos Identification             | U                    | 2192 | %     | 0.001 | No Asbestos Detected | No Asbestos Detected |             | No Asbestos Detected | No Asbestos Detected | No Asbestos Detected |             |             |             |
| Moisture                            | N                    | 2030 | %     | 0.020 | 11                   | 11                   | 11          | 14                   | 14                   | 14                   | 15          | 11          | 13          |
| pH                                  | U                    | 2010 |       | N/A   | 8.2                  | 8.1                  | 8.1         | 8.1                  | 8.2                  | 8.2                  | 7.7         | 8.1         | 8.4         |
| Boron (Hot Water Soluble)           | U                    | 2120 | mg/kg | 0.40  | < 0.40               | < 0.40               | < 0.40      | 0.52                 | 0.64                 | < 0.40               |             |             |             |
| Sulphate (2:1 Water Soluble) as SO4 | U                    | 2120 | g/l   | 0.010 | < 0.010              | < 0.010              | < 0.010     | < 0.010              | 0.016                | 0.010                | < 0.010     | < 0.010     | < 0.010     |
| Total Sulphur                       | U                    | 2175 | %     | 0.010 | 0.018                | 0.017                | 0.016       | 0.019                | 0.032                | 0.028                | 0.015       | 0.022       | 0.014       |
| Cyanide (Total)                     | U                    | 2300 | mg/kg | 0.50  | < 0.50               | < 0.50               | < 0.50      | < 0.50               | < 0.50               | < 0.50               |             |             |             |
| Sulphate (Total)                    | U                    | 2430 | %     | 0.010 | 0.016                | 0.013                | 0.015       | 0.013                | 0.051                | 0.046                | 0.010       | 0.011       | 0.021       |
| Arsenic                             | U                    | 2450 | mg/kg | 1.0   | 19                   | 16                   | 20          | 12                   | 17                   | 11                   |             |             |             |
| Barium                              | U                    | 2450 | mg/kg | 10    | 45                   | 40                   | 41          | 54                   | 70                   | 46                   |             |             |             |
| Cadmium                             | U                    | 2450 | mg/kg | 0.10  | 0.17                 | 0.14                 | 0.15        | 0.46                 | 0.17                 | 0.10                 |             |             |             |
| Chromium                            | U                    | 2450 | mg/kg | 1.0   | 26                   | 23                   | 25          | 20                   | 21                   | 18                   |             |             |             |
| Copper                              | U                    | 2450 | mg/kg | 0.50  | 13                   | 12                   | 12          | 13                   | 20                   | 14                   |             |             |             |
| Mercury                             | U                    | 2450 | mg/kg | 0.10  | < 0.10               | < 0.10               | < 0.10      | 0.44                 | 0.26                 | < 0.10               |             |             |             |
| Nickel                              | U                    | 2450 | mg/kg | 0.50  | 35                   | 31                   | 34          | 18                   | 22                   | 16                   |             |             |             |
| Lead                                | U                    | 2450 | mg/kg | 0.50  | 11                   | 9.6                  | 9.6         | 30                   | 120                  | 26                   |             |             |             |
| Selenium                            | U                    | 2450 | mg/kg | 0.20  | < 0.20               | < 0.20               | < 0.20      | < 0.20               | < 0.20               | < 0.20               |             |             |             |
| Zinc                                | U                    | 2450 | mg/kg | 0.50  | 36                   | 31                   | 30          | 50                   | 77                   | 37                   |             |             |             |
| Organic Matter                      | U                    | 2625 | %     | 0.40  | < 0.40               | < 0.40               |             | 0.41                 | 1.3                  | 1.0                  |             |             |             |
| Aliphatic TPH >C5-C6                | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C6-C8                | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C8-C10               | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C10-C12              | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C12-C16              | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C16-C21              | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C21-C35              | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aliphatic TPH >C35-C44              | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Total Aliphatic Hydrocarbons        | N                    | 2680 | mg/kg | 5.0   | < 5.0                | < 5.0                | < 5.0       | < 5.0                | < 5.0                | < 5.0                |             |             |             |
| Aromatic TPH >C5-C7                 | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C7-C8                 | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C8-C10                | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C10-C12               | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C12-C16               | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C16-C21               | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | 6.3                  | < 1.0                |             |             |             |
| Aromatic TPH >C21-C35               | U                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Aromatic TPH >C35-C44               | N                    | 2680 | mg/kg | 1.0   | < 1.0                | < 1.0                | < 1.0       | < 1.0                | < 1.0                | < 1.0                |             |             |             |
| Total Aromatic Hydrocarbons         | N                    | 2680 | mg/kg | 5.0   | < 5.0                | < 5.0                | < 5.0       | < 5.0                | 6.3                  | < 5.0                |             |             |             |

## Results - Soil

Project: 17-229 Shaftsbury Road

|                                      |                             |            |              |            |             |             |             |             |             |             |             |             |
|--------------------------------------|-----------------------------|------------|--------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Client:</b> Aviron Associates Ltd | <b>Chemtest Job No.:</b>    |            |              |            | 17-19190    | 17-19190    | 17-19190    | 17-19190    | 17-19190    | 17-19190    | 17-19190    | 17-19190    |
| <b>Quotation No.:</b>                | <b>Chemtest Sample ID.:</b> |            |              |            | 487893      | 487894      | 487895      | 487896      | 487897      | 487898      | 487899      | 487900      |
| <b>Order No.:</b>                    | <b>Client Sample Ref.:</b>  |            |              |            | TP2         | TP1         | TP1         | WS01        | WS02        | WS03        | WS1         | WS2         |
|                                      | <b>Sample Type:</b>         |            |              |            | SOIL        | SOIL        | SOIL        | SOIL        | SOIL        | SOIL        | SOIL        | SOIL        |
|                                      | <b>Top Depth (m):</b>       |            |              |            | 0.20        | 0.20        | 0.60        | 0.40        | 0.40        | 0.30        | 1.00        | 1.50        |
|                                      | <b>Date Sampled:</b>        |            |              |            | 20-Jul-2017 | 20-Jul-2017 | 20-Jul-2017 | 21-Jul-2017 | 21-Jul-2017 | 21-Jul-2017 | 21-Jul-2017 | 21-Jul-2017 |
|                                      | <b>Asbestos Lab:</b>        |            |              |            | COVENTRY    | COVENTRY    |             | COVENTRY    | COVENTRY    | COVENTRY    |             |             |
| <b>Determinand</b>                   | <b>Accred.</b>              | <b>SOP</b> | <b>Units</b> | <b>LOD</b> |             |             |             |             |             |             |             |             |
| Total Petroleum Hydrocarbons         | N                           | 2680       | mg/kg        | 10.0       | < 10        | < 10        | < 10        | < 10        | < 10        | < 10        |             |             |
| Naphthalene                          | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Acenaphthylene                       | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Acenaphthene                         | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Fluorene                             | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Phenanthrene                         | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Anthracene                           | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Fluoranthene                         | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Pyrene                               | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Benzo[a]anthracene                   | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Chrysene                             | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Benzo[b]fluoranthene                 | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Benzo[k]fluoranthene                 | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Benzo[a]pyrene                       | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Indeno(1,2,3-c,d)Pyrene              | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Dibenz(a,h)Anthracene                | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Benzo[g,h,i]perylene                 | U                           | 2700       | mg/kg        | 0.10       | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      | < 0.10      |             |             |
| Total Of 16 PAH's                    | U                           | 2700       | mg/kg        | 2.0        | < 2.0       | < 2.0       | < 2.0       | < 2.0       | < 2.0       | < 2.0       |             |             |
| Benzene                              | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| Toluene                              | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| Ethylbenzene                         | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| m & p-Xylene                         | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| o-Xylene                             | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| Methyl Tert-Butyl Ether              | U                           | 2760       | µg/kg        | 1.0        | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       | < 1.0       |             |             |
| Total Phenols                        | U                           | 2920       | mg/kg        | 0.30       | < 0.30      | < 0.30      | < 0.30      | < 0.30      | < 0.30      | < 0.30      |             |             |

**Project: 17-229 Shaftsbury Road**

| <b>Client: Aviron Associates Ltd</b> | <b>Chemtest Job No.:</b>    |      |       |       | 17-19190             |
|--------------------------------------|-----------------------------|------|-------|-------|----------------------|
| Quotation No.:                       | <b>Chemtest Sample ID.:</b> |      |       |       | 487902               |
| Order No.:                           | Client Sample Ref.:         |      |       |       | WS4                  |
|                                      | Sample Type:                |      |       |       | SOIL                 |
|                                      | Top Depth (m):              |      |       |       | 0.40                 |
|                                      | Date Sampled:               |      |       |       | 21-Jul-2017          |
|                                      | Asbestos Lab:               |      |       |       | COVENTRY             |
| Determinand                          | Accred.                     | SOP  | Units | LOD   |                      |
| ACM Type                             | U                           | 2192 |       | N/A   | -                    |
| Asbestos Identification              | U                           | 2192 | %     | 0.001 | No Asbestos Detected |
| Moisture                             | N                           | 2030 | %     | 0.020 | 13                   |
| pH                                   | U                           | 2010 |       | N/A   | 7.8                  |
| Boron (Hot Water Soluble)            | U                           | 2120 | mg/kg | 0.40  | < 0.40               |
| Sulphate (2:1 Water Soluble) as SO4  | U                           | 2120 | g/l   | 0.010 | < 0.010              |
| Total Sulphur                        | U                           | 2175 | %     | 0.010 | 0.015                |
| Cyanide (Total)                      | U                           | 2300 | mg/kg | 0.50  | < 0.50               |
| Sulphate (Total)                     | U                           | 2430 | %     | 0.010 | 0.027                |
| Arsenic                              | U                           | 2450 | mg/kg | 1.0   | 15                   |
| Barium                               | U                           | 2450 | mg/kg | 10    | 100                  |
| Cadmium                              | U                           | 2450 | mg/kg | 0.10  | 0.27                 |
| Chromium                             | U                           | 2450 | mg/kg | 1.0   | 16                   |
| Copper                               | U                           | 2450 | mg/kg | 0.50  | 21                   |
| Mercury                              | U                           | 2450 | mg/kg | 0.10  | 0.19                 |
| Nickel                               | U                           | 2450 | mg/kg | 0.50  | 19                   |
| Lead                                 | U                           | 2450 | mg/kg | 0.50  | 200                  |
| Selenium                             | U                           | 2450 | mg/kg | 0.20  | < 0.20               |
| Zinc                                 | U                           | 2450 | mg/kg | 0.50  | 300                  |
| Organic Matter                       | U                           | 2625 | %     | 0.40  | 1.4                  |
| Aliphatic TPH >C5-C6                 | N                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C6-C8                 | N                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C8-C10                | U                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C10-C12               | U                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C12-C16               | U                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C16-C21               | U                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C21-C35               | U                           | 2680 | mg/kg | 1.0   |                      |
| Aliphatic TPH >C35-C44               | N                           | 2680 | mg/kg | 1.0   |                      |
| Total Aliphatic Hydrocarbons         | N                           | 2680 | mg/kg | 5.0   |                      |
| Aromatic TPH >C5-C7                  | N                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C7-C8                  | N                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C8-C10                 | U                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C10-C12                | U                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C12-C16                | U                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C16-C21                | U                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C21-C35                | U                           | 2680 | mg/kg | 1.0   |                      |
| Aromatic TPH >C35-C44                | N                           | 2680 | mg/kg | 1.0   |                      |
| Total Aromatic Hydrocarbons          | N                           | 2680 | mg/kg | 5.0   |                      |

## Results - Soil

**Project: 17-229 Shaftsbury Road**

| <b>Client: Aviron Associates Ltd</b> | <b>Chemtest Job No.:</b>    |      | 17-19190    |      |        |
|--------------------------------------|-----------------------------|------|-------------|------|--------|
| Quotation No.:                       | <b>Chemtest Sample ID.:</b> |      | 487902      |      |        |
| Order No.:                           | Client Sample Ref.:         |      | WS4         |      |        |
|                                      | Sample Type:                |      | SOIL        |      |        |
|                                      | Top Depth (m):              |      | 0.40        |      |        |
|                                      | Date Sampled:               |      | 21-Jul-2017 |      |        |
|                                      | Asbestos Lab:               |      | COVENTRY    |      |        |
| Determinand                          | Accred.                     | SOP  | Units       | LOD  |        |
| Total Petroleum Hydrocarbons         | N                           | 2680 | mg/kg       | 10.0 |        |
| Naphthalene                          | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Acenaphthylene                       | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Acenaphthene                         | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Fluorene                             | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Phenanthrene                         | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Anthracene                           | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Fluoranthene                         | U                           | 2700 | mg/kg       | 0.10 | 1.1    |
| Pyrene                               | U                           | 2700 | mg/kg       | 0.10 | 1.1    |
| Benzo[a]anthracene                   | U                           | 2700 | mg/kg       | 0.10 | 0.91   |
| Chrysene                             | U                           | 2700 | mg/kg       | 0.10 | 0.60   |
| Benzo[b]fluoranthene                 | U                           | 2700 | mg/kg       | 0.10 | 0.78   |
| Benzo[k]fluoranthene                 | U                           | 2700 | mg/kg       | 0.10 | 0.38   |
| Benzo[a]pyrene                       | U                           | 2700 | mg/kg       | 0.10 | 0.51   |
| Indeno(1,2,3-c,d)Pyrene              | U                           | 2700 | mg/kg       | 0.10 | 0.33   |
| Dibenz(a,h)Anthracene                | U                           | 2700 | mg/kg       | 0.10 | < 0.10 |
| Benzo[g,h,i]perylene                 | U                           | 2700 | mg/kg       | 0.10 | 0.85   |
| Total Of 16 PAH's                    | U                           | 2700 | mg/kg       | 2.0  | 6.6    |
| Benzene                              | U                           | 2760 | µg/kg       | 1.0  |        |
| Toluene                              | U                           | 2760 | µg/kg       | 1.0  |        |
| Ethylbenzene                         | U                           | 2760 | µg/kg       | 1.0  |        |
| m & p-Xylene                         | U                           | 2760 | µg/kg       | 1.0  |        |
| o-Xylene                             | U                           | 2760 | µg/kg       | 1.0  |        |
| Methyl Tert-Butyl Ether              | U                           | 2760 | µg/kg       | 1.0  |        |
| Total Phenols                        | U                           | 2920 | mg/kg       | 0.30 | < 0.30 |

## Results - Soil

| SOP  | Title                                                               | Parameters included                                                                                                                                                                                                                                          | Method summary                                                                                                                                             |
|------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2010 | pH Value of Soils                                                   | pH                                                                                                                                                                                                                                                           | pH Meter                                                                                                                                                   |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS)          | Moisture content                                                                                                                                                                                                                                             | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.                                                       |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium                 | Boron; Sulphate; Magnesium; Chromium                                                                                                                                                                                                                         | Aqueous extraction / ICP-OES                                                                                                                               |
| 2175 | Total Sulphur in Soils                                              | Total Sulphur                                                                                                                                                                                                                                                | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.                                                                 |
| 2192 | Asbestos                                                            | Asbestos                                                                                                                                                                                                                                                     | Polarised light microscopy / Gravimetry                                                                                                                    |
| 2300 | Cyanides & Thiocyanate in Soils                                     | Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate                                                                                                                                                                              | Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.                                                        |
| 2430 | Total Sulphate in soils                                             | Total Sulphate                                                                                                                                                                                                                                               | Acid digestion followed by determination of sulphate in extract by ICP-OES.                                                                                |
| 2450 | Acid Soluble Metals in Soils                                        | Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc                                                                                                     | Acid digestion followed by determination of metals in extract by ICP-MS.                                                                                   |
| 2625 | Total Organic Carbon in Soils                                       | Total organic Carbon (TOC)                                                                                                                                                                                                                                   | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.                                                                 |
| 2680 | TPH A/A Split                                                       | Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44                                                                                | Dichloromethane extraction / GCxGC FID detection                                                                                                           |
| 2700 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID | Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene | Dichloromethane extraction / GC-FID                                                                                                                        |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS       | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule                                                                                                                         | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2920 | Phenols in Soils by HPLC                                            | Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.                                                                                                            | 60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.                                                   |

## **Report Information**

### **Key**

---

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

---

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample

### **Sample Retention and Disposal**

---

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.co.uk](mailto:customerservices@chemtest.co.uk)

## **Appendix**

### **IV        Geotechnical Laboratory Results**

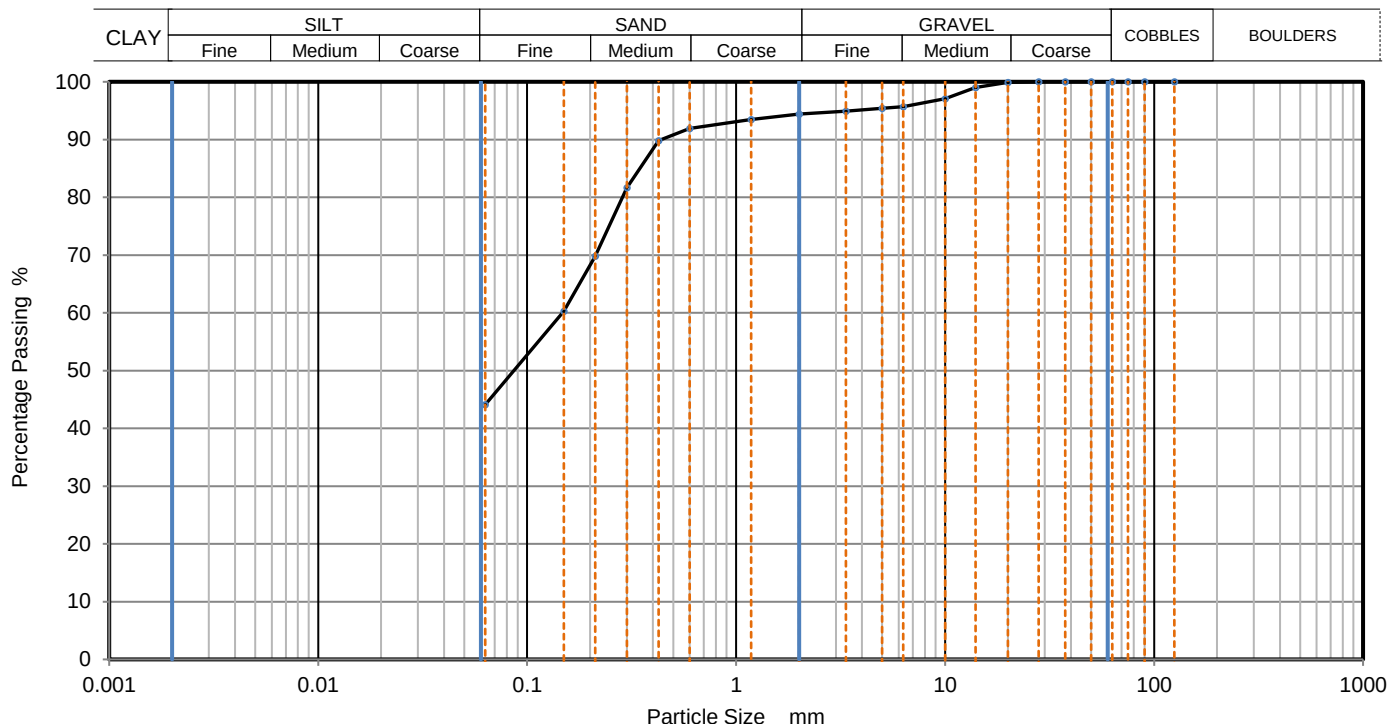
[illegible]



# PARTICLE SIZE DISTRIBUTION

|                    |            |
|--------------------|------------|
| Job Ref            | 23142      |
| Borehole/Pit No.   | WS1+3      |
| Sample No.         | -          |
| Depth Top          | 0.75 m     |
| Depth Base         | 1.00 m     |
| Sample Type        | D          |
| Samples received   | 24/07/2017 |
| Schedules received | 24/07/2017 |
| Project started    | 25/07/2017 |
| Date tested        | 03/08/2017 |

|                  |                                                                                                 |        |        |
|------------------|-------------------------------------------------------------------------------------------------|--------|--------|
| Site Name        | Shaftsbury Road                                                                                 |        |        |
| Project No.      | 17-229                                                                                          | Client | Aviron |
| Soil Description | Brown and orangish brown slightly gravelly sandy CLAY (gravel is fm and sub-angular to rounded) |        |        |
| Test Method      | BS1377:Part 2: 1990, clause 9.0                                                                 |        |        |



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 100       |                  |           |
| 50               | 100       |                  |           |
| 37.5             | 100       |                  |           |
| 28               | 100       |                  |           |
| 20               | 100       |                  |           |
| 14               | 99        |                  |           |
| 10               | 97        |                  |           |
| 6.3              | 96        |                  |           |
| 5                | 95        |                  |           |
| 3.35             | 95        |                  |           |
| 2                | 94        |                  |           |
| 1.18             | 94        |                  |           |
| 0.6              | 92        |                  |           |
| 0.425            | 90        |                  |           |
| 0.3              | 82        |                  |           |
| 0.212            | 70        |                  |           |
| 0.15             | 60        |                  |           |
| 0.063            | 44        |                  |           |

Dry Mass of sample, g 705

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 0.0        |
| Gravel             | 5.6        |
| Sand               | 50.3       |
| Fines <0.063mm     | 44.1       |

| Grading Analysis       |    |
|------------------------|----|
| D100                   | mm |
| D60                    | mm |
| D30                    | mm |
| D10                    | mm |
| Uniformity Coefficient |    |
| Curvature Coefficient  |    |

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



**K4 Soils Laboratory**  
Unit 8, Olds Close, Watford, Herts, WD18 9RU  
Email: james@k4soils.com  
Tel: 01923 711288

Checked and Approved

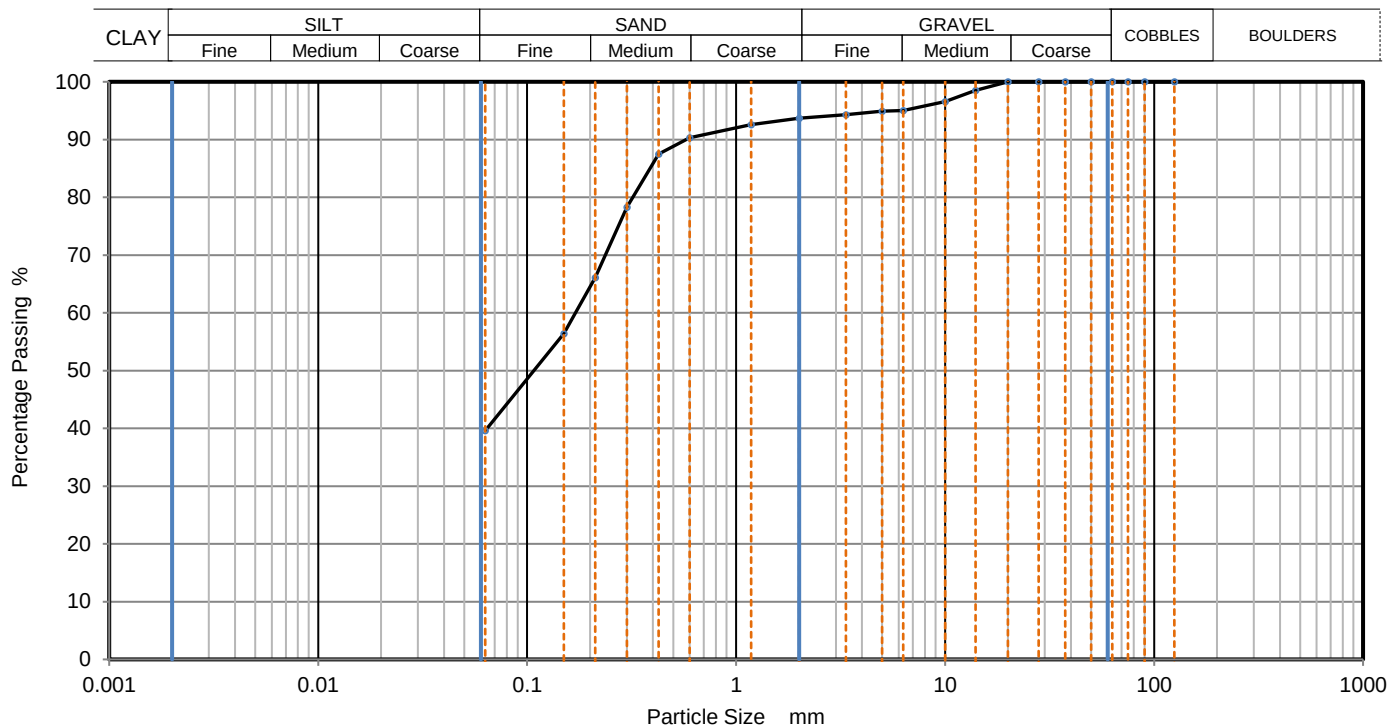
Initials: J.P  
Date: 07/08/2017



# PARTICLE SIZE DISTRIBUTION

|                    |            |
|--------------------|------------|
| Job Ref            | 23142      |
| Borehole/Pit No.   | WS2+3      |
| Sample No.         | -          |
| Depth Top          | 2.00 m     |
| Depth Base         | - m        |
| Sample Type        | D          |
| Samples received   | 24/07/2017 |
| Schedules received | 24/07/2017 |
| Project started    | 25/07/2017 |
| Date tested        | 03/08/2017 |

|                  |                                                                              |        |        |
|------------------|------------------------------------------------------------------------------|--------|--------|
| Site Name        | Shaftsbury Road                                                              |        |        |
| Project No.      | 17-229                                                                       | Client | Aviron |
| Soil Description | Brown slightly gravelly sandy CLAY (gravel is fm and sub-angular to rounded) |        |        |
| Test Method      | BS1377:Part 2: 1990, clause 9.0                                              |        |        |



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 100       |                  |           |
| 50               | 100       |                  |           |
| 37.5             | 100       |                  |           |
| 28               | 100       |                  |           |
| 20               | 100       |                  |           |
| 14               | 99        |                  |           |
| 10               | 97        |                  |           |
| 6.3              | 95        |                  |           |
| 5                | 95        |                  |           |
| 3.35             | 94        |                  |           |
| 2                | 94        |                  |           |
| 1.18             | 93        |                  |           |
| 0.6              | 90        |                  |           |
| 0.425            | 88        |                  |           |
| 0.3              | 78        |                  |           |
| 0.212            | 66        |                  |           |
| 0.15             | 56        |                  |           |
| 0.063            | 40        |                  |           |

Dry Mass of sample, g 590

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 0.0        |
| Gravel             | 6.3        |
| Sand               | 54.1       |
| Fines <0.063mm     | 39.6       |

| Grading Analysis       |    |
|------------------------|----|
| D100                   | mm |
| D60                    | mm |
| D30                    | mm |
| D10                    | mm |
| Uniformity Coefficient |    |
| Curvature Coefficient  |    |

Remarks  
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Unit 8, Olds Close, Watford, Herts, WD18 9RU  
Email: james@k4soils.com  
Tel: 01923 711288

Checked and Approved

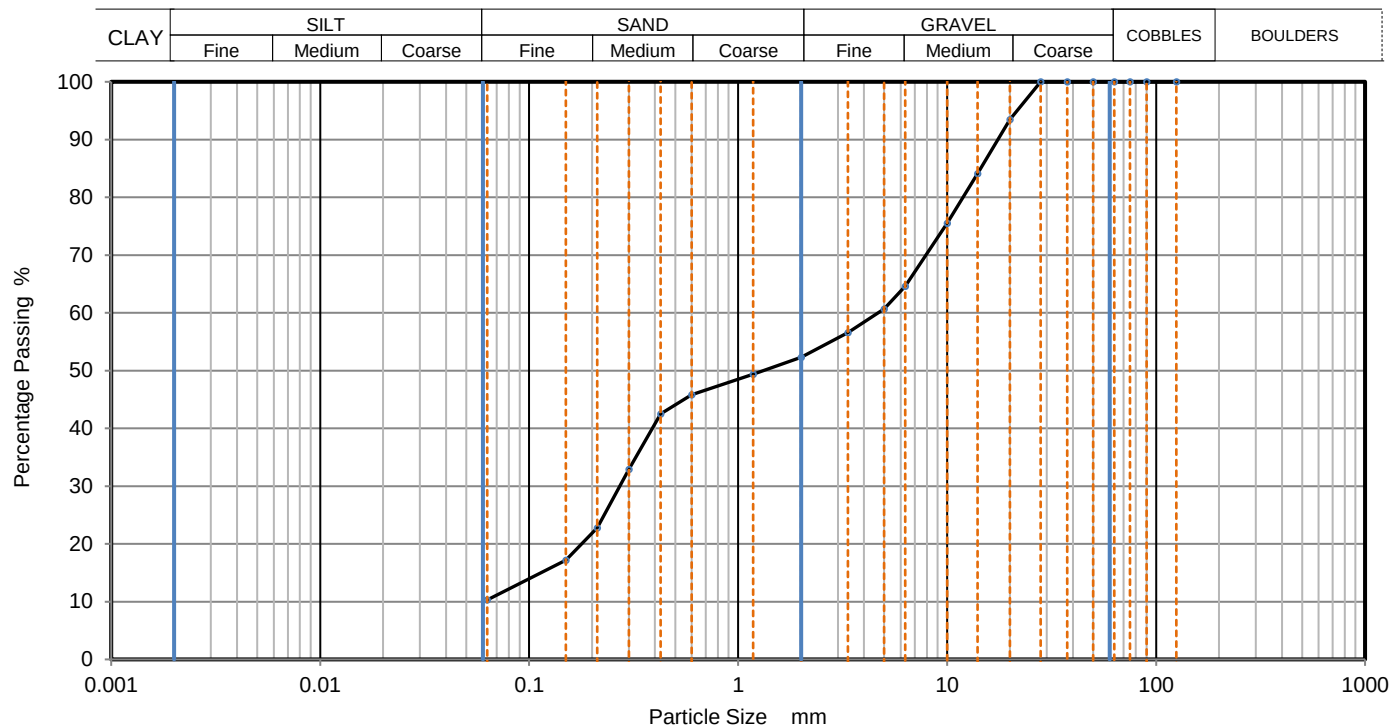
Initials: J.P  
Date: 07/08/2017



## PARTICLE SIZE DISTRIBUTION

|                    |            |
|--------------------|------------|
| Job Ref            | 23142      |
| Borehole/Pit No.   | WS1+2      |
| Sample No.         | -          |
| Depth Top          | 3.00 m     |
| Depth Base         | - m        |
| Sample Type        | D          |
| Samples received   | 24/07/2017 |
| Schedules received | 24/07/2017 |
| Project started    | 25/07/2017 |
| Date tested        | 03/08/2017 |

|                  |                                                                                 |        |        |
|------------------|---------------------------------------------------------------------------------|--------|--------|
| Site Name        | Shaftsbury Road                                                                 |        |        |
| Project No.      | 17-229                                                                          | Client | Aviron |
| Soil Description | Yellowish brown clayey very sandy GRAVEL (gravel is fmc and angular to rounded) |        |        |
| Test Method      | BS1377:Part 2: 1990, clause 9.0                                                 |        |        |



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 100       |                  |           |
| 50               | 100       |                  |           |
| 37.5             | 100       |                  |           |
| 28               | 100       |                  |           |
| 20               | 94        |                  |           |
| 14               | 84        |                  |           |
| 10               | 76        |                  |           |
| 6.3              | 65        |                  |           |
| 5                | 61        |                  |           |
| 3.35             | 57        |                  |           |
| 2                | 52        |                  |           |
| 1.18             | 49        |                  |           |
| 0.6              | 46        |                  |           |
| 0.425            | 43        |                  |           |
| 0.3              | 33        |                  |           |
| 0.212            | 23        |                  |           |
| 0.15             | 17        |                  |           |
| 0.063            | 10        |                  |           |

Dry Mass of sample, g 1088

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 0.0        |
| Gravel             | 47.7       |
| Sand               | 42.0       |
| Fines <0.063mm     | 10.3       |

| Grading Analysis       |    |
|------------------------|----|
| D100                   | mm |
| D60                    | mm |
| D30                    | mm |
| D10                    | mm |
| Uniformity Coefficient |    |
| Curvature Coefficient  |    |

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



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Tel: 01923 711288

Checked and Approved

Initials: J.P  
Date: 07/08/2017

## **Appendix**

### **V        Soil Infiltration Test Results**

# Soil Infiltration Test

17-229.02: 12 Shaftsbury Road, Reading



## Test Pit TP1-1

Date : 20.07.2017

Readings Recorded By: DN

Pit Dimensions: 0.9m(l) x 0.45m(w) x 1.96m(d)  
Start Water Level: 0.65m

Actual Storage Volume: **0.79 m<sup>3</sup>**  
Effective Depth: **1.31 m**

| Time (mins) | Depth BGL (m) |
|-------------|---------------|
| 0           | 0.650         |
| 1           | 0.820         |
| 2           | 0.940         |
| 3           | 1.040         |
| 4           | 1.090         |
| 5           | 1.130         |
| 6           | 1.190         |
| 7           | 1.230         |
| 8           | 1.280         |
| 9           | 1.310         |
| 10          | 1.350         |
| 15          | 1.460         |
| 20          | 1.550         |
| 26          | 1.630         |
| 34          | 1.750         |
| 34          | 1.750         |
| 34          | 1.750         |
| 34          | 1.750         |
| 34          | 1.750         |
| 34          | 1.750         |

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

Effective Storage Volume,  $V$ : **0.9m x 0.45m x 1.31m**

$V$ : **0.53055 m<sup>3</sup>**

$V_{p75-25}$ : **0.265 m<sup>3</sup>**

Effective Internal Surface Area,  $a_{p50}$ : **1.179m<sup>2</sup> + 0.5895m<sup>2</sup> + 0.405m<sup>2</sup>**

$a_{p50}$ : **2.174 m<sup>2</sup>**

Time of water level fall,  $t_{p75-25}$ : **26 - 2.5 mins**

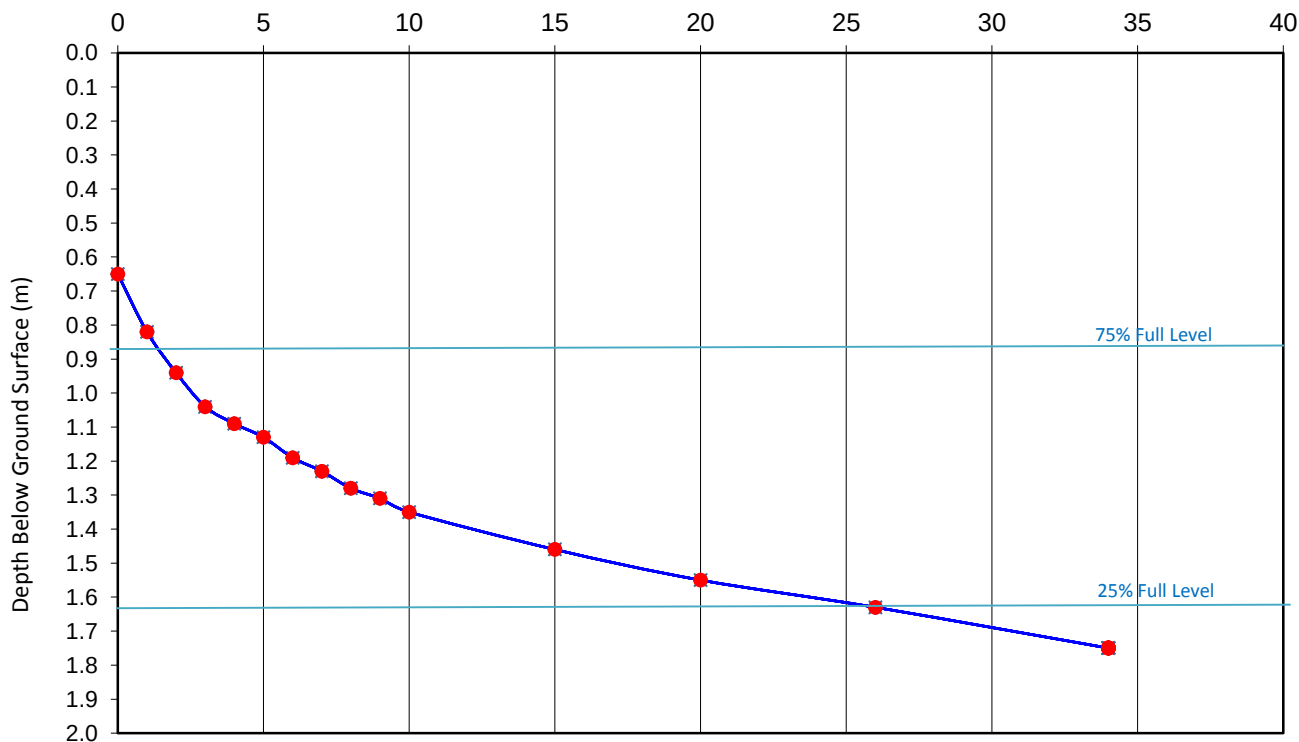
$t_{p75-25}$ : **23.5 mins**

$t_{p75-25}$ : **1410 secs**

Soil infiltration rate,  $f$ : **0.265275/(2.1735 x 1410)**

$f$ : **8.66E-05 ms<sup>-1</sup>**

Water Level vs. Time Time from Filling to Maximum Effective Depth (mins)



Line of best fit  
t75 & t25

# Soil Infiltration Test

17-229.02: 12 Shaftsbury Road, Reading



## Test Pit TP1-2

Date : 20.07.2017

Readings Recorded By: DN

Pit Dimensions: 0.9m(l) x 0.45m(w) x 1.96m(d)  
Start Water Level: 0.55m

Actual Storage Volume: **0.79 m<sup>3</sup>**  
Effective Depth: **1.41 m**

| Time (mins) | Depth BGL (m) |
|-------------|---------------|
| 0           | 0.550         |
| 1           | 0.760         |
| 2           | 0.880         |
| 3           | 0.980         |
| 4           | 1.050         |
| 5           | 1.100         |
| 6           | 1.150         |
| 7           | 1.190         |
| 8           | 1.240         |
| 9           | 1.280         |
| 10          | 1.320         |
| 15          | 1.440         |
| 20          | 1.520         |
| 25          | 1.600         |
| 30          | 1.640         |
| 38          | 1.680         |
| 38          | 1.680         |
| 38          | 1.680         |
| 38          | 1.680         |
| 38          | 1.680         |

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

Effective Storage Volume,  $V$ : **0.9m x 0.45m x 1.41m**

$V$ : **0.57105 m<sup>3</sup>**

$V_{p75-25}$ : **0.286 m<sup>3</sup>**

Effective Internal Surface Area,  $a_{p50}$ : **1.269m<sup>2</sup> + 0.6345m<sup>2</sup> + 0.405m<sup>2</sup>**

$a_{p50}$ : **2.309 m<sup>2</sup>**

Time of water level fall,  $t_{p75-25}$ : **25 - 2.5 mins**

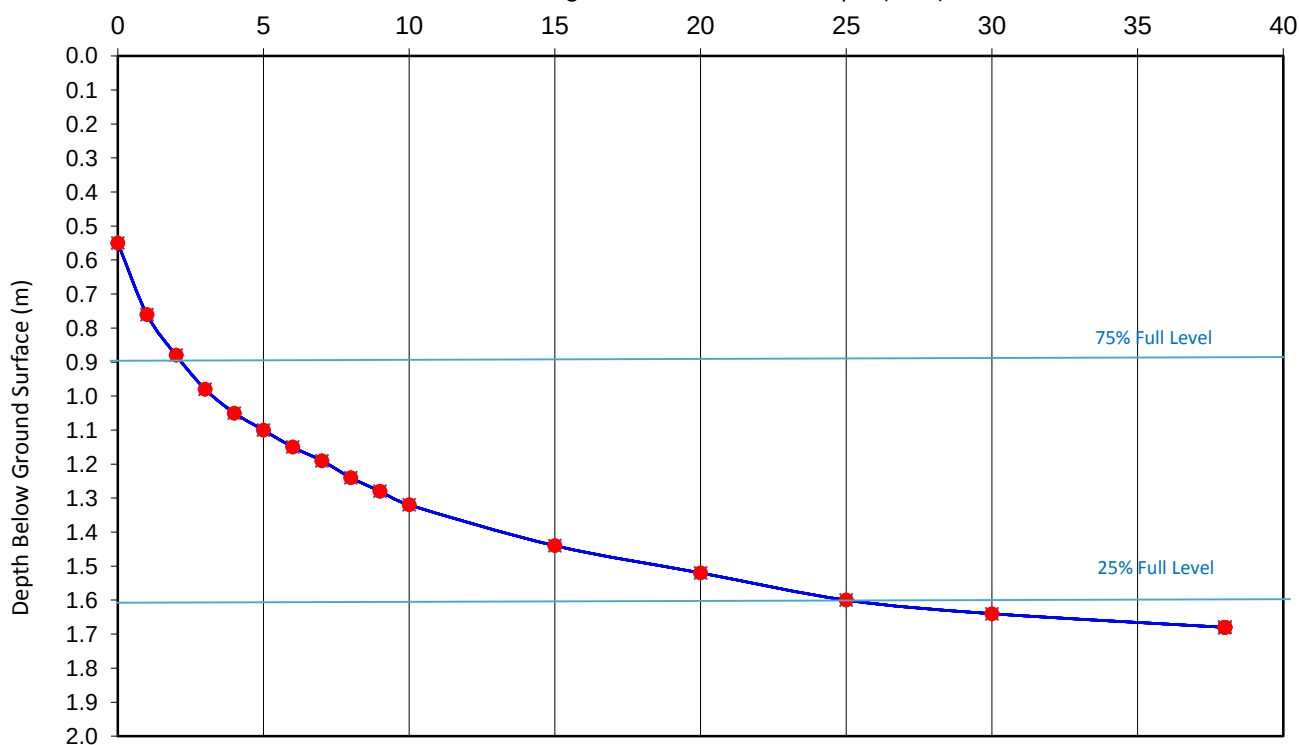
$t_{p75-25}$ : **22.5 mins**

$t_{p75-25}$ : **1350 secs**

Soil infiltration rate,  $f$ : **0.285525/(2.3085 x 1350)**

$f$ : **9.16E-05 ms<sup>-1</sup>**

Water Level vs. Time Time from Filling to Maximum Effective Depth (mins)



Line of best fit  
t75 & t25

# Soil Infiltration Test

17-229.02: 12 Shaftsbury Road, Reading



## Test Pit TP2-1

Date : 20.07.2017

Readings Recorded By: DN

Pit Dimensions: 0.9m(l) x 0.45m(w) x 1.78m(d)  
Start Water Level: 0.53m

Actual Storage Volume: 0.72 m<sup>3</sup>  
Effective Depth: 1.25 m

| Time (mins) | Depth BGL (m) |
|-------------|---------------|
| 0           | 0.530         |
| 1           | 0.610         |
| 2           | 0.660         |
| 3           | 0.700         |
| 4           | 0.750         |
| 5           | 0.800         |
| 6           | 0.830         |
| 7           | 0.850         |
| 8           | 0.870         |
| 9           | 0.880         |
| 10          | 0.890         |
| 20          | 1.020         |
| 29          | 1.120         |
| 45          | 1.280         |
| 75          | 1.410         |
| 105         | 1.500         |
| 105         | 1.500         |
| 105         | 1.500         |
| 105         | 1.500         |
| 105         | 1.500         |

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

Effective Storage Volume, V: 0.9m x 0.45m x 1.25m

V: 0.50625 m<sup>3</sup>

V<sub>p75-25</sub>: 0.253 m<sup>3</sup>

Effective Internal Surface Area, a<sub>p50</sub>: 1.125m<sup>2</sup> + 0.5625m<sup>2</sup> + 0.405m<sup>2</sup>

a<sub>p50</sub>: 2.093 m<sup>2</sup>

Time of water level fall, t<sub>p75-25</sub>: 85 - 6.5 mins

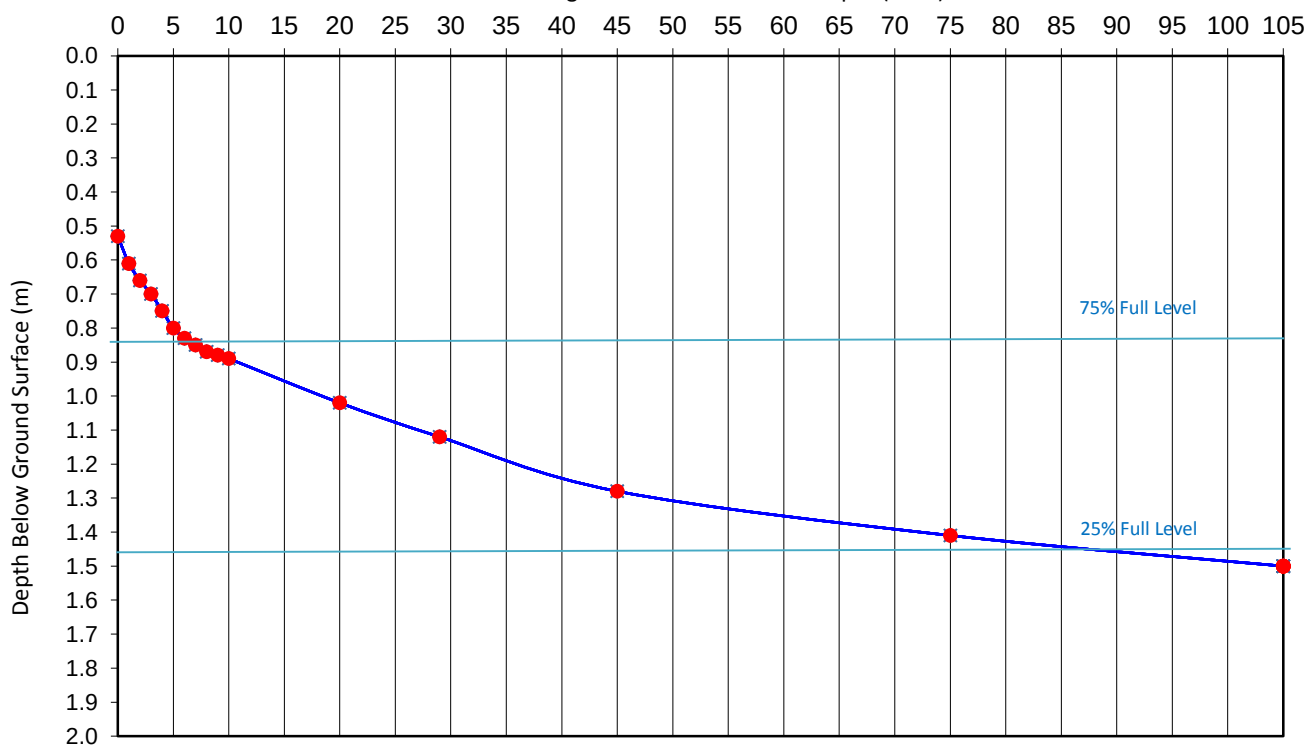
t<sub>p75-25</sub>: 78.5 mins

t<sub>p75-25</sub>: 4710 secs

Soil infiltration rate, f : 0.253125/(2.0925 x 4710)

f : 2.57E-05 ms<sup>-1</sup>

Water Level vs. Time Time from Filling to Maximum Effective Depth (mins)



Line of best fit  
t75 & t25

## **AVIRON ASSOCIATES LIMITED**

**is a dynamic company of Chartered Environmental Surveyors and Geotechnical Engineers.**

We continuously work hard to ensure our services are the most technically competent, efficient and viable in our market place. Our years of experience of vastly varied sites and projects compliment our ability to deliver assured and effective Ground Investigations and Risk Assessments of both Brownfield, Greenfield and Currently Developed Land.

Our clients choose Aviron to plan, design and manage their Ground Investigations and Land Remediation Schemes assisting in land procurement to deliver engineering requirements, discharge planning and ensure their sites are suitable, developable and sustainable.

Our tenaciously committed team ensure regardless of project value we will always deliver quickly, effectively and exceed expectations.



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