



**ADDITIONAL CONTAMINATION RISK ASSESSMENT**

**for**

**FORMER COLT INTERNATIONAL, NEW LANE, HAVANT PO9 2LZ**

**on behalf of**

**DREW SMITH GROUP**

| Report Reference: GWPR3514/CAR/April 2020                                                               |                                                                                      | Status: FINAL                                                                         |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
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| V1.02<br>April<br>2020                                                                                  |  |  |
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## CONTENTS

### 1.0 INTRODUCTION

- 1.1 General
- 1.2 Aims of Investigation
- 1.3 Conditions and Limitations

### 2.0 PREVIOUS FINDINGS

- 2.1 Summary of Previous Findings
- 2.2 Summary of Previous Findings (Ground and Water Limited Contamination Assessment Report, ref. GWPR3192/CAR/December 2019).
- 2.3 Re-evaluated Conceptual Site Model
- 2.4 Remediation Strategy
  - 2.4.1 Human Health Risk
  - 2.4.2 Surface Water Risk
  - 2.4.3 Ground-gas Risk

### 3.0 DEMOLITION AND SITE PREPERATION

### 4.0 REMEDIATION VERIFICATION & ADDITIONAL CONTAMINATION ASSESSMENT

- 4.1 Capping Materials
  - 4.1.1 CLARIE Statistics
  - 4.1.2 Human Health – Asbestos contamination within the Made Ground
  - 4.1.3 Proposed Levels
- 4.2 Groundwater Risk Assessment

## FIGURES

- Figure 1 Site Location Plan
- Figure 2 Site Development Area
- Figure 3 Aerial View of Site
- Figure 4 Proposed Development
- Figure 5 Trial Hole Location Plan – Contamination Assessment (Phase 4)
- Figure 6 Crushed Concrete/Demolition Rubble 6F2 Sampling Locations
- Figure 7 Anticipated Gardens Construction/Finished Levels
- Figure 8 Cable Percussion Borehole Location Plan

## APPENDICES

- Appendix A Conditions and Limitations
- Appendix B Thickness of 6F2 Crushed Concrete/Demolition Rubble Capping
- Appendix C Chemical Laboratory Testing – Crushed Concrete/Demolition Rubble
- Appendix D Soil Assessment Criteria
- Appendix E LQM PAH Profiling Tool
- Appendix F CLAIRE Statistical Analysis
- Appendix G Asbestos Risk Assessment
- Appendix H Cable Percussion Borehole Logs
- Appendix I Chemical Laboratory Testing - Groundwater

## **1.0 INTRODUCTION**

### **1.1 General**

Ground and Water Limited were instructed by Drew Smith Group to conduct contamination assessment and remediation verification works on a redevelopment site at the Former Colt International, New Lane, Havant PO9 2LZ.

### **1.2 Aims of the Investigation**

The purpose of this Contamination Assessment Report (CAR) was to report on the progress of site works, following a phase of demolition and site preparation. A Groundwater risk assessment was also carried out, based on recent groundwater sampling.

This report must be read in conjunction with the following documentation:

- WYG Phase 1 Ground Investigation and Assessment Report, Ref.: A090070-182, dated June 2017;
- Campbell Reith Updated GQRA and Outline Remediation Strategy Report, Ref.: 12663, dated May 2019;
- Ground and Water Limited Contamination Assessment Report, ref. GWPR3192/CAR/December 2019.

This report supersedes the previously issued report (V1.02) due to comments from Campbell Reith.

### **1.3 Conditions and Limitations**

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

The following disclaimer does not supersede the requirements of Drew Smith's appointment by Homes England and the obligations therein.

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## 2.0 PREVIOUS FINDINGS

### 2.1 Summary of Previous Findings

#### **Current Site Use:**

The site comprised a ~31,100m<sup>2</sup> irregular-shaped plot of land, oriented in an north-west to south-east direction, located to the south-west of Bartons Road, south-east of Martin Road and north-west of New Lane. The site was located to the north-east of Havant, Hampshire.

The national grid reference for the centre of the site was approximately SU 72615 07997. A site location plan is given within Figure 1. A plan showing the site boundary can be seen in Figure 2.

The site formally comprised a factory and warehouse structure with associated offices, car parking and hard landscaping areas. All buildings on-site had been demolished at the time of site works, August 2019, with the site covered by a concrete slab over the footprint of the former structures and all tarmac parking areas/concrete hardstanding still present. An Electricity sub-station was noted in the south-western portion of site. An aerial view of the site is given within Figure 3. Further information on this is provided later in this report.

#### **Proposed Development**

At the time of reporting, April 2020, the proposed development will comprise the construction of ~100No. residential houses in the centre and the west of the site, and ~20No. commercial units in the east/south-east, with associated access roads, car parking areas and soft landscaping. A plan of the proposed development is shown within Figure 4.

#### **Geology and Radon:**

The BGS Geological Map for the Fareham area (Sheet No. 316) revealed that the site is located on superficial Head Deposits overlying bedrock of the London Clay Formation. Superficial River Terrace Deposits were noted ~300m to the south-east. No areas of Made or Worked Ground were noted within 250m of the site.

#### *Head Deposits – Chichester area*

Head Deposits occur widely in valley floors, on valley sides and on interfluvies. It is probably much more widespread than shown on the map. In general, clay-with-flints passes downslope into head, locally without a separating break of slope. Head accumulated largely by solifluction and hillwash, mainly under periglacial conditions during the Quaternary glaciations. Its composition varies according to the local sources of material and mode of landscape evolution. It is typically composed of reddish brown to yellow-brown, gravelly silty, sandy clay or diamicton, commonly with variable proportions of coarser material (chiefly broken flint nodules). Borehole records suggest that the head deposits are generally less than 3m thick, but may be over 5m locally.

#### *Undifferentiated River Terrace Deposits*

Extensive spreads of River Terrace Deposits occur along the Rivers Test, Itchen and Hamble. Eleven terraces have been provisionally recognised in the area. The deposits are variable in thickness, ranging from 1 to 5m, and generally consist of gravels, predominantly sub-angular to sub-rounded flints, with a considerable sand content. Poorly sorted clayey and sandy silts and silty clays overlie some of the terraces.

#### *London Clay Formation – Hampshire Basin*

In the Hampshire Basin area, the London Clay Formation comprises blue, brown and grey clay with yellow and grey sands and silts interspersed with pebble beds. Localised developments of sandstone

also occur. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of Gypsum (Selenite) are often found within the weathered part of the London Clay Formation, and precautions against sulphate attack to concrete are sometimes required. The basement beds of the London Clay Formation are sandy with rounded flints.

A BGS borehole located ~150m south-east of site (in similar geology) revealed 0.15m of Topsoil to overlie a firm brown clay with medium to coarse flint gravels and cobbles to 1.37m bgl. This was then underlain by a brown fine-grained sand for the remainder of the borehole, a depth of 3.05m bgl. No groundwater was encountered within the borehole.

Another BGS borehole located ~300m west of site revealed 0.15m of Topsoil to overlie a medium-dense to dense light brown to blue-grey silty fine-grained sand to 9.14m bgl. This was underlain by a stiff to very stiff blue-grey sandy clay for the remaining depth of the borehole (12.19m bgl). Groundwater was noted at a depth of 1.70m bgl. A groundwater strike was noted at 1.52m bgl, standing at between 2.44 – 4.57m bgl at the end of subsequent days of drilling works.

#### **Hydrogeology and Hydrology:**

A review of the DEFRA 'Magic Map' revealed that site was located within a **Secondary (A) Aquifer** to the east, and within a **Secondary (Undifferentiated) Aquifer** in the western portion, both comprising of the superficial Head Deposits. The underlying bedrock deposits of the London Clay Formation was classified as **Unproductive Strata**.

Superficial drift deposits are described by the BGS as permeable unconsolidated (loose) deposits e.g. sands and gravels. Bedrock is described by the BGS as solid permeable or impermeable formations e.g. clay, sandstone, chalk and limestone.'

Secondary aquifers include a wide range of drift deposits with an equally wide range of water permeability and storage capacities. **Secondary (A) Aquifers** consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

**Undifferentiated Secondary Aquifers** are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor aquifer and non-aquifer in different locations due to the variable characteristics of the rock type.

**Unproductive Strata** are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

Examination of the Defra records showed that the site was located within an **Inner Zone 1c (Subsurface Activity)** Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. This relates to the Principal Aquifer associated with the Lewes Nodular Chalk Member and Tarrant Chalk Member underlying the Unproductive Strata of the London Clay Formation.

It was noted that the site was located ~2km to the north-east of the Bedhampton and Havant Spring operated by Portsmouth Water, associated with Chalk Karst zones from the Principal Aquifer. A pathway for deep groundwater was noted to run beneath the site.

The nearest surface water feature to the site was a drain located ~10-20m to the east of the site

(Thought to be the River Lavant, according to previous reports). Emsworth Harbour was noted ~2.65km to the south of site.

Examination of the Environment Agency records showed that the site was located within a Flood Zone 1 (an area with a **low** probability of flooding). However the land immediately to the south-east of site was noted to comprise a **Flood Zone 2** and **Flood Zone 3**, associated with the drain running to the east. **Environment Agency Flood Zone 2**, defined as; land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. **Environment Agency Flood Zone 3** shows the extent of a river flood with a 1 in 100 (1%0 or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

From analysis of hydrogeological and topographical maps, shallow groundwater (associated with superficial deposits) was anticipated to be encountered at shallow to moderate depth (~2 – 4m below existing ground level (bgl)) and it was considered that the groundwater was flowing in an overall southerly direction towards Emsworth Harbour.

### **Radon**

BRE 211 (2015) Map 4 of Hampshire, Berkshire and south Oxfordshire revealed the site **was not** located within an area where mandatory protection measures against the ingress of Radon were likely to be required. The site **was not** located within an area where a risk assessment was required.

### **Results of previous Site Investigations**

Various site investigations were undertaken by numerous companies, some of which trial holes were undertaken through hardstanding, whereas trial holes from later site works were undertaken through crush material.

The phases of works undertaken prior to demolition are described below.

#### *WYG Phase 1 & 2 Ground Investigation and Assessment Report, Ref.: A090070-182, dated June 2017*

A Phase 1 Desk Study Investigation Report was undertaken by WYG in November 2016, which collated publicly available information to review the risks associated with ground conditions with potential to impact upon the redevelopment of the site for combined high density residential and commercial use. The Desk Study confirmed the requirement for intrusive ground investigations to allow a further assessment of risks. This data was collated and interpreted in order to define a Conceptual Site Model, undertake qualitative risk assessment and semi-quantitative risk assessment grading the pollutant linkages in accordance with a risk matrix. This was then used to inform a subsequent intrusive investigation. The pertinent points taken from the report summarising these works are discussed in this section of the report.

At the time of the site walkover in September 2016 and subsequent investigation in February 2017, the site was occupied by the Colt International factory, warehouse and office buildings with associated hardstanding, car parks and access roads. The local topography (which slopes to the south-east) is accommodated by a retaining wall on the north-west boundary, and an embankment running across the site.

In the southern portion of site was a building of brick and metal cladding construction used for fire testing of finished products. Adjacent to this building was an external cylindrical plastic (but likely double-skinned) Above Ground Storage Tank (AST) for 'fuel oil', of approximately 1000 litres capacity positioned on a breeze block plinth. South of the main factory building was a small brick outhouse, understood to have housed a diesel generator that previously provided a 'back up' power supply.

Adjacent west of the outhouse was a former brick bund containing several brick plinths that supported and housed a large cylindrical diesel AST. The tank was no longer present.

An electricity sub-station was located on the eastern edge of the former diesel tank bund.

A review of historic Ordnance Survey maps dating back to 1867 indicated limited residential development on the site prior to redevelopment as a manufacturing facility for Colt International in the mid-1960s. The site layout remained largely unchanged since this period. It was reported that during the Second World War a cottage building in the north west of the site was requisitioned by the mining department of HMS Vernon Mining Department and used for military storage purposes.

The WYG Desk Based Assessment identified potential on-site sources of contamination which are summarised below.

- Former cylindrical diesel AST (circa 10,000 gallons) situated south of the main factory building.
- Double skinned plastic AST (circa 1000 litres capacity) for storage of 'fuel oil' adjacent to the Fire Testing facility.
- Ancillary facilities associated with unknown activities external north west of the factory building.
- Fuel supply (including above ground pipelines) providing fuel to heaters within the building.
- Made Ground.

Although not listed as a potential source of ground contamination, the presence of asbestos materials in building materials was also recognised. A number of current and commercial premises are located in the site vicinity, and of particular note is the Marsh Plant immediately south, Eaton on the opposite side of New Lane, and a gas holder approximately 300m south of the site. Based on the local topography (sloping south east) and the known hydrogeological setting (that includes a public water abstraction to the south west) a southerly groundwater flow direction is inferred. Therefore, commercial premises in the site vicinity are considered to be down gradient in terms of inferred groundwater flow and it is considered relatively unlikely that the site has been impacted by offsite sources of contamination.

Subsequent Phase 2 intrusive works were undertaken between the 1<sup>st</sup> and 3<sup>rd</sup> of February 2017 and comprised 14No. Window sample locations to depths ranging between 0.30 and 5.00m bgl with Standard Penetration Testing (SPTs) and installation of 7No. dual purpose ground-gas and groundwater monitoring wells. Samples were obtained for laboratory assessment and 2No. return monitoring visits were undertaken. Ground conditions encountered during the investigation were consistent with those identified in the published literature and comprised a 0.40 to 2.00m thick layer of Made Ground over Head Deposits overlying the London Clay Formation at depths ranging between 0.80 and 2.80m bgl. The London Clay Formation persisted to the full depth of the investigation. Groundwater was encountered at depths ranging between 0.50 and 1.50m bgl during the investigation and between ground level and 2.79m bgl during return visits.

Contamination testing on soils and groundwater as well as ground-gas monitoring was undertaken following the ground investigation, and revealed the following.

- Minor elevations of methane and carbon dioxide (0.9 and 2.5% respectively) were recorded during gas monitoring.
- Target Screen Values (TSVs) were exceeded samples of soil for residential end use with home-grown produce, mainly in samples of Made Ground.
- Minor quantities of asbestos fibres were detected in three samples of Made Ground.
- Minor exceedances of Environmental Quality Standards (EQS) and Drinking Water Standards (DWS) of groundwater and leachate samples were also recorded.

From the desk-based and intrusive investigations undertaken at the site, a number of contamination sources and potential contamination sources have been identified. These have been tabulated into a Conceptual Site Model as seen overleaf.

| Tabulated Conceptual Site Model – Plausible Pollutant Linkages Only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential On-site Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Potential Absorption Pathways                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Potential Receptors                                                                                                                                                                                                                                                                                                                                            |
| <p>Large former diesel AST (~10,000 gallons) situated south of the main factory building, &amp; small double-skinned plastic AST (~1000 litres) for storage of 'fuel oil' situated on a plinth (not bunded) adjacent to the Fire Testing facility in the south of the site.</p> <ul style="list-style-type: none"> <li>• Total Petroleum Hydrocarbons (TPHs);</li> <li>• Poly-cyclic Aromatic Hydrocarbons (PAHs).</li> </ul> <p>Features of factory buildings, including oil-burning heaters and above-ground fuel pipes and the presence of an 'air pollution test facility'.</p> <ul style="list-style-type: none"> <li>• Heavy Metals and Semi-Metals including: Arsenic, Cadmium, Chromium, Lead, Copper, Zinc, Beryllium, Mercury etc;</li> <li>• Poly-cyclic Aromatic Hydrocarbons (PAHs);</li> <li>• Total Petroleum Hydrocarbons (TPHs);</li> <li>• Asbestos (building materials).</li> </ul> <p>Electricity Sub-station present in south of site.</p> <ul style="list-style-type: none"> <li>• PCB Oils.</li> </ul> | <p>Leaching of onsite sources of contamination.</p> <p>Lateral and vertical migration of gases/vapours.</p> <p>Overland surface water runoff.</p> <p>Contaminant migration through preferential pathways (e.g. piles, underground service ducts, and drains).</p> <p>Contaminant transport through off site migration of groundwater.</p> <p>Atmospheric transport and inhalation of airborne dusts, vapours and fibres (indoors and outdoors).</p> <p>Direct contact (dermal contact and ingestion) with soil, dust and water.</p> <p>Inhalation of vapours arising from soil contamination.</p> | <p>Future site users (users/ occupants of future commercial/ residential premises).</p> <p>Construction workers during future development works.</p> <p>Groundwater (Head Deposits, Thanet Sand Formation, White Chalk; Aquifers, SPZ).</p> <p>Surface waters (River Lavant).</p> <p>On-site buildings and services.</p> <p>Offsite workers and residents.</p> |

*Campbell Reith Updated GQRA and Outline Remediation Strategy Report, Ref.: 12663, dated May 2019*

Based on the findings of the previous Desk Study and Ground Investigation Reports undertaken by WYG, further (Phase 3) intrusive investigation and testing was done by Campbell Reith in order to increase sampling density and depth of trial holes.

During the summer of 2018 supplementary ground investigation was conducted with the objective of addressing the recommendations of the WYG 2017 report:

- Two Cable Percussive boreholes to a maximum depth of 17.50m bgl
- Seven Windowless Sampler boreholes to a maximum depth of 5.45m bgl
- Four Hand-dug Pits to a maximum depth of 1.20m bgl
- Nine machine dug Trial Pits to a maximum depth of 3.10m bgl
- Four Groundwater and ground gas monitoring visits.

The two deep Cable Percussive boreholes were progressed to 12.50 and 17.50m bgl, both encountering Made Ground overlying Superficial Head Deposits (BH202 only) and London Clay Formation to the base of the boreholes.

Nine exploratory locations (three Windowless Samplers, three Trial Pits and one Cable Percussive borehole) were progressed across the building footprint to provide additional coverage where the area had previously not been investigated. Trial pits TP209, TP210 and TP211 were progressed into the bank to the west of the monsoon drain, with the intention of investigating the drainage. There were no visual observations of contamination in the bank.

Superficial deposits were not considered to be present in significant thickness in the western car park. Variable Head Deposits were present across the bulk of the centre of the site, often trial pits did not prove the maximum depth of superficial deposits (~2.00 to 3.00m bgl). The borehole in the centre of the site demonstrated the base of the superficial deposits to be 3.20m bgl. A 12.50m deep borehole in the centre of the site encountered London Clay Formation from 3.20 to 12.50m bgl. The deep borehole in

the western car park encountered London Clay Formation from 1.30 – 4.50m bgl, followed by brown mottled orange-brown silty, fine to coarse sand, from 4.50 to 11.50m, inferred to be the Bognor Sand Member. The London Clay Formation of stiff dark greenish-grey slightly sandy clay is present from 11.50 to 17.50m bgl.

Based on contamination testing results from both the WYG and Campbell Reith investigations, the following Contamination Risk Summary was derived.

- End Users: A High risk has been identified associated with concentrations of lead, polycyclic aromatic hydrocarbons and asbestos in shallow soils.
- Groundwater: A Very Low risk has been identified due to the London Clay Formation acting as an aquitard preventing shallow groundwater affecting the aquifer at depth. Should piling be proposed, a piling risk assessment should be conducted.
- Surface Water: A Low to Moderate risk has been identified due to identified hydrocarbon contamination in shallow soils in the south east of the site. Although no impact to the nearby river has been identified to date.
- Ground Gas: The site has been classified as a CIRIA Characteristic Situation 1 (CS1), however elevated concentrations of methane and carbon dioxide require local consideration of increasing to Characteristic Situation 2.
- Services: Made Ground has hydrocarbon contamination which should be assessed for the potential requirement for protective water supply pipework.
- Groundworks: A Low to moderate risk has been identified based on the assumption that basic health and safety provisions are in place. Additional assessments with regard to asbestos in soils may be required.

This risk summary was **not** thought to significantly change the Conceptual Site Model tabulated based on the results of the WYG investigation. Based on this investigation the following outline remediation strategy was derived.

- Human health exposure: a cover system is recommended in order to mitigate the potential risks to end users from shallow soils. The depth and validation criteria should be determined with regard to the detailed layout when available. This should be submitted to and approved by the Local Planning Authority.
- Surface water risk: Although it has been shown that no discernible effect on the River Lavant, it is considered that there is a theoretical risk to surface waters from the odorous soils in the location of TP 202. It is recommended that localised source removal is conducted in the location of TP 202 and groundwater monitoring wells are installed between TP 202 and the River Lavant. The requirements of the monitoring should be agreed with the Local Planning Authority.
- Unforeseen Contamination: A watching brief for unforeseen contamination during slab removal is recommended. This is recommended to be conducted on a grid basis, where inspections should be made and evidence of unforeseen contamination should be investigated and remediated as required.

## **2.2 Summary of Previous Findings (Ground and Water Limited Contamination Assessment Report, ref. GWPR3192/CAR/December 2019).**

A fourth phase of intrusive works and risk assessment was undertaken by Ground and Water Limited post demolition, through an existing capping of crushed concrete. **The purposes of contamination testing was to increase sampling density and reduce uncertainty. The data from the Phase 2 WYG and Phase 3 Campbell Reith investigations were combined with that from the Phase 4 Ground and Water Limited investigation.**

#### Phase 4 Fieldwork Undertaken

Additional fieldwork was undertaken on the 29<sup>th</sup> – 30<sup>th</sup> August and 2<sup>nd</sup> September 2019, and comprised the construction of 20 No. Windowless Sampler Boreholes (WS1 – WS20) to a depth of between 1.80 – 3.00m bgl.

#### Sampling Procedures

The methodology for sampling locations can be seen tabulated below and overpage, this includes our interpretation of the WYG and Campbell Reith locations. A trial hole location plan is given within Figure 5.

| Methodology for Sampling Locations and Chemical Laboratory Testing (Ground and Water Ltd) |               |                                    |                                                                                              |                                                           |
|-------------------------------------------------------------------------------------------|---------------|------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Trial Hole                                                                                | Depth (m bgl) | Sampling Strategy                  | Site Use (Existing)                                                                          | Site Use (Proposed)                                       |
| WS1                                                                                       | 2.80          | Targeted sampling strategy         | Access road/car park to south of former office building.                                     | Commercial units and associated access roads/car parking. |
| WS2                                                                                       | 2.45          |                                    |                                                                                              |                                                           |
| WS3                                                                                       | 3.00          |                                    | Concrete pad for former factory building.                                                    |                                                           |
| WS4                                                                                       | 2.45          |                                    | Concrete hardstanding adjacent to Electricity Sub-station.                                   | Residential housing and associated garden areas.          |
| WS5                                                                                       | 1.80          |                                    |                                                                                              |                                                           |
| WS6                                                                                       | 2.45          |                                    |                                                                                              |                                                           |
| WS7                                                                                       | 2.45          |                                    |                                                                                              | Residential flats and associated car parking.             |
| WS8                                                                                       | 2.45          |                                    |                                                                                              | Residential housing and associated garden areas.          |
| WS9                                                                                       | 2.45          |                                    |                                                                                              | Residential flats and associated car parking.             |
| WS10                                                                                      | 2.45          |                                    | Concrete pad for former factory building.                                                    | Residential housing and associated garden areas.          |
| WS11                                                                                      | 2.00          |                                    |                                                                                              | Residential flats and associated car parking.             |
| WS12                                                                                      | 2.45          |                                    |                                                                                              |                                                           |
| WS13                                                                                      | 2.45          |                                    |                                                                                              | Residential housing and associated garden areas.          |
| WS14                                                                                      | 2.00          |                                    |                                                                                              |                                                           |
| WS15                                                                                      | 2.00          |                                    |                                                                                              | Residential flats and associated car parking.             |
| WS16                                                                                      | 2.45          |                                    |                                                                                              |                                                           |
| WS17                                                                                      | 2.45          |                                    | Tarmac car parking area.                                                                     | Residential housing and associated garden areas.          |
| WS18                                                                                      | 2.45          |                                    |                                                                                              |                                                           |
| WS19                                                                                      | 2.45          |                                    |                                                                                              |                                                           |
| WS20                                                                                      | 2.45          |                                    |                                                                                              |                                                           |
| BH1                                                                                       | 4.00          | Random sampling strategy (assumed) | Tarmac car parking area.                                                                     | Residential housing and associated garden areas.          |
| BH2                                                                                       | 3.50          |                                    | Concrete hardstanding area to north of factory building.                                     | Residential flats and associated car parking.             |
| BH3                                                                                       | 4.00          |                                    |                                                                                              |                                                           |
| BH4                                                                                       | 5.00          |                                    | Soft landscaping area adjacent to car park.                                                  | Soft landscaping adjacent to commercial units.            |
| BH5                                                                                       | 2.70          |                                    | Tarmac car parking area south of offices.                                                    | Commercial units and associated access roads/car parking. |
| BH6                                                                                       | 1.80          |                                    |                                                                                              |                                                           |
| BH7                                                                                       | 4.00          |                                    | Hardstanding area surrounding Electricity Sub-station, south of factory building.            | Residential housing and associated garden areas.          |
| BH8                                                                                       | 0.80          |                                    |                                                                                              |                                                           |
| BH9                                                                                       | 3.00          |                                    |                                                                                              |                                                           |
| BH10                                                                                      | 0.30          |                                    | Tarmac car parking area.                                                                     |                                                           |
| BH11                                                                                      | 3.00          |                                    |                                                                                              |                                                           |
| BH12                                                                                      | 3.00          |                                    | Soft landscaping west of factory building.                                                   | Soft landscaping adjacent to residential housing.         |
| BH13                                                                                      | 1.50          |                                    | Soft landscaping along eastern boundary of site, adjacent to offices and associated parking. | Soft landscaping adjacent to commercial units.            |
| BH14                                                                                      | 4.00          |                                    |                                                                                              | Commercial units and associated access roads/car parking. |
| BH1-I                                                                                     | 3.00          |                                    | Concrete pad inside factory building.                                                        | Residential flats and associated car parking.             |
| BH2-I                                                                                     | 4.00          |                                    |                                                                                              |                                                           |
| BH3-I                                                                                     | 3.00          |                                    |                                                                                              |                                                           |

Cont'd Overleaf:

| Methodology for Sampling Locations and Chemical Laboratory Testing (WYG/Campbell Reith) |               |                            |                                                                                              |                                                   |
|-----------------------------------------------------------------------------------------|---------------|----------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------|
| Trial Hole                                                                              | Depth (m bgl) | Sampling Strategy          | Site Use (Existing)                                                                          | Site Use (Proposed)                               |
| BH201                                                                                   | 17.50         | Targeted sampling strategy | Tarmac car parking area.                                                                     | Residential housing and associated garden areas.  |
| BH202                                                                                   | 0.30          |                            | Concrete pad for former factory building.                                                    |                                                   |
| BH202a                                                                                  | 12.50         |                            | Tarmac car parking area.                                                                     |                                                   |
| WS201                                                                                   | 0.50          |                            |                                                                                              |                                                   |
| WS202                                                                                   | 2.90          |                            |                                                                                              |                                                   |
| WS203                                                                                   | 5.45          |                            |                                                                                              |                                                   |
| WS204                                                                                   | 4.00          |                            | Concrete pad for former factory building.                                                    |                                                   |
| WS205                                                                                   | 2.90          |                            | Soft landscaping west of former factory building.                                            | Soft landscaping adjacent to residential housing. |
| WS206                                                                                   | 2.45          |                            | Concrete hardstanding area to north of factory building.                                     | Residential flats and associated car parking.     |
| WS207                                                                                   | 0.50          |                            | Tarmac car parking area.                                                                     | Commercial units and associated access roads.     |
| TP202                                                                                   | 2.50          |                            | Concrete pad for former factory building.                                                    | Residential housing and associated garden areas.  |
| TP204                                                                                   | 3.10          |                            |                                                                                              |                                                   |
| TP205                                                                                   | 2.20          |                            |                                                                                              |                                                   |
| TP206                                                                                   | 3.00          |                            | Soft landscaping west of former factory building.                                            | Soft landscaping adjacent to residential housing. |
| TP207                                                                                   | 1.10          |                            |                                                                                              |                                                   |
| TP208                                                                                   | 2.70          |                            |                                                                                              |                                                   |
| TP209                                                                                   | 2.50          |                            | Soft landscaping area adjacent to car park.                                                  | Soft landscaping adjacent to commercial units.    |
| TP210                                                                                   | 1.90          |                            |                                                                                              |                                                   |
| TP211                                                                                   | 2.00          |                            | Soft landscaping along eastern boundary of site, adjacent to offices and associated parking. | Commercial units and associated access roads.     |
| HP201                                                                                   | 0.40          |                            |                                                                                              |                                                   |
| HP202                                                                                   | 0.60          |                            |                                                                                              |                                                   |
| HP203                                                                                   | 1.00          |                            |                                                                                              |                                                   |
| HP204                                                                                   | 0.80          |                            |                                                                                              |                                                   |

The area of the site totals ~31,100m<sup>2</sup> (3.10 Hectares) and with 20No. Ground and Water Limited sampling locations, given an unknown hotspot shape, the sampling density means that a hotspot with an area of approximately 2,332.50m<sup>2</sup> and a radius of approximately 27.25m would be encountered (CLR 4, 1994).

Including the WYG and Campbell Reith data, a total of 60 sampling locations have been provided. Given an unknown hotspot shape, the sampling density means that a hotspot with an area of approximately 777.50m<sup>2</sup> and a radius of approximately 15.73m would be encountered (CLR 4, 1994).

### Soil Conditions

The ground conditions encountered during the investigation are described in this section. For the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised below.

### Made Ground Head Deposits (WS1-WS2, WS4-WS6, WS8-WS17, WS20) London Clay Formation (WS6-WS7, WS18-WS20)

#### Made Ground

Made Ground was encountered in all trial holes from beneath a 0.18 – 0.30m thick capping of Concrete within WS1 – WS16, and a 0.10 – 0.20m thick capping of Tarmac in WS17 – WS20, to a depth of between 0.30 – 1.50m bgl (and for the entire depth of WS3 to 3.00m bgl). The soils were noted to be variable across the site, but most generally comprised a light to dark brown, grey-brown, pale yellow

and orange to reddish-brown, sandy gravelly clay to sandy gravel (locally a gravelly slightly clayey sand). The sand was fine to coarse grained and the gravel was fine to coarse, angular to rounded flint rejects, brick, concrete, tarmac, metal, ceramic fragments, chalk fragments and charcoal/carbonaceous material. A hydrocarbon/creosote odour was noted within WS1, WS3 and WS16.

Within WS5 from 0.80 – 1.00m, WS9 from 0.25 – 0.40m, WS17 from 0.15 – 0.40m, WS18 from 0.20 – 0.70m and WS19 from 0.10 – 0.40m bgl, the Made Ground was recovered as a matrix-dominated chalk fill (Dm Grade according to CIRIA C574).

#### *Head Deposits*

Soils representative of the superficial Head Deposits were noted underlying the Made Ground to a depth of 1.80m bgl within WS6 and 1.00m bgl within WS20, and for the remaining depth of WS1-WS2, WS4-WS5 and WS8-WS17, a depth of between 1.80 – 2.80m bgl. A mixture of cohesive and granular deposits were noted.

Cohesive soils were noted underlying the Made Ground for the remaining depth of WS1-WS2, WS4 and WS8, and to a depth of between 1.00 – 1.80m bgl within WS5-WS6, WS9 and WS17, and generally comprised a light to mid-brown, mid to dark grey-brown and orange-brown sandy gravelly clay. The sand was fine to coarse grained and the gravel was occasional to frequent, fine to coarse, angular to sub-rounded (locally rounded) flint and occasional carbonaceous material.

Granular soils were noted underlying the cohesive deposits for the remaining depth of WS5, WS9 and WS17, and underlying the Made Ground for the remaining depth of WS10-WS16, and generally comprised an orange-brown, grey-brown and mid-brown mottled (locally slightly clayey) gravelly silty sand. The sand was fine to medium grained and the gravel was fine to coarse, angular to rounded flint.

A slight hydrocarbon odour was noted from ~1.50 - 2.00m bgl within WS1.

#### *London Clay Formation*

Soils of the London Clay Formation were noted underlying the Made Ground/ Head Deposits for the remaining depth of WS6-WS7 and WS18-WS20, and comprised a blue-grey, orange and grey-brown (locally slightly sandy) clay. The sand was fine grained. Shell fragments were noted at 1.70m bgl within WS20, and claystone fragments at 2.00m bgl within WS18 and WS20.

Roots were noted to a depth of between 0.50 – 2.00m bgl within WS6-WS8 and WS17-WS20. A summary of root depths within individual trial holes is tabulated below.

| Summary of Root Depth |                             |                        |
|-----------------------|-----------------------------|------------------------|
| Trial Hole            | Depth of Trial Hole (m bgl) | Depth of Roots (m bgl) |
| WS6                   | 2.45m                       | 1.00m                  |
| WS7                   | 2.45m                       | 0.80m                  |
| WS8                   | 2.45m                       | 0.80m                  |
| WS17                  | 2.45m                       | 0.50m                  |
| WS18                  | 2.45m                       | 2.00m (Decayed)        |
| WS19                  | 2.45m                       | 2.00m                  |
| WS20                  | 2.45m                       | 1.00m                  |

A groundwater strike was noted at 1.70m bgl within WS8, and wet soils were encountered within WS1, WS2, WS10, WS13, WS16 and WS19 at depths of between 0.70 – 2.80m bgl. A summary of groundwater depths is tabulated overleaf.

| Summary of Groundwater Encountered |                            |                            |
|------------------------------------|----------------------------|----------------------------|
| Trial Hole                         | Depth of GW strike (m bgl) | Depth of wet soils (m bgl) |
| WS1                                | -                          | 2.40 – 2.80m               |
| WS2                                | -                          | 1.00 – 2.45m bgl           |
| WS8                                | 1.70m                      | -                          |
| WS10                               | -                          | 0.80 – 1.10m               |
| WS13                               | -                          | 1.50m                      |
| WS16                               | -                          | 1.50 – 2.00m               |
| WS19                               | -                          | 0.70 – 1.50m               |

### Chemical Laboratory Testing – Human Health Risk Assessment

A programme of chemical laboratory testing, scheduled by Ground and Water Limited and carried out by DETS Limited, was undertaken on twenty-five soil samples recovered from the trial holes.

Twenty-five soil samples were sent off for analysis for a broad range of contaminants in accordance with DEFRA/CLEA methodologies.

The samples tested and the reasons for testing can be seen tabulated below.

| Methodology for Sampling Locations and Chemical Laboratory Testing |               |                                                                                                   |
|--------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------|
| Trial Hole                                                         | Depth (m bgl) | Sampling Strategy                                                                                 |
| WS1                                                                | 0.30          | Samples of Made Ground surrounding the contamination hotspot 'TP202'.                             |
| WS1                                                                | 2.00          |                                                                                                   |
| WS2                                                                | 0.50          |                                                                                                   |
| WS3                                                                | 2.00          |                                                                                                   |
| WS4                                                                | 1.50          | Sample of Made Ground from concrete hardstanding area to the south of site.                       |
| WS5                                                                | 1.50          | Representative samples of Made Ground beneath concrete slab of former Factory/Warehouse building. |
| WS6                                                                | 0.50          |                                                                                                   |
| WS7                                                                | 0.50          |                                                                                                   |
| WS8                                                                | 0.30          |                                                                                                   |
| WS9                                                                | 0.50          |                                                                                                   |
| WS11                                                               | 0.80          |                                                                                                   |
| WS13                                                               | 0.50          |                                                                                                   |
| WS14                                                               | 0.50          |                                                                                                   |
| WS15                                                               | 1.00          |                                                                                                   |
| WS16                                                               | 0.50          |                                                                                                   |
| WS16                                                               | 0.80          |                                                                                                   |
| WS16                                                               | 1.00          |                                                                                                   |
| WS17                                                               | 0.30          | Representative samples of Made Ground from beneath tarmac parking area to the north-west of site. |
| WS17                                                               | 0.50          |                                                                                                   |
| WS18                                                               | 0.30          |                                                                                                   |
| WS18                                                               | 1.00          |                                                                                                   |
| WS19                                                               | 0.30          |                                                                                                   |
| WS19                                                               | 0.80          |                                                                                                   |
| WS19                                                               | 1.00          |                                                                                                   |
| WS20                                                               | 0.30          |                                                                                                   |

The analysis suite for the Ground and Water Limited Phase of Investigation is presented below/overleaf, and comprised.

- Semi Metals and Heavy Metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc (WS1/2.00m, WS3/2.00m, WS16/0.50m, WS16/0.80m, WS17/0.50m bgl);

- Lead (WS1/0.30m, WS1/2.00m, WS2/0.50m, WS3/2.00m, WS4/1.50m, WS5/1.50m, WS6/0.50m, WS7/0.50m, WS8/0.30m, WS9/0.50m, WS11/0.80m, WS13/0.50m, WS14/0.50m, WS15/1.00m, WS16/0.50m, WS16/0.80m, WS16/1.00m, WS17/0.30m, WS17/0.50m, WS18/0.30m, WS18/1.00m, WS19/0.30m, WS19/0.80m, WS19/1.00m, WS20/0.30m bgl);
- Asbestos Screen (WS1/0.30m, WS1/2.00m, WS2/0.50m, WS3/2.00m, WS4/1.50m, WS5/1.50m, WS6/0.50m, WS7/0.50m, WS8/0.30m, WS9/0.50m, WS11/0.80m, WS13/0.50m, WS14/0.50m, WS15/1.00m, WS16/0.50m, WS16/0.80m, WS16/1.00m, WS17/0.30m, WS17/0.50m, WS18/0.30m, WS18/1.00m, WS19/0.30m, WS19/0.80m, WS19/1.00m, WS20/0.30m bgl);
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene (WS1/0.30m, WS1/2.00m, WS2/0.50m, WS4/1.50m, WS5/1.50m, WS6/0.50m, WS7/0.50m, WS8/0.30m, WS9/0.50m, WS11/0.80m, WS13/0.50m, WS14/0.50m, WS15/1.00m, WS16/1.00m, WS17/0.30m, WS17/0.50m, WS18/0.30m, WS18/1.00m, WS19/0.30m, WS19/0.80m, WS19/1.00m, WS20/0.30m bgl);
- Fuel Oils – Speciated TPH including full aliphatic/aromatic split (WS3/2.00m, WS16/0.50m, WS16/0.80m bgl);
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs) (WS3/2.00m, WS16/0.50m, WS16/0.80m bgl).

The results of the comparison of the representative contaminant concentrations for all rounds of chemical testing are presented in the table overleaf.

| Soil Guideline Values and General Acceptance Criteria Results |                                                                                                                 |                                                                    |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Substance                                                     | Sample Location<br>Where available LQM/CIEH S4UL/ CSL4 LLTC or GAC were exceeded for relevant land-use scenario |                                                                    |
|                                                               | "Residential with Home-grown produce" Land-Use Scenario                                                         | "Commercial" Land-Use Scenario                                     |
| Arsenic                                                       | None                                                                                                            | None                                                               |
| Beryllium                                                     | None                                                                                                            | None                                                               |
| Boron                                                         | None                                                                                                            | None                                                               |
| Cadmium                                                       | None                                                                                                            | None                                                               |
| Chromium (III)                                                | None                                                                                                            | None                                                               |
| Hexavalent Chromium (VI)                                      | None                                                                                                            | None                                                               |
| Copper                                                        | None                                                                                                            | None                                                               |
| Lead                                                          | WS17/0.50m (859mg/kg), WS18/1.00m (274mg/kg), WS19/0.80m (403mg/kg), WS19/1.00m (444mg/kg)                      | None                                                               |
| Mercury (Elemental)                                           | None                                                                                                            | None                                                               |
| Nickel                                                        | None                                                                                                            | None                                                               |
| Selenium                                                      | None                                                                                                            | None                                                               |
| Vanadium                                                      | None                                                                                                            | None                                                               |
| Zinc                                                          | None                                                                                                            | None                                                               |
| Cyanide (Total)                                               | None                                                                                                            | None                                                               |
| Total Phenol                                                  | None                                                                                                            | None                                                               |
| Naphthalene                                                   | BH11/0.30m (2.31mg/kg)                                                                                          | None                                                               |
| Acenaphthylene                                                | None                                                                                                            | None                                                               |
| Acenaphthene                                                  | None                                                                                                            | None                                                               |
| Fluorene                                                      | None                                                                                                            | None                                                               |
| Phenanthrene                                                  | BH201/0.25m (230mg/kg)                                                                                          | None                                                               |
| Anthracene                                                    | None                                                                                                            | None                                                               |
| Fluoranthene                                                  | None                                                                                                            | None                                                               |
| Pyrene                                                        | None                                                                                                            | None                                                               |
| Benzo(a)anthracene                                            | BH201/0.25m (130mg/kg), BH11/0.30m (14.64mg/kg)                                                                 | None                                                               |
| Chrysene                                                      | BH201/0.25m (94mg/kg), BH11/0.30m (15.55mg/kg)                                                                  | None                                                               |
| Benzo(b)fluoranthene                                          | BH201/0.25m (110mg/kg), BH11/0.30m (18.65mg/kg), WS201/0.45m (4.3mg/kg)                                         | WS1/0.30m (101mg/kg)                                               |
| Benzo(k)fluoranthene                                          | None                                                                                                            | None                                                               |
| Benzo(a)pyrene                                                | BH201/0.25m (84mg/kg), BH11/0.30m (16.19mg/kg), WS201/0.45m (3.5mg/kg)                                          | WS1/0.30m (67.3mg/kg)                                              |
| Indeno(1,2,3-cd)pyrene                                        | BH201/0.25m (50mg/kg)                                                                                           | None                                                               |
| Dibenz(a,h)anthracene                                         | BH201/0.25m (17mg/kg), BH11/0.30m (2.25mg/kg), WS201/0.45m (0.33mg/kg)                                          | WS1/0.30m (8.54mg/kg)                                              |
| Benzo(ghi)perylene                                            | None                                                                                                            | None                                                               |
| TPH C5 – C6 (aliphatic)                                       | None                                                                                                            | None                                                               |
| TPH C6 – C8 (aliphatic)                                       | None                                                                                                            | None                                                               |
| TPH C8 – C10 (aliphatic)                                      | WS16/0.50m (76mg/kg), WS16/0.80m (66mg/kg)                                                                      | None                                                               |
| TPH C10 – C12 (aliphatic)                                     | WS16/0.50m (437mg/kg), WS16/0.80m (367mg/kg)                                                                    | None                                                               |
| TPH C12 – C16 (aliphatic)                                     | WS16/0.50m (1547mg/kg), WS16/0.80m (1246mg/kg)                                                                  | None                                                               |
| TPH C16 – C21 (aliphatic)                                     | None                                                                                                            | None                                                               |
| TPH C21 – C34 (aliphatic)                                     | None                                                                                                            | None                                                               |
| TPH C5 – C7 (aromatic)                                        | None                                                                                                            | None                                                               |
| TPH C7 – C8 (aromatic)                                        | None                                                                                                            | None                                                               |
| TPH C8 – C10 (aromatic)                                       | None                                                                                                            | None                                                               |
| TPH C10 – C12 (aromatic)                                      | WS16/0.50m (356mg/kg), WS16/0.80m (299mg/kg)                                                                    | None                                                               |
| TPH C12 – C16 (aromatic)                                      | WS16/0.50m (382mg/kg), WS16/0.80m (297mg/kg), BH201/0.25m (240mg/kg)                                            | None                                                               |
| TPH C16 – C21 (aromatic)                                      | BH201/0.25m (1600mg/kg)                                                                                         | None                                                               |
| TPH C21 – C35 (aromatic)                                      | BH201/0.25m (2600mg/kg)                                                                                         | None                                                               |
| Benzene                                                       | None                                                                                                            | None                                                               |
| Toluene                                                       | None                                                                                                            | None                                                               |
| Ethylbenzene                                                  | None                                                                                                            | None                                                               |
| Xylene (o, m & p)                                             | None                                                                                                            | None                                                               |
| MTBE                                                          | None                                                                                                            | None                                                               |
| Asbestos Screen                                               | BH2/0.60m (Amosite: 0.002%)                                                                                     | BH14/0.30m (Chrysotile: 0.012%), HP201/0.50m (Chrysotile: <0.001%) |

### CLAIRE Statistics

CLAIRE statistical analysis revealed the distribution of Lead and PAHs within the Made Ground was non-normal. Outliers were noted within all phases of works, however the Upper Confidence Limit only exceeded the threshold for a **'Residential with Home-grown Produce'** land use scenario for Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene. The outliers that had to be removed in order to bring the Upper Confidence Limit below the threshold comprised the samples BH201/0.25m, WS1/0.30m, BH11/0.30m, BH4/0.50m and WS2/0.50m.

As WS1, WS2 and BH4 were all located within the area of site with a **'Commercial'** land-use scenario, and only WS1 was noted to exceed the threshold for this land-use, it was considered that no remediation was necessary for WS2 or BH4. **Remediation could be considered for WS1 with respect to human health.**

As the remaining two outliers noted during initial CLAIRE statistical analysis (covering the entire site) and samples found to individually exceed the threshold for a **'Residential with Home-Grown Produce'** land-use scenario were all located within the north-western portion of site (a car parking area), then it was considered that a second CLAIRE statistical analysis over this area of site would help determine a more realistic remediation strategy for the proposed residential development.

This analysis confirmed that outliers were present within the north-western residential area samples at BH201/0.25m and BH11/0.30m. However, it also revealed that Lead was elevated across the site area, even with an outlier at WS17/0.50m bgl having been removed. Therefore, it was considered that remediation was necessary for the entire north-western car park area of site.

Remediation was also considered necessary for the elevated TPH values present within WS16. As this was the only trial hole where elevated determinands were noted outside of the north-western car park and **'Commercial'** area, hotspot removal in a ~15m radius surrounding WS16 was thought to be the most cost-effective solution.

### Human Health – Asbestos contamination within the Made Ground

Fibres of Amosite asbestos was noted within BH2/0.60m bgl, and Chrysotile asbestos was noted within BH14/0.30m, CP3/0.35m (this location could not be found on trial hole location plans, so it was assumed this was BH3), and HP201/0.50m bgl. Asbestos quantifications revealed concentrations of between <0.001% and 0.012% for Chrysotile, and 0.002% for Amosite.

Given the presence of these fibres within the soils and the potential for these hotspots to coincide with publicly accessible areas on site, as well as workers during site redevelopment, it is considered likely that further risk assessment is necessary with respect to the asbestos detections noted.

The quantifications for BH2/0.60m and BH14/0.30m bgl were subject to risk assessment, as these were the highest noted for Amosite and Chrysotile respectively.

The risk assessment revealed remediation of BH2 was considered necessary in order to eliminate the risk from Amosite fibres to end-users. No remediation procedures were considered necessary where Chrysotile fibres were detected.

Fragments of Chrysotile asbestos in the form of cement and bitumen were also noted in three samples tested; TP206/0.30m bgl, around the eastern portion of the residential area of site, and HP203/0.15m and HP201/0.20m bgl around the north-eastern and south-eastern boundary of site. Through examination of the proposed development plans it was thought that these areas of soil are likely to

comprise areas of soft landscaping, and although some soils may be excavated as part of redevelopment, there may still be a residual risk to end users. Therefore, remediation of these areas in the form of Made Ground removal and the use of a geo-textile membrane may be required.

An **Asbestos Management Strategy** should be put in place to ensure that any more potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination.

#### **Groundwater Risk Assessment**

A review of the DEFRA 'Magic Map' revealed that site was located within a **Secondary (A) Aquifer** to the east, and within a **Secondary (Undifferentiated) Aquifer** in the western portion, both comprising of the superficial Head Deposits. The underlying bedrock deposits of the London Clay Formation was classified as **Unproductive Strata**.

Examination of the Defra records showed that the site was located within an **Inner Zone 1c (Subsurface Activity)** Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater. This relates to the Principal Aquifer associated with the Lewes Nodular Chalk Member and Tarrant Chalk Member underlying the Unproductive Strata of the London Clay Formation.

The nearest surface water feature to the site was a drain located ~10-20m to the east of the site (Thought to be the River Lavant, according to previous reports). Emsworth Harbour was noted ~2.65km to the south of site.

During the Ground and Water investigation, a groundwater strike was noted at 1.70m bgl within WS8, and wet soils were encountered within WS1, WS2, WS10, WS13, WS16 and WS19 at depths of between 0.70 – 2.80m bgl. During the WYG investigation, groundwater strikes were encountered at depths ranging between 0.50 and 1.80m bgl and then between ground level and 2.79m bgl during return visits to monitor wells installed across the site. The CampbellReith investigation revealed groundwater strikes between 1.40 – 17.40m bgl, with slight seepage noted at depths of between 0.40 – 2.50m bgl.

Examination of the Environment Agency records showed that the site was located within a Flood Zone 1 (an area with a **low** probability of flooding). However, the land immediately to the south-east of site was noted to comprise a **Flood Zone 2** and **Flood Zone 3**, associated with the drain running to the east.

Given the olfactory evidence to suggest hydrocarbon-type contamination on-site, and corresponding exceedances of PAHs and lighter-end TPHs noted during the investigation, the Made Ground encountered onsite **was** considered to pose a possible risk to shallow groundwater.

Details on this sampling and testing, as noted within the WYG Phase 1 Ground Investigation and Assessment Report (Ref.: A090070-182, dated June 2017), is detailed below.

An initial visit was made to the site (10<sup>th</sup> February 2017) to complete well development. Subsequently, two monitoring trips were completed dated 20<sup>th</sup> and 27<sup>th</sup> February 2017. During these visits ground water sampling and groundwater level monitoring was undertaken. Groundwater was removed from the well as part of well development, using low flow method. All wells were purged dry due to slow flow rate.

Groundwater samples were collected using the low-flow technique, whereby the sample is extracted at the same rate that water flows into the well, i.e. the water level within the well remains constant throughout. As a precaution, due to the slow flow rate and low recharge, the wells were only purged

until the water ran clear, which approximately removed 0.5 litres of groundwater.

The environmental chemistry of 13No. groundwater samples selected by WYG were analysed by Jones Environmental Laboratory. The analysis suite is presented below and comprised.

- Metals Suite – Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium (III), Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Zinc;
- Calcium;
- Chloride;
- Polycyclic Aromatic Hydrocarbons (USEPA Standard 16) suite;
- Total Petroleum Hydrocarbons (TPH) Criteria Working group testing;
- Total Hardness;
- Phenols by HPLC;
- Standard inorganics including pH, sulphate, total cyanide;
- Nitrate and Nitrite;
- Dissolved Organic Carbon;
- Ammonical Nitrogen as  $\text{NH}_3$  and  $\text{NH}_4$ ;
- BTEX by GC-MS;
- Total Alkalinity as  $\text{CaCO}_3$ ;
- Volatile Organic Compounds.

Of the 13 groundwater samples tested, exceedances with regard to annual average (AA) and maximum allowable concentration (MAC) Environmental Quality Standards were noted within 9 samples from BH1, BH4, BH5, BH11 and BH14. Where determinands were found to be under detection limits, no further risk assessment was considered necessary. Any above detection limits are tabulated below.

| Tabulated Results For Groundwater Testing |                                                                                                                                                               |                    |           |                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Determinant                               | Units                                                                                                                                                         | EQS Source         | EQS Level | Samples where EQS Level was exceeded                                                                                                                                                                                                                                                                  |
| Dissolved Nickel                          | $\mu\text{g/l}$                                                                                                                                               | AA-EQS Freshwater  | 4         | BH5/Round 1 (6.7 $\mu\text{g/l}$ ), Round 2 (7.0 $\mu\text{g/l}$ )<br>BH11/Round 1 (4.3 $\mu\text{g/l}$ ), Round 2 (4.4 $\mu\text{g/l}$ )                                                                                                                                                             |
| Anthracene                                | $\mu\text{g/l}$                                                                                                                                               | AA-EQS Freshwater  | 0.1       | BH1/Round 1 (0.47 $\mu\text{g/l}$ ), Round 2 (0.14 $\mu\text{g/l}$ )<br>BH5/Round 2 (0.15 $\mu\text{g/l}$ )                                                                                                                                                                                           |
| Fluoranthene                              | $\mu\text{g/l}$                                                                                                                                               | AA-EQS Freshwater  | 0.0063    | BH1/Round 1 (0.83 $\mu\text{g/l}$ ), Round 2 (0.27 $\mu\text{g/l}$ )<br>BH4/Round 1 (0.01 $\mu\text{g/l}$ )<br>BH5/Round 2 (2.45 $\mu\text{g/l}$ )<br>BH11/Round 1 (0.04 $\mu\text{g/l}$ ), Round 2 (0.11 $\mu\text{g/l}$ )<br>BH14/Round 1 (0.03 $\mu\text{g/l}$ )                                   |
| Benzo(a)pyrene                            | $\mu\text{g/l}$                                                                                                                                               | AA-EQS Freshwater  | 0.00017   | BH1/Round 1 (0.02 $\mu\text{g/l}$ )<br>BH5/Round 2 (0.35 $\mu\text{g/l}$ )                                                                                                                                                                                                                            |
| Benzo(ghi)perylene                        | $\mu\text{g/l}$                                                                                                                                               | MAC-EQS Freshwater | 0.0082    | BH1/Round 1 (0.01 $\mu\text{g/l}$ )<br>BH5/Round 2 (0.23 $\mu\text{g/l}$ )                                                                                                                                                                                                                            |
| Benzo(k)fluoranthene                      | $\mu\text{g/l}$                                                                                                                                               | MAC-EQS Freshwater | 0.017     | BH5/Round 2 (0.23 $\mu\text{g/l}$ )                                                                                                                                                                                                                                                                   |
| Benzo(b)fluoranthene                      | $\mu\text{g/l}$                                                                                                                                               | MAC-EQS Freshwater | 0.017     | BH1/Round 1 (0.03 $\mu\text{g/l}$ )<br>BH5/Round 2 (0.58 $\mu\text{g/l}$ )                                                                                                                                                                                                                            |
| Total Cyanide                             | $\mu\text{g/l}$                                                                                                                                               | AA-EQS Freshwater  | 1         | BH1/Round 1 (2 $\mu\text{g/l}$ ), Round 2 (4 $\mu\text{g/l}$ )<br>BH5/Round 1 (2 $\mu\text{g/l}$ ), Round 2 (3 $\mu\text{g/l}$ )<br>BH11/Round 1 (3 $\mu\text{g/l}$ ), Round 2 (4 $\mu\text{g/l}$ )                                                                                                   |
| Ammonia as Nitrogen                       | $\mu\text{g/l}$                                                                                                                                               | EQS Freshwater     | 300       | BH1/Round 1 (3,150 $\mu\text{g/l}$ ), Round 2 (870 $\mu\text{g/l}$ )<br>BH5/Round 1 (1,530 $\mu\text{g/l}$ ), Round 2 (1,470 $\mu\text{g/l}$ )<br>BH11/Round 1 (10,100 $\mu\text{g/l}$ ), Round 2 (4,070 $\mu\text{g/l}$ )<br>BH14/Round 1 (1,150 $\mu\text{g/l}$ ), Round 2 (1,140 $\mu\text{g/l}$ ) |
| Notes                                     | EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration |                    |           |                                                                                                                                                                                                                                                                                                       |

The testing revealed that a number of contaminants, in particular PAH compounds, metals, ammonia and cyanide exceeded the relevant EQS Freshwater standards. The exceedances for Nickel and Cyanide were noted to be marginal (within an order of magnitude of the threshold), however greater exceedances were noted for Ammonia within groundwater collected from BH1 and BH11 in the west of the site, and also in BH5 and BH14 in the south-east.

Relatively high concentrations of PAH compounds (fluoranthene, benzo(a)pyrene, benzo(ghi)perylene and benzo(b)fluoranthene) were also recorded within BH1 and BH5. It was noted during the WYG investigation that in BH1, superficial strata was not recorded and the shallow groundwater encountered was considered to be perched within the Made Ground overlying the London Clay Formation. BH1 was located in the north-west of the site ~250m from the nearest surface water feature to site (thought to be the River Lavant), and based on the inconsistent contaminant concentrations recorded within the groundwater, the absence of a confirmed continuous groundwater pathway and the travel distance to surface water features, it was considered **unlikely** that the groundwater contaminants recorded within BH1 would risk impacting watercourses surrounding the site (such as the River Lavant). This was confirmed by water sampling and testing of the on-site Monsoon Drain and nearby River Lavant undertaken by WYG, which revealed **no** exceedances with regard to EQS thresholds.

The exceedances of PAH compounds within BH5 were thought to be directly related to contaminants within the surrounding soils (such as those noted within WS1), as it was noted within the WYG report that minimal recovery of groundwater occurred following purging of the well and the groundwater sampled contained a high silt content. **It was therefore considered likely that hotspot remediation of WS1 would eliminate the source of PAHs into groundwater in this area, and no further remediation would be necessary.**

In addition to groundwater sampling, WYG also conducted leachate analysis on 3No. soil samples recovered during the investigation. The analysis suite is presented below and comprised:

- Metals Suite – Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium (III), Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Zinc;
- Polycyclic Aromatic Hydrocarbons (USEPA Standard 16) suite.

Of the 3 samples tested for leachates, exceedances with regard to annual average (AA) and maximum allowable concentration (MAC) Environmental Quality Standards were noted within 3 samples from BH1, BH5 and BH14. Where determinands were found to be under detection limits, no further risk assessment was considered necessary. Any above detection limits are tabulated overleaf.

| Tabulated Results For Groundwater Testing |                                                                                                                                                               |                    |           |                                                                       |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------|-----------------------------------------------------------------------|
| Determinant                               | Units                                                                                                                                                         | EQS Source         | EQS Level | Samples where EQS Level was exceeded                                  |
| Dissolved Nickel                          | µg/l                                                                                                                                                          | AA-EQS Freshwater  | 4         | BH14/Round 1 (6.6µg/l)                                                |
| Fluoranthene                              | µg/l                                                                                                                                                          | AA-EQS Freshwater  | 0.0063    | BH1/1.50m (0.02µg/l)<br>BH1/0.60m (0.70µg/l)<br>BH14/0.30m (0.02µg/l) |
| Benzo(a)pyrene                            | µg/l                                                                                                                                                          | AA-EQS Freshwater  | 0.00017   | BH5/0.60m (0.13µg/l)                                                  |
| Benzo(ghi)perylene                        | µg/l                                                                                                                                                          | MAC-EQS Freshwater | 0.0082    | BH5/0.60m (0.08µg/l)                                                  |
| Benzo(k)fluoranthene                      | µg/l                                                                                                                                                          | MAC-EQS Freshwater | 0.017     | BH5/0.60m (0.08µg/l)                                                  |
| Benzo(b)fluoranthene                      | µg/l                                                                                                                                                          | MAC-EQS Freshwater | 0.017     | BH5/0.60m (0.2µg/l)                                                   |
| Notes                                     | EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration |                    |           |                                                                       |

The exceedances noted within leachate samples correspond to those present within groundwater, with nickel and PAH exceedances noted in boreholes where groundwater contamination was also present. It was however noted within the WYG report that the method of leachate derivation can result in concentrations that exceed those present under natural conditions. It was therefore considered that the occurrences of contamination within groundwater provided a more meaningful assessment of the potential risks to controlled waters (such as the drain/River Lavant to the east of site).

With regard to the groundwater and leachate testing conducted during previous phases of investigation, it was confirmed that the thickness of the London Clay Formation underlying the site was considered sufficient to protect the underlying Principal Aquifer from perched groundwater contamination, and there were not sufficient pathways for contamination to affect watercourses close to the site. This was confirmed by upstream and downstream testing of the nearby River Lavant, as well as the on-site Monsoon Drain, revealing no elevated contaminants with regard to EQS thresholds.

**However, it was agreed that further groundwater monitoring wells should be installed and further groundwater monitoring undertaken to reduce uncertainty. This is detailed later in this report.**

### Ground Gas Risk Assessment

Based on the WYG and CampbellReith ground gas monitoring and risk assessment to date, given the elevated Methane and Carbon Dioxide values recorded, it was recommended that precautions up to a Characteristic Situation 2 in accordance with BS8485 (2015) are installed within the proposed buildings.

### 2.3 Re-Evaluated Conceptual Site Model

Following evaluation of the Site Investigation, the CSM developed within Section 2.7 of this report was re-evaluated and can be seen overleaf. The plausible pollutant linkages remaining after risk assessment are shown and where risk assessment has indicated no unacceptable risk to sensitive receptors, the pollutant linkages have been crossed out.

| Tabulated Conceptual Site Model – Plausible Pollutant Linkages Only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential On-site Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Potential Absorption Pathways                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Potential Receptors                                                                                                                                                                                                                                                                                                                                            |
| <p>Large former diesel AST (~10,000 gallons) situated south of the main factory building, &amp; small double-skinned plastic AST (~1000 litres) for storage of 'fuel oil' situated on a plinth (not bunded) adjacent to the Fire Testing facility in the south of the site:</p> <ul style="list-style-type: none"> <li>• <b>Total Petroleum Hydrocarbons (TPHs);</b></li> <li>• <b>Poly-cyclic Aromatic Hydrocarbons (PAHs).</b></li> </ul> <p>Chemical testing revealed elevated TPHs and PAHs within soils in NW portion of site, and WS1 in SE Commercial area.</p> <p>Features of factory buildings, including oil-burning heaters and above-ground fuel pipes and the presence of an 'air pollution test facility':</p> <ul style="list-style-type: none"> <li>• Heavy Metals and Semi-Metals including: Arsenic, Cadmium, Chromium, <b>Lead</b>, Copper, Zinc, Beryllium, Mercury etc;</li> <li>• <b>Poly-cyclic Aromatic Hydrocarbons (PAHs);</b></li> <li>• <b>Total Petroleum Hydrocarbons (TPHs);</b></li> <li>• <b>Asbestos (building materials).</b></li> </ul> <p>Chemical testing revealed elevated Lead, TPHs and PAHs within soils in NW portion of site, and WS1 in SE Commercial area.</p> <p>Amosite fibres presented risk to end-users in BH2, fragments requiring removal also noted to NE and SE boundaries.</p> <p>Electricity Sub-station present in south of site:</p> <ul style="list-style-type: none"> <li>• PCB Oils;</li> </ul> <p>No evidence of PCB oil contamination noted during chemical testing.</p> | <p>Leaching of onsite sources of contamination.</p> <p>Lateral and vertical migration of gases/vapours.</p> <p>Overland surface water runoff.</p> <p>Contaminant migration through preferential pathways (e.g. piles, underground service ducts, and drains).</p> <p>Contaminant transport through off-site migration of groundwater.</p> <p><b>Groundwater testing revealed elevated Ammonia, Nickel, Cyanide and PAHs within wells. However, limited superficial soils and impermeable bedrock thought to protect underlying Principal Aquifer, and no sufficient pathways for contaminants to affect nearby watercourses.</b></p> <p>Atmospheric transport and inhalation of airborne dusts, vapours and fibres (indoors and outdoors).</p> <p>Direct contact (dermal contact and ingestion) with soil, dust and water.</p> <p>Inhalation of vapours arising from soil contamination.</p> | <p>Future site users (users/ occupants of future commercial/ residential premises).</p> <p>Construction workers during future development works.</p> <p>Groundwater (Head Deposits, Thanet Sand Formation, White Chalk, Aquifers, SPZ).</p> <p>Surface waters (River Lavant).</p> <p>On-site buildings and services.</p> <p>Offsite workers and residents.</p> |
| <p>Ground gases associated with on-site contaminants noted during chemical testing.</p> <ul style="list-style-type: none"> <li>• <b>Carbon dioxide;</b></li> <li>• <b>Methane;</b></li> <li>• Hydrogen Sulphide;</li> <li>• Carbon Monoxide;</li> <li>• Trace Gases/VOC's</li> </ul> <p>Elevated CO2 and CH4 concentrations noted during monitoring within WS202; site classified CS2.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>Migration through anthropogenic and natural pathways</p> <p>Inhalation</p> <p>Asphyxiation</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>Site occupiers.</p> <p>Buildings.</p> <p>Construction workers, service and maintenance operatives, especially in confined spaces.</p>                                                                                                                                                                                                                       |

## 2.4 Remediation Strategy

Based on the results of the intrusive works and chemical analyses undertaken to-date, the following remedial measures were considered at the time of reporting:

### 2.4.1 Human Health Risk

At the time of reporting, the original remediation strategy was to excavate the Made Ground for a 16m radius around the WS16 hotspot (which would also remove BH2). The resulting void was then to be backfilled with verified clean topsoil/sub-soil.

Excavation and removal/remediation of the Made Ground for a 16m radius around the WS1 hotspot in the employment zone. To be backfilled with certified clean topsoil/sub-soil.

However, the contamination assessment for the residential site has been superseded by the more

recent demolition works discussed later on within the report. The resulting remediation strategy relating to human health risk is also discussed later within the report.

#### **2.4.2 Surface Water Risk**

Based on discussion it was considered necessary, in order to comply with Home England conditions, for the employment area to be remediated.

Excavation and removal/remediation of the Made Ground for a 16m radius around the WS1 hotspot in the employment zone. To be backfilled with certified clean topsoil/sub-soil. Following the hotspot removal, groundwater monitoring and sampling should be undertaken to verify that no harmful levels of contaminants were within the groundwater and reduce uncertainty.

#### **2.4.3 Ground-gas Risk**

**Based on the WYG/CampbellReith ground-gas monitoring and risk assessment to date, given the elevated Carbon Dioxide and Methane values recorded, it is recommended that precautions up to a Characteristic Situation 2, in accordance with BS8485 (2015), are installed within the proposed buildings.**

For Residential Houses (Building Type A) then this would be as follows:

Given privately managed residential properties are proposed, in accordance with BS8485 (2015), "3.5" gas protection points are required.

Protection systems providing such solutions scores could include the following, the options provided have taken into account the ground conditions encountered, for example a suspended slab is likely to be adopted given a shallow piled foundation scheme is likely to be used.

- Venting/Dilution;
- Passive sub-floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)

#### **Good to Very good: 1.5 - 2.5 points.**

In accordance with BS8485: The volume flow-through rate is governed by the size and number of side vents; for small to medium width buildings (up to 15 m wide – considered to be present onsite), the minimum area of side ventilation should be 1500mm<sup>2</sup>/m run of wall on at least two opposite sides. Where there are multiple internal obstructions to air flow (caused by beams), there should be four or five times the area of the side vents provided in the internal obstructions.

This semi-quantitative risk assessment is deemed appropriate as it is based on the guidance provided in BS8485.

Gas resistant membrane meeting all of the following criteria (2 Points).

- Sufficiently impervious to the gases (carbon dioxide);
- Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
- Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc);
- Capable, after installation, of providing a complete barrier to the entry of the relevant gas;
- Verified in accordance with CIRIA C735.

However, the human health contamination assessment, with respect to soil contamination, for the residential site has been superseded by the more recent demolition works discussed later on within the report. The resulting remediation strategy relating to human health risk is also discussed later within the report.

It was agreed that in order to comply with Drew Smiths Limited commitments under contract to Homes England, and potential human health and controlled water risk in the employment zone, that the “hotspot” in WS1 would be removed and further groundwater monitoring wells should be installed and further groundwater monitoring undertaken to reduce uncertainty. This is dealt with overall in a separate report (ref. GWPR3514/GRA/April 2020), however the results of the additional groundwater monitoring are also discussed in this report.

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### **3.0 DEMOLITION AND SITE PREPARATION**

It is understood that as part of the site preparation works the site underwent demolition with existing concrete recycled into a 6F2 type materials (crushed concrete/demolition rubble).

The site was then levelled, with sub-surface concrete obstructions removed, and a layer of the crushed concrete/demolition rubble (6F2) placed across to a thickness ranging from 150 – 500mm. The thickness at any given point can be seen in Appendix B.

The materials generally comprised an orange brown and grey sandy gravel, locally clayey. The sand was fine to coarse grained and the gravel was fine to coarse, angular to rounded flints (0 - 65%), concrete (30 – 50%), brick (30 - 50%), tarmac (0 - 5%), carbonaceous material (0 – 10%) and chalk fragments (0 – 5%).

Locally a membrane was found, plastic fragments and concrete boulders.

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## 4.0 ADDITIONAL CONTAMINATION ASSESSMENT

### 4.1 Capping Material

A Ground and Water Limited Engineer attended site on the 4<sup>th</sup> December 2019 to take samples of the crushed concrete/demolition rubble capping the site, following demolition and site preparation. The samples were mainly taken from the northern areas of the site.

27No. samples of the capping were taken from across the site at a depth of ~0.10m bgl and analysed. The location of the sampling points can be seen in Figure 6.

The analysis suite for the Ground and Water Limited Phase of Investigation is presented below and comprised.

- Semi Metals and Heavy Metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc (All samples, TP1 – TP27);
- Asbestos Screen (All samples, TP1 – TP27);
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene (All samples, TP1 – TP27);
- Fuel Oils – Speciated TPH including full aliphatic/aromatic split (TP3, TP6, TP9, TP12, TP15, TP18, TP21, TP24, TP27);
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs) (TP3, TP6, TP9, TP12, TP15, TP18, TP21, TP24, TP27).

The results of the analysis can be seen in Appendix C.

The results of the chemical laboratory testing were compared to the LQM/CIEH Sutable 4 Use Levels (S4UL) for a ***“Residential with home-grown produce”*** land-use scenario for the majority of site, with a ***“Commercial”*** land-use scenario for the eastern portion, as these were considered the most appropriate land-use scenarios for the proposed development. The soil assessment criteria used in this assessment are given within Appendix D.

Where no LQM/CIEH S4UL/C4SL LLTC was available for a particular determinand then preliminary reference was made to the laboratory detection limit of the determinand. If a positive concentration was noted, then further risk assessment was undertaken.

For Cyanide, where no LQM/CIEH S4UL/GAC/C4SL LLTC was available a Site Specific Assessment Criteria of 10mg/kg was adopted. This is based on ICRL 59/83, TCL, ATRISK (SOIL) Screening Value and Dutch Intervention Value (ranging from 20 – 34mg/kg). Therefore, a SSAC of ~10mg/kg is considered conservative.

Where a contaminant of concern's LQM/CIEH S4UL/GAC/C4SL LLTC varies according to the Soil's Organic Matter (SOM), the SOM recorded for each soil sample was used to derive the appropriate SGV/GAC. The SOM of capping material ranged between 0.3 – 1.3%, therefore the results were analysed against the 1.0% SOM category.

Double plot analysis of the speciated PAH's undertaken in Phase 4 of the investigation revealed all of the PAH's to be coal/coal ash and part of the urban background, with the exception of WS18/1.00m bgl which appeared to be coal tar/creosote-derived.

Analysis of the speciated PAH's from TP20 also revealed a coal/coal ash/coal derived soot. As most PAH's were not coal tar derived, then the benzo(a)pyrene S4UL is suitable for use. A copy of the LQM PAH Profiling Tool used can be seen in Appendix E.

The results of the comparison of the representative contaminant concentrations for crushed concrete/demolition rubble are presented in the table overleaf.

| Soil Guideline Values and General Acceptance Criteria Results |                                                                                                                 |                                |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------|
| Substance                                                     | Sample Location<br>Where available LQM/CIEH S4UL/ CSL4 LLTC or GAC were exceeded for relevant land-use scenario |                                |
|                                                               | "Residential with Home-grown produce" Land-Use Scenario                                                         | "Commercial" Land-Use Scenario |
| Arsenic                                                       | None                                                                                                            | None                           |
| Beryllium                                                     | None                                                                                                            | None                           |
| Boron                                                         | None                                                                                                            | None                           |
| Cadmium                                                       | None                                                                                                            | None                           |
| Chromium (III)                                                | None                                                                                                            | None                           |
| Hexavalent Chromium (VI)                                      | None                                                                                                            | None                           |
| Copper                                                        | None                                                                                                            | None                           |
| Lead                                                          | TP22/0.10m bgl                                                                                                  | None                           |
| Mercury (Elemental)                                           | None                                                                                                            | None                           |
| Nickel                                                        | None                                                                                                            | None                           |
| Selenium                                                      | None                                                                                                            | None                           |
| Vanadium                                                      | None                                                                                                            | None                           |
| Zinc                                                          | None                                                                                                            | None                           |
| Cyanide (Total)                                               | None                                                                                                            | None                           |
| Total Phenol                                                  | None                                                                                                            | None                           |
| Naphthalene                                                   | None                                                                                                            | None                           |
| Acenaphthylene                                                | None                                                                                                            | None                           |
| Acenaphthene                                                  | None                                                                                                            | None                           |
| Fluorene                                                      | None                                                                                                            | None                           |
| Phenanthrene                                                  | None                                                                                                            | None                           |
| Anthracene                                                    | None                                                                                                            | None                           |
| Fluoranthene                                                  | None                                                                                                            | None                           |
| Pyrene                                                        | None                                                                                                            | None                           |
| Benzo(a)anthracene                                            | None                                                                                                            | None                           |
| Chrysene                                                      | None                                                                                                            | None                           |
| Benzo(b)fluoranthene                                          | TP20/0.10m bgl                                                                                                  | None                           |
| Benzo(k)fluoranthene                                          | None                                                                                                            | None                           |
| Benzo(a)pyrene                                                | TP20/0.10m bgl                                                                                                  | None                           |
| Indeno(1,2,3-cd)pyrene                                        | None                                                                                                            | None                           |
| Dibenz(a,h)anthracene                                         | TP20/0.10m bgl                                                                                                  | None                           |
| Benzo(ghi)perylene                                            | None                                                                                                            | None                           |
| TPH C5 – C6 (aliphatic)                                       | None                                                                                                            | None                           |
| TPH C6 – C8 (aliphatic)                                       | None                                                                                                            | None                           |
| TPH C8 - C10 (aliphatic)                                      | None                                                                                                            | None                           |
| TPH C10 - C12 (aliphatic)                                     | None                                                                                                            | None                           |
| TPH C12 - C16 (aliphatic)                                     | None                                                                                                            | None                           |
| TPH C16 - C21 (aliphatic)                                     | None                                                                                                            | None                           |
| TPH C21 - C34 (aliphatic)                                     | None                                                                                                            | None                           |
| TPH C5 – C7 (aromatic)                                        | None                                                                                                            | None                           |
| TPH C7 – C8 (aromatic)                                        | None                                                                                                            | None                           |
| TPH C8 – C10 (aromatic)                                       | None                                                                                                            | None                           |
| TPH C10 – C12 (aromatic)                                      | None                                                                                                            | None                           |
| TPH C12 – C16 (aromatic)                                      | None                                                                                                            | None                           |
| TPH C16 - C21 (aromatic)                                      | None                                                                                                            | None                           |
| TPH C21 - C35 (aromatic)                                      | None                                                                                                            | None                           |
| Benzene                                                       | None                                                                                                            | None                           |
| Toluene                                                       | None                                                                                                            | None                           |
| Ethylbenzene                                                  | None                                                                                                            | None                           |
| Xylene (o, m & p)                                             | None                                                                                                            | None                           |
| MTBE                                                          | None                                                                                                            | None                           |
| Asbestos Screen                                               | TP21/0.10m (Amosite: <0.001%)                                                                                   | TP21/0.10m (Amosite: <0.001%)  |

The chemical laboratory testing revealed elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(a,h)anthracene within one sample tested (TP20/0.10m bgl) in excess of the ***“Residential with Home-grown Produce”*** land-use scenario.

An elevated level of Lead was also noted within TP22 in excess of the ***“Residential with Home-grown Produce”*** land-use scenario.

With the exception of a positive Asbestos screen within the sample from TP21, no other elevated levels of determinands in excess of the ***“Residential with Home-grown Produce”*** land-use scenario were noted. None of the levels noted exceeded the ***“Commercial”*** land-use scenario.

A positive Asbestos identification was noted in the sample from TP21. Quantification revealed Amosite present as bundles, at <0.001%. An Asbestos Risk Assessment is provided in 4.1.2 of this report.

#### 4.1.1 CLAIRE Statistics

The results of CLAIRE statistical analysis of the distribution of elevated levels of Lead and PAHs within the crushed concrete/demolition rubble can be seen tabulated below.

The crushed concrete/demolition rubble encountered was generally described as an orange brown and grey sandy gravels, locally clays. The sand was fine to coarse grained and the gravel was fine to coarse, angular to rounded flints (0 - 65%), concrete (30 - 50%), brick (30 - 50%) tarmac (0 - 5%), carbonaceous material (0 - 10%), chalk. Bit was considered that the materials was all likely from the same course and, therefore, the use of CLAIRE statistics was deemed appropriate.

The results of the analysis can be seen in Appendix F. A précis of the results is tabulated below.

| Soil Guideline Values and General Acceptance Criteria Results |                  |                                                     |                                                                                                |            |
|---------------------------------------------------------------|------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------|------------|
| Substance                                                     | Outliers Present | Upper Confidence Limit of Sample Population (mg/kg) | Does the Upper Confidence Limit of the Sample Population Exceed the LQM/ClEH S4UL or CSL4 LLTC |            |
|                                                               |                  |                                                     | Residential with Home Grown Produce                                                            | Commercial |
| Lead (with outliers)                                          | Yes              | 154.61                                              | No                                                                                             | No         |
| Benzo(b)fluoranthene (with outliers)                          | Yes              | 2.160                                               | No                                                                                             | No         |
| Benzo(a)pyrene (with outliers)                                | Yes              | 1.440                                               | No                                                                                             | No         |
| Dibenz(a,h)anthracene (with outliers)                         | Yes              | 1.920                                               | No                                                                                             | No         |

The table above shows that the distribution of Lead and PAHs within the Made Ground was non-normal. The outlier related to TP20 for the PAH's and TP22 for the lead. However, with the outliers present the Upper Confidence Limit did not exceed the threshold for a ***‘Residential with Home-grown Produce’*** land use scenario for any determinand. The evidence level ranged from 97 - 99%. Based on the above, the isolated levels of lead and PAH's did not post a risk to end-users.

#### 4.1.2 Human Health – Asbestos contamination within the Made Ground

A positive Asbestos identification was noted in the sample from TP21. Quantification revealed Amosite present as bundles, at <0.001%.

Given the presence of these fibres within the soils and the potential for these hotspots to coincide with publicly accessible areas on site, as well as workers during site redevelopment, it is considered likely that further risk assessment is necessary with respect to the asbestos detections noted.

The quantification for TP21 was subject to risk assessment.

Based on a comparison of the results of the asbestos risk assessment in Appendix G with Tables 14.1 and 14.3 of CIRIA733, BH14 revealed a lifetime risk of mesothelioma of **0.8 per 100,000 people exposed (highest arguable 6)**. The risk of Lung Cancer was probably **insignificant**.

A risk of less than 1 in 100,000 people exposed is deemed to be a publicly acceptable risk.

#### 4.1.3 Proposed Levels

The client would like to utilise the existing level on top of the recycled 6F2 crushed concrete/demolition rubble.

It is understood that at any point the soft landscaping will be capped by a minimum 400mm of imported Topsoil. This can be seen in Figure 7.

The testing to date has indicated that the existing demolition rubble/crushed concrete capping appears suitable for use. The majority of the materials shows no elevated levels of determinands, but three small hotspots are present which appear to pose no unacceptable risk to end-users.

**The crushed concrete/demolition rubble will provide a break layer against end-users in private gardens/communal gardens digging further. A minimum 400mm capping of clean Topsoil will provide protection against the minor risks highlighted in the testing. Therefore, the proposed capping of Topsoil on top of the recycled 6F2 was deemed to be acceptable remediation strategy.**

## 4.2 Groundwater Risk Assessment

In order to reduce uncertainty in the groundwater risk assessment undertaken to date, further groundwater monitoring wells were installed onsite between the 16<sup>th</sup> and 21<sup>st</sup> January 2020.

5No. cable percussion boreholes (BH1 – BH5) were constructed across the site to 15.00 - 20.00m bgl. Standard in-situ testing and sampling was undertaken for geotechnical analysis, which will be the subject of a separate report. 5No. combined ground-gas and groundwater monitoring wells were installed within each borehole, the construction of which can be seen tabulated below.

| Combined Ground-gas and Groundwater Monitoring Well Construction |                        |                               |                                                         |                                                   |                               |
|------------------------------------------------------------------|------------------------|-------------------------------|---------------------------------------------------------|---------------------------------------------------|-------------------------------|
| Trial Hole                                                       | Borehole Depth (m bgl) | Depth of Installation (m bgl) | Thickness of slotted piping with gravel filter pack (m) | Depth of plain piping with bentonite seal (m bgl) | Piping external diameter (mm) |
| BH1                                                              | 15.00                  | 5.00                          | 4.00                                                    | 1.00                                              | 63                            |
| BH2                                                              | 20.00                  | 5.00                          | 4.00                                                    | 1.00                                              | 63                            |
| BH3                                                              | 18.45                  | 5.00                          | 4.00                                                    | 1.00                                              | 63                            |
| BH4                                                              | 15.45                  | 5.00                          | 4.00                                                    | 1.00                                              | 63                            |
| BH5                                                              | 15.45                  | 5.00                          | 4.00                                                    | 1.00                                              | 63                            |

A trial hole location plan can be seen in Figure 9.

The ground conditions encountered in the boreholes can be seen tabulated below. Trial hole logs are given in Appendix H.

| Summary of Strata Encountered (BH1 – BH5).                                                                                                                                                                                                                                      |                           |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------|
| Strata                                                                                                                                                                                                                                                                          | Depth Encountered (m bgl) | Thickness (m)   |
| <b>TOPSOIL (BH5): (Drillers Description)</b>                                                                                                                                                                                                                                    | GL                        | 0.20            |
| <b>MADE GROUND:</b> Generally comprised a greyish brown to light brown silty sandy gravel. The sand was fine to coarse grained. The gravel was fine to coarse, sub-angular to sub-rounded, slate, brick, flint, and concrete. Occasional fragments of metal, glass and plastic. | GL                        | 0.20 – 1.00     |
| <b>MADE GROUND (BH1 &amp; BH2, BH5):</b> Generally comprised a brown and orangish brown sandy gravelly silty clay. The sand was fine to coarse grained. The gravel was fine to coarse, sub-angular to rounded, flint with rare glass and brick.                                 | 0.20 - 0.50               | 0.30 – 1.20     |
| <b>HEAD DEPOSITS (Cohesive) (BH1, BH3 – BH5):</b> Generally comprised Orangish brown, brown and grey sandy gravelly silty clay. Gravel is fine to coarse, sub-angular to rounded, flint. Cobble of flint in TP9.                                                                | 1.00 – 1.60               | 1.00 - 9.10     |
| <b>HEAD DEPOSITS (Granular) (BH2):</b> Generally comprised an orangish brown occasionally clayey silty sand. The sand was fine to medium grained. Occasional fine to coarse, sub-rounded to rounded, flint.                                                                     | 0.50                      | 4.50            |
| <b>HEAD DEPOSITS (Cohesive) (BH2):</b> Orangish brown and grey silty sandy CLAY. Sand is fine to medium grained.                                                                                                                                                                | 5.00                      | 1.00            |
| <b>LONDON CLAY FORMATION (BH2,):</b> Generally comprised a dark grey silty clay. Fine selenite noted. Shell fragments from 8.00 – 12.00m bgl. Sandy from 18.00m bgl in BH2                                                                                                      | 2.00 – 10.70              | >10.95 – >15.45 |

No roots were noted in any trial holes during the site investigation.

Perched water and groundwater were encountered at varying depths during the site investigation in all trial holes except BH3, TP2, TP3, TP6, TP7 & TP9. Due to water added into the boreholes to aid drilling, it was not possible to fully determine the groundwater conditions.

| Depth of Perched/Groundwater within Trial Holes |                                      |                        |
|-------------------------------------------------|--------------------------------------|------------------------|
| Trial Hole                                      | Water Encountered                    | Water Depth (m bgl)    |
| BH1                                             | Groundwater 1 Hour after drilling    | 11.50                  |
| BH2                                             | Groundwater Seepage                  | 8.00                   |
| BH4                                             | Groundwater                          | 12.50, 13.20 and 13.80 |
| BH5                                             | Groundwater                          | 3.00                   |
| TP1                                             | Perched water                        | 0.80                   |
| TP4                                             | Minor Groundwater                    | 2.40                   |
| TP5                                             | Perched water from historic soakaway | 1.00                   |
| TP8                                             | Minor Perched water seepage          | 1.00 – 1.20            |

The results of return visits to dip the wells installed can be seen tabulated overleaf.

| Depth of Groundwater Strikes/Standing Groundwater Within Trial Holes |          |                      |                                               |
|----------------------------------------------------------------------|----------|----------------------|-----------------------------------------------|
| Trial Hole                                                           | Date     | Depth of Groundwater | Depth to Base of Trial Hole/Standpipe (m bgl) |
| BH1                                                                  | 29/01/20 | 4.85                 | 4.93                                          |
|                                                                      | 27/02/20 | 4.79                 | 5.05                                          |
| BH2                                                                  | 29/01/20 | 1.14                 | 2.13                                          |
|                                                                      | 27/02/20 | 0.90                 | 2.04                                          |
| BH3                                                                  | 29/01/20 | 0.66                 | 4.25                                          |
|                                                                      | 27/02/20 | 0.87                 | 4.20                                          |
| BH4                                                                  | 29/01/20 | 1.45                 | 4.88                                          |
|                                                                      | 27/02/20 | 0.42                 | 5.01                                          |
| BH5                                                                  | 29/01/20 | 1.20                 | 4.80                                          |
|                                                                      | 27/02/20 | 1.24                 | 4.95                                          |

The results of the above analysis indicate that the well in BH2 may be silted up given the granular nature of the Head Deposits encountered at that location.

A programme of chemical laboratory testing, scheduled by Ground and Water Limited and carried out by DETS Limited, was undertaken on groundwater samples recovered from the monitoring standpipe installed within BH1 – BH5.

Samples were recovered from the boreholes on the 26<sup>th</sup> February 2020. The samples were taken to determine if the groundwater underlying the site was impacted from historic uses onsite or within the site's environs.

**The testing schedule and suite was based on the Conceptual Site Model given within 2.1 of this report and the results of the intrusive ground investigation.**

During the sampling visit the well was purged (three times the volume of water in the well) prior to sampling.

The analysis suite is presented below and comprised.

- Semi Metals and Heavy Metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc (BH1 – BH5)
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene (BH1 – BH5);
- Fuel Oils – Speciated TPH including full aliphatic/aromatic split (BH1 – BH5);
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs) (BH1 – BH5).
- Volatile Organic Compounds (VOCs) (BH1, BH3, BH5).

The results of the groundwater analysis can be seen tabulated in the following pages.

| Tabulated Results for Groundwater Testing - Metals/Semi Metals                                                                                                                                                                                 |       |         |                     |                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------------|----------------------------------------------------------------------------------|
| Determinant                                                                                                                                                                                                                                    | Units | Source  | Threshold Level     | Samples where EQS Level was exceeded                                             |
| Total Cyanide                                                                                                                                                                                                                                  | ug/l  | AA-EQS  | 1                   | BH3 (10ug/l),<br>BH4 (17ug/l)                                                    |
| Sulphate as SO <sub>4</sub>                                                                                                                                                                                                                    | mg/l  | AA-EQS  | 400                 | BH1 (518mg/l)                                                                    |
| Arsenic (dissolved)                                                                                                                                                                                                                            | ug/l  | AA-EQS  | 50                  | None                                                                             |
| Boron (dissolved)                                                                                                                                                                                                                              | ug/l  | AA-EQS  | 2000                | None                                                                             |
| Cadmium (dissolved)                                                                                                                                                                                                                            | ug/l  | AA-EQS  | ≤0.08               | Below detection Limit                                                            |
| Chromium (dissolved)                                                                                                                                                                                                                           | ug/l  | AA-EQS  | 4.7                 | BH4 (17ug/l)                                                                     |
| Chromium (hexavalent)                                                                                                                                                                                                                          | ug/l  | AA-EQS  | 3.4                 | Below detection Limit                                                            |
| Copper (dissolved)                                                                                                                                                                                                                             | ug/l  | AA-EQS  | 1 (bioavailable)    | BH1 (15ug/l),<br>BH2 (11ug/l),<br>BH3 (8ug/l),<br>BH4 (42ug/l),<br>BH5 (8ug/l)   |
| Lead (dissolved)                                                                                                                                                                                                                               | ug/l  | AA-EQS  | 1.5 (bioavailable)  | Below Detection Limit                                                            |
| Mercury (dissolved)                                                                                                                                                                                                                            | ug/l  | MAC-EQS | 0.07                | None                                                                             |
| Nickel (dissolved)                                                                                                                                                                                                                             | ug/l  | AA-EQS  | 4 (bioavailable)    | BH1 (14ug/l),<br>BH4 (15ug/l)                                                    |
| Selenium (dissolved)                                                                                                                                                                                                                           | ug/l  | DWS     | 10                  | None                                                                             |
| Vanadium (dissolved)                                                                                                                                                                                                                           | ug/l  | AA-EQS  | 20                  | BH3 (29ug/l)                                                                     |
| Zinc (dissolved)                                                                                                                                                                                                                               | ug/l  | AA-EQS  | 10.9 (bioavailable) | BH1 (22ug/l),<br>BH2 (20ug/l),<br>BH3 (16ug/l),<br>BH4 (14ug/l),<br>BH5 (16ug/l) |
| Total Phenols (monohydric)                                                                                                                                                                                                                     | ug/l  | AA-EQS  | 7.7                 | BH3 (19ug/l),<br>BH4 (44ug/l)                                                    |
| Notes<br>DWS = UK Drinking Water Standards<br>EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration<br>WHO = World Health Organisation |       |         |                     |                                                                                  |

| Tabulated Results for Groundwater Testing - Polyaromatic Hydrocarbons (PAHs)                                                                                                                                                                   |       |                        |                 |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------|-----------------|--------------------------------------|
| Determinant                                                                                                                                                                                                                                    | Units | Source                 | Threshold Level | Samples where EQS Level was exceeded |
| Naphthalene                                                                                                                                                                                                                                    | ug/l  | AA-EQS                 | 2               | None                                 |
| Acenaphthylene                                                                                                                                                                                                                                 | ug/l  | No available standards | -               | Below detection Limit                |
| Acenaphthene                                                                                                                                                                                                                                   | ug/l  | No available standards | -               | BH3 (0.08ug/l), BH4 (0.45ug/l)       |
| Fluorene                                                                                                                                                                                                                                       | ug/l  | No available standards | -               | BH3 (0.05ug/l), BH4 (0.16ug/l)       |
| Phenanthrene                                                                                                                                                                                                                                   | ug/l  | No available standards | -               | BH3 (0.09ug/l), BH4 (0.45ug/l)       |
| Anthracene                                                                                                                                                                                                                                     | ug/l  | AA-EQS                 | 0.1             | BH3 (0.02ug/l), BH4 (0.11ug/l)       |
| Fluoranthene                                                                                                                                                                                                                                   | ug/l  | AA-EQS                 | 0.0063          | BH3 (0.05ug/l), BH4 (0.19ug/l)       |
| Pyrene                                                                                                                                                                                                                                         | ug/l  | No available standards | -               | BH3 (0.03ug/l), BH4 (0.12ug/l)       |
| Benzo(a)anthracene                                                                                                                                                                                                                             | ug/l  | No available standards | -               | Below detection Limit                |
| Chrysene                                                                                                                                                                                                                                       | ug/l  | No available standards | -               | BH4 (0.02ug/l)                       |
| Benzo(b)fluoranthene                                                                                                                                                                                                                           | ug/l  | AA-EQS                 | 0.00017         | Below detection Limit                |
| Benzo(k)fluoranthene                                                                                                                                                                                                                           | ug/l  | AA-EQS                 | 0.00017         | Below detection Limit                |
| Benzo(a)pyrene                                                                                                                                                                                                                                 | ug/l  | AA-EQS                 | 0.00017         | Below detection Limit                |
| Indeno(1,2,3-cd)pyrene                                                                                                                                                                                                                         | ug/l  | AA-EQS                 | 0.00017         | Below detection Limit                |
| Dibenz(a,h)anthracene                                                                                                                                                                                                                          | ug/l  | No available standards | -               | Below detection Limit                |
| Benzo(ghi)perylene                                                                                                                                                                                                                             | ug/l  | AA-EQS                 | 0.00017         | Below detection Limit                |
| Notes<br>DWS = UK Drinking Water Standards<br>EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration<br>WHO = World Health Organisation |       |                        |                 |                                      |

| Tabulated Results for Groundwater Testing - Total Petroleum Hydrocarbons (TPH)                                                                                                                                                              |       |        |                 |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|-----------------|--------------------------------------|
| Determinant                                                                                                                                                                                                                                 | Units | Source | Threshold Level | Samples where EQS Level was exceeded |
| Aliphatic >C5 - C6                                                                                                                                                                                                                          | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C6 - C8                                                                                                                                                                                                                          | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C8 - C10                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C10 - C12                                                                                                                                                                                                                        | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C12 - C16                                                                                                                                                                                                                        | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C16 - C21                                                                                                                                                                                                                        | ug/l  | DWS    | 10              | None                                 |
| Aliphatic >C21 - C34                                                                                                                                                                                                                        | ug/l  | DWS    | 10              | None                                 |
| Aliphatic (C5 - C34)                                                                                                                                                                                                                        | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C5 - C7                                                                                                                                                                                                                           | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C7 - C8                                                                                                                                                                                                                           | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C8 - C10                                                                                                                                                                                                                          | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C10 - C12                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C12 - C16                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C16 - C21                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Aromatic >C21 - C35                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Aromatic (C5 - C35)                                                                                                                                                                                                                         | ug/l  | DWS    | 10              | None                                 |
| Total >C5 - C35                                                                                                                                                                                                                             | ug/l  | DWS    | 10              | None                                 |
| Notes DWS = UK Drinking Water Standards<br>EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration<br>WHO = World Health Organisation |       |        |                 |                                      |

| Tabulated Results for Groundwater Testing - BTEX (Benzene, Toluene, Ethylbenzene & Xylene)                                                                                                                                                  |       |                        |                 |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------|-----------------|--------------------------------------|
| Determinant                                                                                                                                                                                                                                 | Units | Source                 | Threshold Level | Samples where EQS Level was exceeded |
| Benzene                                                                                                                                                                                                                                     | ug/l  | AA-EQS                 | 10              | None                                 |
| Toluene                                                                                                                                                                                                                                     | ug/l  | AA-EQS                 | 74              | None                                 |
| Ethylbenzene                                                                                                                                                                                                                                | ug/l  | WHO                    | 300             | None                                 |
| Xylene (p, m & o)                                                                                                                                                                                                                           | ug/l  | AA-EQS                 | 30              | None                                 |
| MTBE                                                                                                                                                                                                                                        | ug/l  | No available standards | -               | Below detection Limit                |
| Notes DWS = UK Drinking Water Standards<br>EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration<br>WHO = World Health Organisation |       |                        |                 |                                      |

| Tabulated Results for Groundwater Testing - Polyaromatic Hydrocarbons (PAHs) |                                                                                                                                                                                                                                       |                        |                 |                                      |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------|--------------------------------------|
| Determinant                                                                  | Units                                                                                                                                                                                                                                 | Source                 | Threshold Level | Samples where EQS Level was exceeded |
| Dichlorodifluoromethane                                                      | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Vinyl Chloride                                                               | ug/l                                                                                                                                                                                                                                  | DWS                    | 0.5             | Below detection Limit                |
| Chloromethane                                                                | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Chloroethane                                                                 | ug/l                                                                                                                                                                                                                                  | DWS                    | 0.5             | Below detection Limit                |
| Bromomethane                                                                 | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Trichlorofluoromethane                                                       | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,1-Dichloroethene                                                           | ug/l                                                                                                                                                                                                                                  | WHO                    | 30              | Below detection Limit                |
| trans-1,2-Dichloroethene                                                     | ug/l                                                                                                                                                                                                                                  | WHO                    | 50              | Below detection Limit                |
| 1,1-Dichloroethane                                                           | ug/l                                                                                                                                                                                                                                  | WHO                    | 30              | Below detection Limit                |
| cis-1,2-Dichloroethene                                                       | ug/l                                                                                                                                                                                                                                  | WHO                    | 50              | Below detection Limit                |
| 2,2-Dichloropropane                                                          | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Chloroform                                                                   | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 2.5             | Below detection Limit                |
| Bromochloromethane                                                           | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,1,1-Trichloroethane                                                        | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 100             | Below detection Limit                |
| 1,1-Dichloropropene                                                          | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Carbon Tetrachloride                                                         | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 12              | Below detection Limit                |
| 1,2-Dichloroethane                                                           | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 10              | Below detection Limit                |
| 1,2-Dichloropropane                                                          | ug/l                                                                                                                                                                                                                                  | DWS                    | 0.1             | Below detection Limit                |
| Trichloroethene (TCE)                                                        | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 10              | Below detection Limit                |
| Bromodichloromethane                                                         | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Dibromomethane                                                               | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| TAME                                                                         | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| cis-1,3-Dichloropropene                                                      | ug/l                                                                                                                                                                                                                                  | DWS                    | 0.1             | Below detection Limit                |
| trans-1,3-Dichloropropene                                                    | ug/l                                                                                                                                                                                                                                  | DWS                    | 0.1             | Below detection Limit                |
| 1,1,2-Trichloroethane                                                        | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 400             | Below detection Limit                |
| 1,3-Dichloropropane                                                          | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Tetrachloroethene (PCE)                                                      | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 10              | Below detection Limit                |
| Dibromochloromethane                                                         | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,2-Dibromoethane                                                            | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Chlorobenzene                                                                | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,1,1,2-Tetrachloroethane                                                    | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Styrene                                                                      | ug/l                                                                                                                                                                                                                                  | AA-EQS                 | 50              | Below detection Limit                |
| Bromoform                                                                    | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Isopropylbenzene                                                             | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,1,2,2-Tetrachloroethane                                                    | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,2,3-Trichloropropane                                                       | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| n-Propylbenzene                                                              | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| Bromobenzene                                                                 | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 2-Chlorotoluene                                                              | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,3,5-Trimethylbenzene                                                       | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 4-Chlorotoluene                                                              | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| tert-Butylbenzene                                                            | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,2,4-Trimethylbenzene                                                       | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| sec-Butylbenzene                                                             | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| p-Isopropyltoluene                                                           | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,3-Dichlorobenzene                                                          | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,4-Dichlorobenzene                                                          | ug/l                                                                                                                                                                                                                                  | WHO                    | 300             | Below detection Limit                |
| n-Butylbenzene                                                               | ug/l                                                                                                                                                                                                                                  | No available standards | -               | Below detection Limit                |
| 1,2-Dichlorobenzene                                                          | ug/l                                                                                                                                                                                                                                  | WHO                    | 100             | Below detection Limit                |
| 1,2-Dibromo-3-chloropropane                                                  | ug/l                                                                                                                                                                                                                                  | WHO                    | 1               | Below detection Limit                |
| Hexachlorobutadiene                                                          | ug/l                                                                                                                                                                                                                                  | MAC-EQS                | 0.6             | Below detection Limit                |
| Notes                                                                        | DWS = UK Drinking Water Standards<br>EQS = Environmental Quality Standard for Protection of Aquatic Life (Freshwater or Saltwater)<br>AA = Annual Average<br>MAC = Maximum Allowable Concentration<br>WHO = World Health Organisation |                        |                 |                                      |

The results of the groundwater testing can be seen in Appendix I.

The testing revealed that a number of contaminants, in particular PAH compounds, metals, cyanide and Phenols exceeded the relevant EQS Freshwater standards.

During the intrusive site investigation, the shallow groundwater encountered was considered to be perched within the Made Ground overlying the superficial Head Deposits and the London Clay Formation

The boreholes were located ~50 to ~210m northeast of the from the nearest surface water feature to site (thought to be the River Lavant), and based on the inconsistent contaminant concentrations recorded within the groundwater, the absence of a confirmed continuous groundwater pathway and the travel distance to surface water features, it was considered unlikely that the groundwater contaminants recorded within BH1 – BH5 would risk impacting watercourses surrounding the site (such as the River Lavant).

This was confirmed by water sampling and testing of the on-site Monsoon Drain and nearby River Lavant undertaken by WYG, which revealed no exceedances with regard to EQS thresholds.

Therefore, the exceedances noted during groundwater sampling to-date suggested that there was a low to moderate risk to surface/perched waters. However, the thickness of London Clay Formation recorded during the intrusive site investigation was considered sufficient to protect the underlying Principal Aquifer associated with the Lewes Nodular Chalk Member and Tarrant Chalk Member, and therefore the risk to deep groundwater was considered to be negligible.

The very slight PAH's and heavy metals contamination are considered reasonable for the setting of the site. Remediation to what could be considered conservative EQS/DWS standards with respect to metallic and PAH' contamination is unlikely to be cost effective, compared to the potential positive impact likely. Therefore no further remediation with respect to the risks to controlled waters is required.

---



NOT TO SCALE

APPROXIMATE SITE BOUNDARY

Project:

Former Colt International, New Lane, Havant PO9 2LZ

Client:

Drew Smith Group

Date:

March 2020

Site Location Plan

Ref:

GWPR3514

Figure 1

ground&water



NOT TO SCALE

APPROXIMATE  
SITE BOUNDARY

Project:

Former Colt International, New Lane, Havant PO9 2LZ

Client:

Drew Smith Group

Date:

March 2020

Ref:

GWPR3514

Site Development Area

Figure 2

ground&water



NOT TO SCALE

APPROXIMATE SITE BOUNDARY

Project:

Former Colt International, New Lane, Havant PO9 2LZ

Client:

Drew Smith Group

Date:

March 2020

Ref:

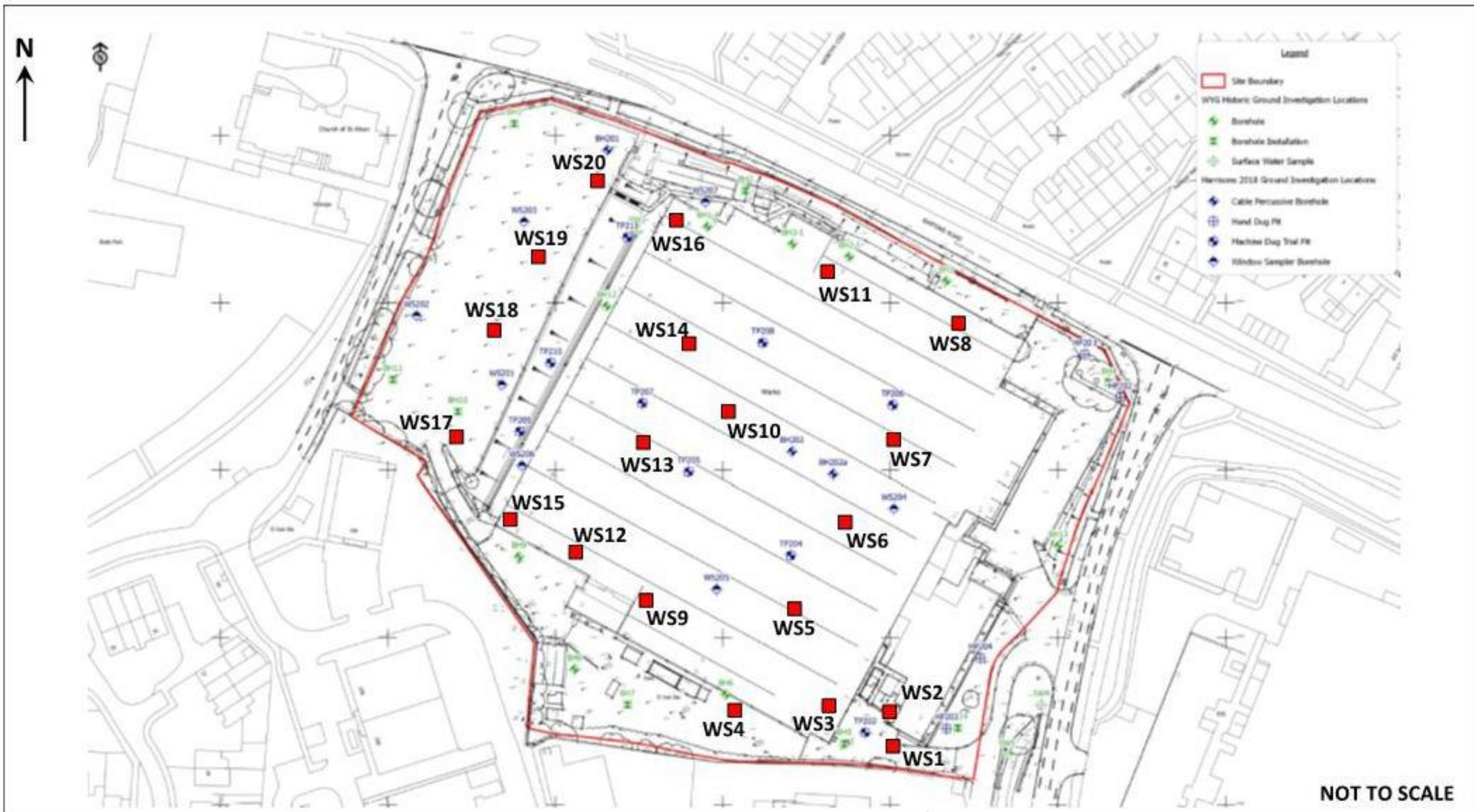
GWPR3514

Aerial View of the Site

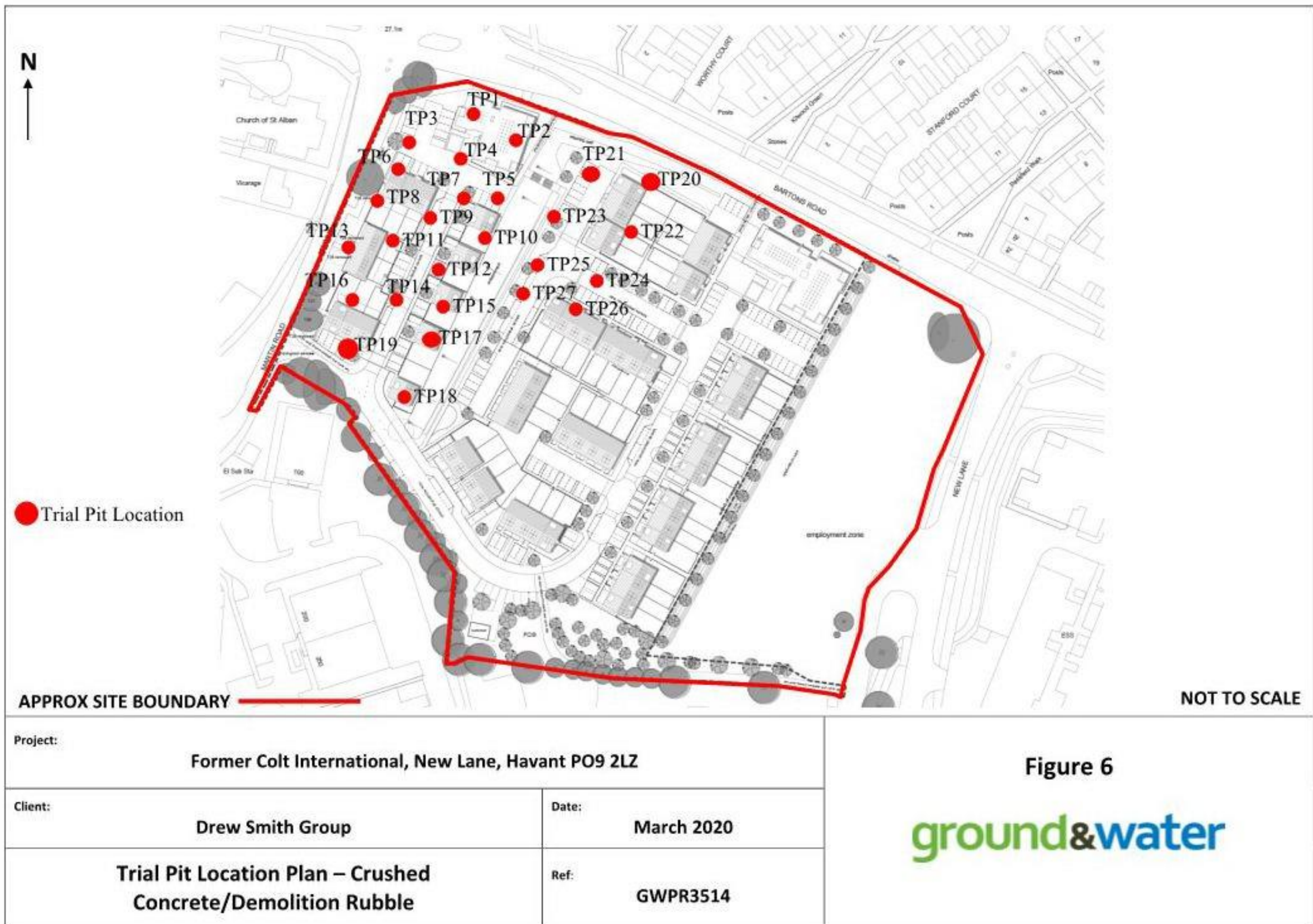
Figure 3

ground&water



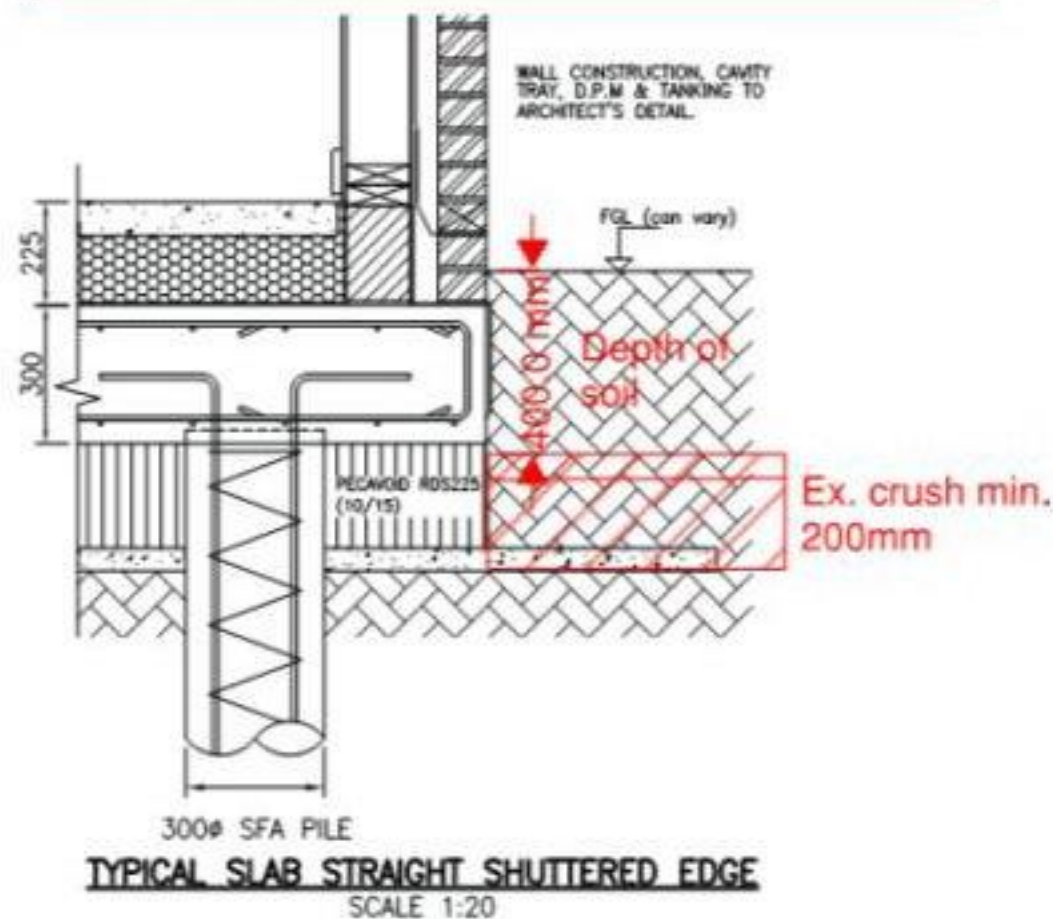


|                                    |                  |                                                     |            |                                                       |
|------------------------------------|------------------|-----------------------------------------------------|------------|-------------------------------------------------------|
| Project:                           |                  | Former Colt International, New Lane, Havant PO9 2LZ |            | <p><b>Figure 5</b></p> <p><b>ground&amp;water</b></p> |
| Client:                            | Drew Smith Group | Date:                                               | March 2020 |                                                       |
| Trial Hole Location Plan – Phase 4 |                  | Ref:                                                | GWPR3514   |                                                       |



N  
↑

**Road Construction:**  
 Capping - min. 250mm existing 6f2  
 Sub Base 150mm type 1  
 Base Course 100 - AC32  
 Binder Course 60mm AC20  
 Surface Course - 30mm AC10  
  
 Total 340mm + capping



NOT TO SCALE

Project:

Former Colt International, New Lane, Havant PO9 2LZ

Client:

Drew Smith Group

Date:

March 2020

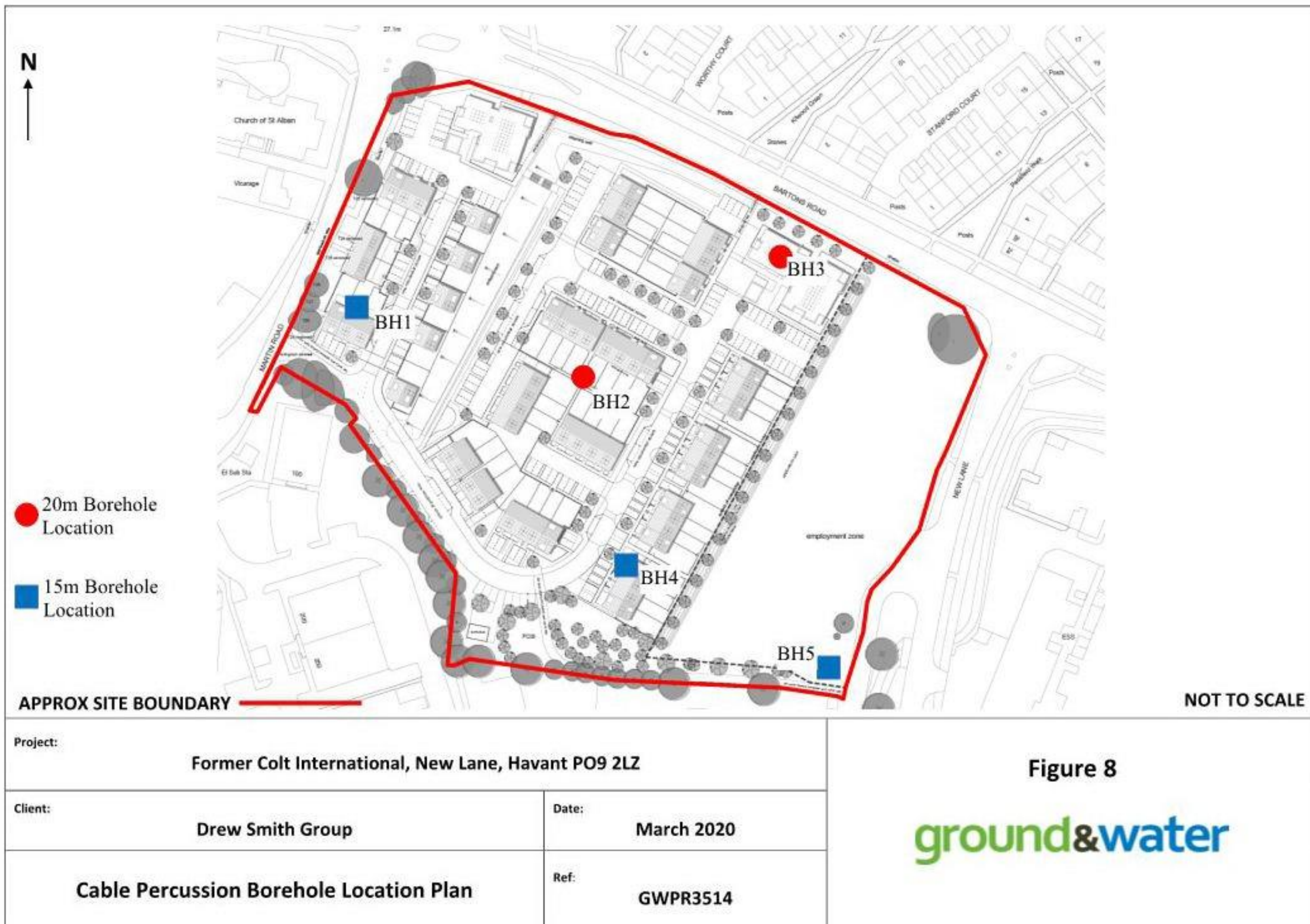
Anticipated Garden Construction/Finished Levels

Ref:

GWPR3514

Figure 7

ground&water



## **APPENDIX A**

### **Conditions and Limitations**

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly, any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Any Recipient must consider any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist. It was not part of the scope of this report to comment on environment/contaminated land considerations.

The conclusions and recommendations relate to Former Colt International, New Lane, Havant PO9 2LZ.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit,

borehole or window sampler borehole implies the specific technique used to produce a trial hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

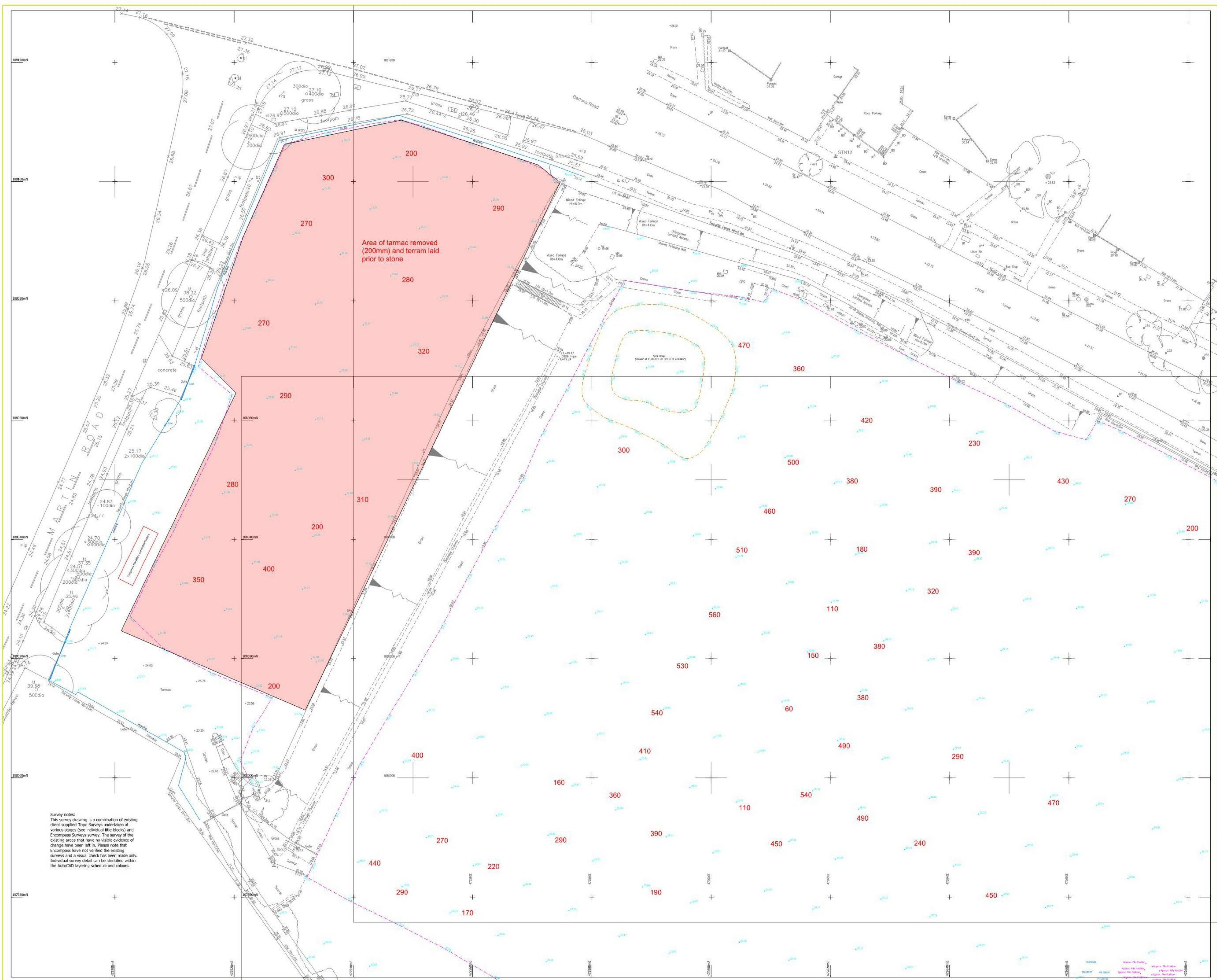
Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets, remain with Ground and Water Limited. Licence is for the sole use of the client and may not be assigned, transferred or given to a third party.

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

---

**APPENDIX B**  
**Thickness of 6F2 Crushed Concrete/Demolition Rubble Post Demolition**



**Survey notes:**  
This survey drawing is a combination of existing client supplied Topo Surveys undertaken at various stages (see individual title blocks) and Encompass Surveys survey. The survey of the existing areas that have no visible evidence of change have been left in. Please note that Encompass have not verified the existing surveys and a visual check has been made only. Individual survey detail can be identified within the AutoCAD layering schedule and colours.

**NOTES:**

**Drawings:**  
Impoundments are filled where there is to be and all drainage into impoundments has been obtained through visual inspection only, with no entry into manholes. Therefore the complete accuracy cannot be guaranteed. The contractor shall be responsible for impoundance serving the services of a specialized design expert be used.

**Tree:**  
Every effort has been made to identify and label all trees on site but where there are areas of critical importance we suggest the use of a professional arborist to be consulted.

**GPS:**  
The data obtained is relative to the time and date of survey. GPS levels and coordinates are based on the datum of the National Geodetic Survey according to the quality of the GPS network at the time of survey. In addition, the survey data is based on the datum of the National Vertical Datum. Establishments are established from a control site fix and baseline orientation station utilizing GPS correction data.

**Survey Limit:**  
Survey specification is limited to the original purpose of the survey conducted at shown and is to be used for this purpose only. The survey is not to be used for any other purpose outside of the survey area within limitations of site conditions at the time of survey. In areas difficult to survey due to restricted access, there of no access, the survey is not to be used for any other purpose. The survey is to be verified following suitable distance.

**Survey Data:**  
Survey data obtained and shown is relative to the plotting scale.

**Copyright:**  
This survey information is Copyright to Reynolds surveys Ltd (2009)



LEGEND

### TREE SPECIES INFORMATION

|                |     |                 |     |
|----------------|-----|-----------------|-----|
| ALDER          | ALD | LYCORT          | LOC |
| ASH            | ASH | LYONB FINE      | LPH |
| ASPEN          | ASP | MACULOSA        | MAG |
| BEECH          | BCH | MAPLE           | MPL |
| CEDAR          | CED | OAK             | OAK |
| CHERRY         | CHP | PEAR            | PNE |
| CHERRYB        | CHP | PEACH           | PUS |
| ELM            | ELM | PLUM            | PLU |
| FIR            | FIR | RHODOCENDRUS    | RDN |
| FRUIT          | FRT | ROBIN           | RBN |
| HAWTHORN       | HWR | SILVER BIRCH    | SIB |
| HAZEL          | HZL | SCURUS          | SCR |
| HOLLY          | HLY | SHED CHERRY     | SCD |
| HORSE CHESTNUT | HCH | SYCAMORE        | SYC |
| HORNBEAM       | HHR | WALNUT          | WNT |
| LAUREL         | LWL | WILLOW          | WCH |
| LARCH          | LAR | YEW             | YEW |
| LINE           | LPH | SPECIES UNKNOWN | SPU |
|                |     | COMPACT         | COP |

**TREE ANNOTATIONS:** Tree Species / Tree Boli Size / No. of Boli  
Tree Height / Tree Canopy Spread

| FENCE INFORMATION    |     | LEVEL INFORMATION |     |
|----------------------|-----|-------------------|-----|
| BARBED WIRE FENCE    | BWF | BASEMENT LEVEL    | BTL |
| CONCRETE/IRON FENCE  | CIF | BDL LEVEL         | BL  |
| CORUGATED FENCE      | CF  | COVER LEVEL       | CL  |
| CUL-DE-SAC FENCE     | CLF | DAWN PROOF COURSE | DPC |
| CHESTNUT PALLIS      | CWF | FLOOR LEVEL       | FL  |
| CHAIN-BARRIER        | CB  | INVERT LEVEL      | IL  |
| HANDRAIL             | HDL | OUTGOAL LEVEL     | OL  |
| IRON RAILINGS        | IRL | THRESHOLD LEVEL   | TL  |
| LARCH PALIS          | LPF | LOW WATER         | FW  |
| MISCELLANEOUS FENCE  | MUF | SURFACE WATER     | SW  |
| POST AND RAIL FENCE  | PRF | UNABLE TO LIFT    | UL  |
| POCKET FENCE         | PF  | WATER LEVEL       | WL  |
| POST AND CHAIN FENCE | PCF |                   |     |

### SURFACE INFORMATION

| LETTER PRINCIPLE | TV | CONCRETE | CHANCE |
|------------------|----|----------|--------|
| LETTER B         | BT | BOUNCE   | B      |
| LETTER C         | CT | CHANCE   | C      |
| LETTER D         | DT | DOWN     | D      |
| LETTER E         | ET | EVERY    | E      |
| LETTER F         | FT | FACE     | F      |
| LETTER G         | GT | GO       | G      |
| LETTER H         | HT | HAND     | H      |
| LETTER I         | IT | IN       | I      |
| LETTER J         | JT | JACK     | J      |
| LETTER K         | KT | KICK     | K      |
| LETTER L         | LT | LEAD     | L      |
| LETTER M         | MT | MIND     | M      |
| LETTER N         | NT | NET      | N      |
| LETTER O         | OT | OFF      | O      |
| LETTER P         | PT | PUT      | P      |
| LETTER Q         | QT | QUIT     | Q      |
| LETTER R         | RT | RACE     | R      |
| LETTER S         | ST | STOP     | S      |
| LETTER T         | TT | TALK     | T      |
| LETTER U         | UT | UP       | U      |
| LETTER V         | VT | VIEW     | V      |
| LETTER W         | WT | WALK     | W      |
| LETTER X         | XT | XRAY     | X      |
| LETTER Y         | YT | YIELD    | Y      |
| LETTER Z         | ZT | ZONE     | Z      |

| FEATURE INFORMATION    |      |                      |     |
|------------------------|------|----------------------|-----|
| BOLD                   | BT   | NOTICE BOARD         | MB  |
| BRITISH TELEVISION     | BTB  | POST                 | PB  |
| BRITISH TELEVISION     | BTB  | RAIN WATER PIPE      | RWP |
| CABLE TELEVISION       | CTV  | SHOULDER FLUORESCENT | SF  |
| CABLE TELEVISION       | CATV | ROAD SIGN            | RS  |
| CABLE TELEVISION       | CNTV | ROOMING OFF          | RO  |
| ELECTRICITY CABLE POST | EC   | SERVICE WAREHOUSE    | SW  |
| ELECTRICITY CABLE POST | EC   | SEA, VENT PIPE       | SV  |
| ELECTRICITY CABLE POST | EC   | SHOCK                | SH  |
| ELECTRICITY POST       | EP   | STOP WATER           | SW  |
| FIRE HYDRANT           | PH   | THUNDERBOLT PIPE     | TP  |
| FLUORESCENT LIGHT      | FL   | UNDER THE CALL BOX   | UCB |
| LAMP POST              | LP   | TRAFFIC SIGNAL       | TS  |
| LETTER BOX             | LB   | TRAFFIC SIGNALS      | TS  |
| LETTER BOX             | LB   | WATER METER          | WM  |
| LETTER BOX             | LB   | WATER TAP            | WT  |
| LETTER BOX             | LB   | WATER TAP            | WT  |

|                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Level Datum:<br/>Levels are related to existing survey as supplied by the client.<br/>Ref: CD Surveys drawing number HS/1806006 August 2018</p> |
| <p>Grid:<br/>Grid is related to the existing client supplied survey (see above)</p>                                                                |



Encompass Surveys Ltd  
Unit 2  
Talisman Business Centre  
Duncan Road  
Park Gate, Southampton  
Hampshire SO31 7GA

Tel: 023 80652002 Email: [info@encompass-surveys.co.uk](mailto:info@encompass-surveys.co.uk)

|                  |                                        |           |                |
|------------------|----------------------------------------|-----------|----------------|
| Client:          | Drew Smith                             |           |                |
| Survey Location: | Former Colt Site<br>New Lane<br>Havant |           |                |
| Survey type:     | Topographical                          | Scale:    | 1:200@A0       |
| Drawing ref:     | ENC/081119/1GG7C                       | Date:     | Dec 2019       |
| Drawn/QA:        | SH/GL                                  | Revision: | See .dwg notes |



**APPENDIX C**  
**Chemical Laboratory Testing – Crushed Concrete/Demolition Rubble**



James Dalziel  
Ground & Water Ltd  
2 The Long Barn  
Norton Farm  
Selborne Road  
Alton  
Hampshire  
GU34 3NB

**DETS Ltd**  
Unit 1  
Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Kent  
ME17 2JN  
t: 01622 850410

## **DETS Report No: 19-17321**

**Site Reference:** Former Colt International, New Lane, Havant, PO9 2LZ

**Project / Job Ref:** GWPR3192A

**Order No:** None Supplied

**Sample Receipt Date:** 13/12/2019

**Sample Scheduled Date:** 13/12/2019

**Report Issue Number:** 1

**Reporting Date:** 19/12/2019

**Authorised by:**

Dave Ashworth  
Technical Manager

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

| Soil Analysis Certificate                                            |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP1           | TP2           | TP3           | TP4           | TP5           |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452376        | 452377        | 452378        | 452379        | 452380        |

| Determinand                            | Unit          | RL      | Accreditation |              |              |              |              |              |
|----------------------------------------|---------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          |              |              |              |              |              |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      |              |              |              |              |              |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      |              |              |              |              |              |
| pH                                     | pH Units      | N/a     | MCERTS        | 10.5         | 11.1         | 10.9         | 11.0         | 11.2         |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 1310         | 949          | 374          | 59           | 699          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 1.30         | 0.95         | 0.37         | 0.06         | 0.70         |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 1.1          | 1.2          | 0.7          | 0.7          | 1.2          |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.6          | 0.7          | 0.4          | 0.4          | 0.7          |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7            | 6            | 6            | 7            | 8            |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.4          | 0.4          | 0.3          | 0.3          | 0.4          |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 17           | 13           | 13           | 12           | 16           |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 47           | 11           | 10           | 11           | 12           |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 117          | 59           | 51           | 59           | 60           |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 9            | 8            | 8            | 8            | 10           |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 28           | 23           | 24           | 23           | 27           |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 59           | 51           | 42           | 49           | 46           |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
Subcontracted analysis (S)

| Soil Analysis Certificate                                            |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP6           | TP7           | TP8           | TP9           | TP10          |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452381        | 452382        | 452383        | 452384        | 452385        |

| Determinand                            | Unit          | RL      | Accreditation |              |              |              |              |              |
|----------------------------------------|---------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          |              |              |              |              |              |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      |              |              |              |              |              |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      |              |              |              |              |              |
| pH                                     | pH Units      | N/a     | MCERTS        | 11.3         | 10.9         | 11.7         | 10.8         | 11.1         |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 800          | 764          | 941          | 1610         | 1610         |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 0.80         | 0.76         | 0.94         | 1.61         | 1.61         |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 0.7          | 1.2          | 0.9          | 1.2          | 1.1          |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.4          | 0.7          | 0.5          | 0.7          | 0.6          |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7            | 7            | 7            | 7            | 7            |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.4          | 0.4          | 0.4          | 0.4          | 1            |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 15           | 16           | 15           | 15           | 15           |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 47           | 16           | 25           | 12           | 13           |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 139          | 54           | 80           | 89           | 151          |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 9            | 9            | 10           | 9            | 9            |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 29           | 28           | 28           | 27           | 28           |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 51           | 51           | 61           | 166          | 58           |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
Subcontracted analysis (S)

| Soil Analysis Certificate                                            |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP11          | TP12          | TP13          | TP14          | TP15          |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452386        | 452387        | 452388        | 452389        | 452390        |

| Determinand                            | Unit          | RL      | Accreditation |              |              |              |              |              |
|----------------------------------------|---------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          |              |              |              |              |              |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      |              |              |              |              |              |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      |              |              |              |              |              |
| pH                                     | pH Units      | N/a     | MCERTS        | 10.7         | 10.7         | 10.7         | 10.8         | 10.9         |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 1810         | 515          | 1300         | 1180         | 1290         |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 1.81         | 0.52         | 1.30         | 1.18         | 1.29         |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 1.1          | 0.9          | 1.1          | 0.7          | 1            |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.6          | 0.5          | 0.7          | 0.4          | 0.6          |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7            | 7            | 7            | 7            | 8            |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.4          | 0.4          | 0.4          | 1            | 0.4          |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 16           | 15           | 15           | 16           | 15           |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 13           | 17           | 14           | 15           | 18           |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 168          | 95           | 125          | 164          | 110          |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 10           | 10           | 10           | 11           | 10           |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 28           | 27           | 30           | 30           | 28           |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 71           | 90           | 60           | 96           | 71           |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
Subcontracted analysis (S)



**DETS Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
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| Soil Analysis Certificate                                            |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP16          | TP17          | TP18          | TP19          | TP20          |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452391        | 452392        | 452393        | 452394        | 452395        |

| Determinand                            | Unit          | RL      | Accreditation |              |              |              |              |              |
|----------------------------------------|---------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          |              |              |              |              |              |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      |              |              |              |              |              |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      |              |              |              |              |              |
| pH                                     | pH Units      | N/a     | MCERTS        | 10.5         | 10.9         | 10.7         | 10.4         | 11.3         |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 130          | 442          | 1160         | 968          | 30           |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 0.13         | 0.44         | 1.16         | 0.97         | 0.03         |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 0.7          | 1.2          | 1.3          | 1.2          | 0.7          |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.4          | 0.7          | 0.8          | 0.7          | 0.4          |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7            | 8            | 8            | 8            | 7            |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.4          | 0.5          | 0.7          | 0.4          | 0.4          |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 16           | 17           | 17           | 16           | 14           |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 26           | 23           | 17           | 25           | 10           |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 187          | 173          | 150          | 178          | 61           |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 11           | 10           | 10           | 10           | 8            |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 29           | 29           | 30           | 30           | 25           |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 71           | 99           | 58           | 102          | 36           |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
 Subcontracted analysis (S)

| Soil Analysis Certificate                                            |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP21          | TP22          | TP23          | TP24          | TP25          |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452396        | 452397        | 452398        | 452399        | 452400        |

| Determinand                            | Unit          | RL      | Accreditation | Detected                   | Not Detected | Not Detected | Not Detected | Not Detected |
|----------------------------------------|---------------|---------|---------------|----------------------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Detected                   | Not Detected | Not Detected | Not Detected | Not Detected |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          | Amosite Present as bundles |              |              |              |              |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      | Amosite                    |              |              |              |              |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      | < 0.001                    |              |              |              |              |
| pH                                     | pH Units      | N/a     | MCERTS        | 11.8                       | 11.6         | 11.7         | 11.8         | 11.6         |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2                        | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 13                         | 125          | 16           | 48           | 11           |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 0.01                       | 0.12         | 0.02         | 0.05         | 0.01         |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 0.3                        | 0.3          | 0.4          | 0.5          | 0.5          |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.2                        | 0.2          | 0.3          | 0.3          | 0.3          |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7                          | 7            | 7            | 8            | 6            |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1                        | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.2                        | 0.2          | 0.2          | 0.3          | 0.2          |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 15                         | 14           | 16           | 15           | 13           |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2                        | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 10                         | 13           | 12           | 14           | 10           |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 43                         | 264          | 49           | 71           | 42           |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1                        | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 9                          | 9            | 10           | 10           | 8            |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3                        | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 28                         | 24           | 28           | 29           | 24           |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 31                         | 50           | 43           | 44           | 30           |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2                        | < 2          | < 2          | < 2          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
Subcontracted analysis (S)

| Soil Analysis Certificate                                            |                 |               |               |  |  |  |
|----------------------------------------------------------------------|-----------------|---------------|---------------|--|--|--|
| DETS Report No: 19-17321                                             | Date Sampled    | 04/12/19      | 04/12/19      |  |  |  |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied |  |  |  |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | TP26          | TP27          |  |  |  |
| Project / Job Ref: GWPR3192A                                         | Additional Refs | None Supplied | None Supplied |  |  |  |
| Order No: None Supplied                                              | Depth (m)       | 0.10          | 0.10          |  |  |  |
| Reporting Date: 19/12/2019                                           | DETS Sample No  | 452401        | 452402        |  |  |  |

| Determinand                            | Unit          | RL      | Accreditation |              |              |  |  |  |
|----------------------------------------|---------------|---------|---------------|--------------|--------------|--|--|--|
| Asbestos Screen <sup>(S)</sup>         | N/a           | N/a     | ISO17025      | Not Detected | Not Detected |  |  |  |
| Sample Matrix <sup>(S)</sup>           | Material Type | N/a     | NONE          |              |              |  |  |  |
| Asbestos Type <sup>(S)</sup>           | PLM Result    | N/a     | ISO17025      |              |              |  |  |  |
| Asbestos Quantification <sup>(S)</sup> | %             | < 0.001 | ISO17025      |              |              |  |  |  |
| pH                                     | pH Units      | N/a     | MCERTS        | 11.9         | 11.6         |  |  |  |
| Total Cyanide                          | mg/kg         | < 2     | NONE          | < 2          | < 2          |  |  |  |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | mg/l          | < 10    | MCERTS        | 15           | 13           |  |  |  |
| W/S Sulphate as SO <sub>4</sub> (2:1)  | g/l           | < 0.01  | MCERTS        | 0.01         | 0.01         |  |  |  |
| Organic Matter                         | %             | < 0.1   | MCERTS        | 0.6          | 0.4          |  |  |  |
| Total Organic Carbon (TOC)             | %             | < 0.1   | MCERTS        | 0.3          | 0.2          |  |  |  |
| Arsenic (As)                           | mg/kg         | < 2     | MCERTS        | 7            | 7            |  |  |  |
| W/S Boron                              | mg/kg         | < 1     | NONE          | < 1          | < 1          |  |  |  |
| Cadmium (Cd)                           | mg/kg         | < 0.2   | MCERTS        | 0.4          | < 0.2        |  |  |  |
| Chromium (Cr)                          | mg/kg         | < 2     | MCERTS        | 16           | 14           |  |  |  |
| Chromium (hexavalent)                  | mg/kg         | < 2     | NONE          | < 2          | < 2          |  |  |  |
| Copper (Cu)                            | mg/kg         | < 4     | MCERTS        | 21           | 11           |  |  |  |
| Lead (Pb)                              | mg/kg         | < 3     | MCERTS        | 89           | 41           |  |  |  |
| Mercury (Hg)                           | mg/kg         | < 1     | NONE          | < 1          | < 1          |  |  |  |
| Nickel (Ni)                            | mg/kg         | < 3     | MCERTS        | 9            | 8            |  |  |  |
| Selenium (Se)                          | mg/kg         | < 3     | NONE          | < 3          | < 3          |  |  |  |
| Vanadium (V)                           | mg/kg         | < 2     | NONE          | 27           | 27           |  |  |  |
| Zinc (Zn)                              | mg/kg         | < 3     | MCERTS        | 72           | 33           |  |  |  |
| Total Phenols (monohydric)             | mg/kg         | < 2     | NONE          | < 2          | < 2          |  |  |  |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.  
Subcontracted analysis (S)



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#### Soil Analysis Certificate - Speciated PAHs

|                                                                         |                 |               |               |               |               |               |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                                | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | TP1           | TP2           | TP3           | TP4           | TP5           |
| Project / Job Ref: GWPR3192A                                            | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                                 | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                              | DETS Sample No  | 452376        | 452377        | 452378        | 452379        | 452380        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.42  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.13  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.31  | 0.18  | 0.65  | 0.27  | 0.55  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.18  | < 0.1 | 0.13  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 1.01  | 0.86  | 1.61  | 1.49  | 0.69  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.91  | 0.76  | 1.40  | 1.15  | 0.58  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.64  | 0.50  | 0.99  | 0.92  | 0.40  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.63  | 0.49  | 0.93  | 0.80  | 0.42  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.91  | 0.64  | 1.28  | 1.06  | 0.54  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.31  | 0.22  | 0.47  | 0.35  | 0.18  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.57  | 0.41  | 0.80  | 0.64  | 0.33  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.46  | 0.31  | 0.61  | 0.49  | 0.28  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.40  | 0.27  | 0.52  | 0.40  | 0.22  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 6.2   | 4.6   | 9.4   | 7.6   | 4.9   |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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# **Soil Analysis Certificate - Speciated PAHs**

|                                                                             |                        |               |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP6           | TP7           | TP8           | TP9           | TP10          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452381        | 452382        | 452383        | 452384        | 452385        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.19  | 0.51  | 0.18  | 0.23  | 0.31  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.12  | < 0.1 | < 0.1 | < 0.1 |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 0.73  | 1.19  | 0.68  | 0.97  | 1.05  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.76  | 0.97  | 0.67  | 0.85  | 0.93  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.59  | 0.63  | 0.42  | 0.67  | 0.60  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.58  | 0.61  | 0.37  | 0.66  | 0.60  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.97  | 0.82  | 0.52  | 0.97  | 0.83  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.26  | 0.27  | 0.16  | 0.27  | 0.21  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.64  | 0.51  | 0.33  | 0.59  | 0.53  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.50  | 0.39  | 0.24  | 0.45  | 0.40  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.44  | 0.32  | 0.20  | 0.34  | 0.34  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 5.7   | 6.3   | 3.8   | 6     | 5.8   |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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# Soil Analysis Certificate - Speciated PAHs

|                                                                             |                        |               |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP11          | TP12          | TP13          | TP14          | TP15          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452386        | 452387        | 452388        | 452389        | 452390        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.13  | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.17  | < 0.1 | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.25  | 0.83  | 0.21  | 0.32  | 0.25  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.21  | < 0.1 | < 0.1 | < 0.1 |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 0.91  | 1.08  | 0.86  | 1.53  | 0.99  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.82  | 0.92  | 0.80  | 1.40  | 0.89  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.57  | 0.51  | 0.46  | 0.74  | 0.47  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.55  | 0.54  | 0.49  | 0.79  | 0.59  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.79  | 0.74  | 0.68  | 0.97  | 0.77  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.24  | 0.21  | 0.23  | 0.31  | 0.25  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.51  | 0.46  | 0.47  | 0.72  | 0.56  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.38  | 0.33  | 0.32  | 0.46  | 0.40  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.31  | 0.29  | 0.30  | 0.42  | 0.37  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 5.3   | 6.4   | 4.8   | 7.7   | 5.5   |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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# Soil Analysis Certificate - Speciated PAHs

|                                                                             |                        |               |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP16          | TP17          | TP18          | TP19          | TP20          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452391        | 452392        | 452393        | 452394        | 452395        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 2.05  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 1.71  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 1.45  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.24  | 0.30  | 1.57  | 0.14  | 15.80 |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.43  | < 0.1 | 4.04  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 0.78  | 1.05  | 3.43  | 0.64  | 15.30 |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.92  | 0.89  | 2.64  | 0.60  | 9.74  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.41  | 0.66  | 1.73  | 0.40  | 6.41  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.53  | 0.73  | 1.50  | 0.42  | 6.39  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.61  | 1     | 1.99  | 0.64  | 7.35  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.18  | 0.29  | 0.68  | 0.20  | 2.46  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.41  | 0.68  | 1.43  | 0.46  | 4.97  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.28  | 0.43  | 0.88  | 0.32  | 3.28  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.15  | < 0.1 | 0.73  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.26  | 0.40  | 0.74  | 0.28  | 2.48  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 4.6   | 6.4   | 17.2  | 4.1   | 84.1  |

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# Soil Analysis Certificate - Speciated PAHs

|                                                                         |                 |               |               |               |               |               |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                                | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | TP21          | TP22          | TP23          | TP24          | TP25          |
| Project / Job Ref: GWPR3192A                                            | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                                 | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                              | DETS Sample No  | 452396        | 452397        | 452398        | 452399        | 452400        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.12  | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.11  | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.79  | 0.75  | 0.98  | 0.78  | 1.33  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | 0.18  | 0.18  | 0.24  | 0.19  | 0.32  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 1.25  | 1.07  | 1.13  | 1.07  | 1.71  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 1.04  | 0.75  | 0.78  | 0.76  | 1.17  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.49  | 0.50  | 0.44  | 0.47  | 0.76  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.47  | 0.48  | 0.55  | 0.50  | 0.78  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.51  | 0.61  | 0.61  | 0.54  | 0.93  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.16  | 0.18  | 0.21  | 0.19  | 0.33  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.35  | 0.46  | 0.41  | 0.38  | 0.67  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.22  | 0.30  | 0.28  | 0.25  | 0.44  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.18  | 0.26  | 0.24  | 0.21  | 0.34  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 5.6   | 5.6   | 6.1   | 5.3   | 8.8   |

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#### Soil Analysis Certificate - Speciated PAHs

|                                                                         |                 |               |               |  |  |  |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|--|--|--|
| DETS Report No: 19-17321                                                | Date Sampled    | 04/12/19      | 04/12/19      |  |  |  |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied |  |  |  |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | TP26          | TP27          |  |  |  |
| Project / Job Ref: GWPR3192A                                            | Additional Refs | None Supplied | None Supplied |  |  |  |
| Order No: None Supplied                                                 | Depth (m)       | 0.10          | 0.10          |  |  |  |
| Reporting Date: 19/12/2019                                              | DETS Sample No  | 452401        | 452402        |  |  |  |

| Determinand            | Unit  | RL    | Accreditation |       |       |  |
|------------------------|-------|-------|---------------|-------|-------|--|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | 0.13  | < 0.1 |  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 |  |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | 0.19  | < 0.1 |  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | 0.15  | < 0.1 |  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 1.68  | 0.54  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | 0.39  | 0.13  |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 2.38  | 0.71  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 1.64  | 0.50  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.92  | 0.30  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.92  | 0.32  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 1.17  | 0.37  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.37  | 0.12  |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.78  | 0.26  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.45  | 0.16  |  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 |  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.35  | 0.14  |  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 11.5  | 3.6   |  |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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**Soil Analysis Certificate - TPH CWG Banded**

|                                                                             |                        |               |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP3           | TP6           | TP9           | TP12          | TP15          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452378        | 452381        | 452384        | 452387        | 452390        |

| Determinand          | Unit  | RL     | Accreditation |        |        |        |        |        |
|----------------------|-------|--------|---------------|--------|--------|--------|--------|--------|
| Aliphatic >C5 - C6   | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aliphatic >C6 - C8   | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aliphatic >C8 - C10  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C10 - C12 | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C12 - C16 | mg/kg | < 3    | MCERTS        | < 3    | 10     | < 3    | 5      | < 3    |
| Aliphatic >C16 - C21 | mg/kg | < 3    | MCERTS        | < 3    | 14     | < 3    | 24     | 13     |
| Aliphatic >C21 - C34 | mg/kg | < 10   | MCERTS        | < 10   | < 10   | < 10   | 163    | 58     |
| Aliphatic (C5 - C34) | mg/kg | < 21   | NONE          | < 21   | 24     | < 21   | 192    | 71     |
| Aromatic >C5 - C7    | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aromatic >C7 - C8    | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aromatic >C8 - C10   | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C10 - C12  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C12 - C16  | mg/kg | < 2    | MCERTS        | < 2    | 3      | < 2    | 4      | < 2    |
| Aromatic >C16 - C21  | mg/kg | < 3    | MCERTS        | 15     | 11     | 9      | 32     | 14     |
| Aromatic >C21 - C35  | mg/kg | < 10   | MCERTS        | 73     | 29     | 29     | 210    | 56     |
| Aromatic (C5 - C35)  | mg/kg | < 21   | NONE          | 89     | 43     | 38     | 246    | 70     |
| Total >C5 - C35      | mg/kg | < 42   | NONE          | 89     | 67     | < 42   | 439    | 140    |

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# Soil Analysis Certificate - TPH CWG Banded

|                                                                         |                 |               |               |               |               |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|
| DETS Report No: 19-17321                                                | Date Sampled    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | TP18          | TP21          | TP24          | TP27          |
| Project / Job Ref: GWPR3192A                                            | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                                                 | Depth (m)       | 0.10          | 0.10          | 0.10          | 0.10          |
| Reporting Date: 19/12/2019                                              | DETS Sample No  | 452393        | 452396        | 452399        | 452402        |

| Determinand          | Unit  | RL     | Accreditation |        |        |        |        |
|----------------------|-------|--------|---------------|--------|--------|--------|--------|
| Aliphatic >C5 - C6   | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aliphatic >C6 - C8   | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aliphatic >C8 - C10  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C10 - C12 | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C12 - C16 | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | 14     |
| Aliphatic >C16 - C21 | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | 39     |
| Aliphatic >C21 - C34 | mg/kg | < 10   | MCERTS        | < 10   | < 10   | < 10   | 56     |
| Aliphatic (C5 - C34) | mg/kg | < 21   | NONE          | < 21   | < 21   | < 21   | 109    |
| Aromatic >C5 - C7    | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aromatic >C7 - C8    | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aromatic >C8 - C10   | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C10 - C12  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C12 - C16  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C16 - C21  | mg/kg | < 3    | MCERTS        | 20     | < 3    | < 3    | < 3    |
| Aromatic >C21 - C35  | mg/kg | < 10   | MCERTS        | 39     | < 10   | < 10   | < 10   |
| Aromatic (C5 - C35)  | mg/kg | < 21   | NONE          | 59     | < 21   | < 21   | < 21   |
| Total >C5 - C35      | mg/kg | < 42   | NONE          | 59     | < 42   | < 42   | 109    |

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# **Soil Analysis Certificate - BTEX / MTBE**

|                                                                             |                        |               |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP3           | TP6           | TP9           | TP12          | TP15          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452378        | 452381        | 452384        | 452387        | 452390        |

| <b>Determinand</b> | <b>Unit</b> | <b>RL</b> | <b>Accreditation</b> |     |     |     |     |     |
|--------------------|-------------|-----------|----------------------|-----|-----|-----|-----|-----|
| Benzene            | ug/kg       | < 2       | MCERTS               | < 2 | < 2 | < 2 | < 2 | < 2 |
| Toluene            | ug/kg       | < 5       | MCERTS               | < 5 | < 5 | < 5 | < 5 | < 5 |
| Ethylbenzene       | ug/kg       | < 2       | MCERTS               | < 2 | < 2 | < 2 | < 2 | < 2 |
| p & m-xylene       | ug/kg       | < 2       | MCERTS               | < 2 | < 2 | < 2 | < 2 | < 2 |
| o-xylene           | ug/kg       | < 2       | MCERTS               | < 2 | < 2 | < 2 | < 2 | < 2 |
| MTBE               | ug/kg       | < 5       | MCERTS               | < 5 | < 5 | < 5 | < 5 | < 5 |

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# Soil Analysis Certificate - BTEX / MTBE

|                                                                             |                        |               |               |               |               |
|-----------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 19-17321</b>                                             | <b>Date Sampled</b>    | 04/12/19      | 04/12/19      | 04/12/19      | 04/12/19      |
| <b>Ground &amp; Water Ltd</b>                                               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | TP18          | TP21          | TP24          | TP27          |
| <b>Project / Job Ref: GWPR3192A</b>                                         | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>                                              | <b>Depth (m)</b>       | 0.10          | 0.10          | 0.10          | 0.10          |
| <b>Reporting Date: 19/12/2019</b>                                           | <b>DETS Sample No</b>  | 452393        | 452396        | 452399        | 452402        |

| Determinand  | Unit  | RL  | Accreditation |     |     |     |     |     |
|--------------|-------|-----|---------------|-----|-----|-----|-----|-----|
| Benzene      | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| Toluene      | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 | < 5 | < 5 |
| Ethylbenzene | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| p & m-xylene | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| o-xylene     | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| MTBE         | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 | < 5 | < 5 |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.



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# Soil Analysis Certificate - Sample Descriptions

|                                                                      |  |
|----------------------------------------------------------------------|--|
| DETS Report No: 19-17321                                             |  |
| Ground & Water Ltd                                                   |  |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ |  |
| Project / Job Ref: GWPR3192A                                         |  |
| Order No: None Supplied                                              |  |
| Reporting Date: 19/12/2019                                           |  |

| DETS Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description                      |
|----------------|------------|-----------------|-----------|----------------------|------------------------------------------------|
| 452376         | TP1        | None Supplied   | 0.10      | 15.8                 | Brown gravelly sand with stones and glass      |
| 452377         | TP2        | None Supplied   | 0.10      | 15.5                 | Brown gravelly sand with stones                |
| 452378         | TP3        | None Supplied   | 0.10      | 11.4                 | Brown gravelly sand with stones and brick      |
| 452379         | TP4        | None Supplied   | 0.10      | 11.6                 | Brown gravelly sand with stones                |
| 452380         | TP5        | None Supplied   | 0.10      | 13.3                 | Brown gravelly sand with stones                |
| 452381         | TP6        | None Supplied   | 0.10      | 12.3                 | Brown gravelly sand with stones and glass      |
| 452382         | TP7        | None Supplied   | 0.10      | 15.8                 | Brown gravelly sand with stones and vegetation |
| 452383         | TP8        | None Supplied   | 0.10      | 11.8                 | Brown gravelly sand with stones and glass      |
| 452384         | TP9        | None Supplied   | 0.10      | 14.8                 | Brown gravelly sand with stones                |
| 452385         | TP10       | None Supplied   | 0.10      | 17.1                 | Brown gravelly sand with stones and brick      |
| 452386         | TP11       | None Supplied   | 0.10      | 15.7                 | Brown gravelly sand with stones and glass      |
| 452387         | TP12       | None Supplied   | 0.10      | 13.2                 | Brown gravelly sand with stones                |
| 452388         | TP13       | None Supplied   | 0.10      | 14.7                 | Brown gravelly sand with stones and brick      |
| 452389         | TP14       | None Supplied   | 0.10      | 13.7                 | Brown gravelly sand with stones                |
| 452390         | TP15       | None Supplied   | 0.10      | 13                   | Brown gravelly sand with stones                |
| 452391         | TP16       | None Supplied   | 0.10      | 13                   | Brown gravelly sand with stones                |
| 452392         | TP17       | None Supplied   | 0.10      | 14.2                 | Brown gravelly sand with stones                |
| 452393         | TP18       | None Supplied   | 0.10      | 11.7                 | Brown gravelly sand with stones and brick      |
| 452394         | TP19       | None Supplied   | 0.10      | 14.6                 | Brown gravelly sand with stones                |
| 452395         | TP20       | None Supplied   | 0.10      | 8.1                  | Brown gravelly sand with stones and brick      |
| 452396         | TP21       | None Supplied   | 0.10      | 7.7                  | Brown gravelly sand with stones                |
| 452397         | TP22       | None Supplied   | 0.10      | 11.2                 | Brown gravelly sand with stones                |
| 452398         | TP23       | None Supplied   | 0.10      | 8.3                  | Brown gravelly sand with stones                |
| 452399         | TP24       | None Supplied   | 0.10      | 11.4                 | Brown gravelly sand with stones                |
| 452400         | TP25       | None Supplied   | 0.10      | 9.2                  | Brown gravelly sand with stones                |
| 452401         | TP26       | None Supplied   | 0.10      | 8.7                  | Brown gravelly sand with stones                |
| 452402         | TP27       | None Supplied   | 0.10      | 8                    | Brown gravelly sand with stones                |

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>1/2</sup>

Unsuitable Sample <sup>1/5</sup>



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# **Soil Analysis Certificate - Methodology & Miscellaneous Information**

**DETS Report No: 19-17321**

**Ground & Water Ltd**

**Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ**

**Project / Job Ref: GWPR3192A**

**Order No: None Supplied**

**Reporting Date: 19/12/2019**

| Matrix | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                             | Method No |
|--------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Soil   | D           | Boron - Water Soluble                                                                                                                           | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES                                                            | E012      |
| Soil   | AR          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                             | E001      |
| Soil   | D           | Cations                                                                                                                                         | Determination of cations in soil by aqua-regia digestion followed by ICP-OES                                                                         | E002      |
| Soil   | D           | Chloride - Water Soluble (2:1)                                                                                                                  | Determination of chloride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | AR          | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry | E016      |
| Soil   | AR          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                             | E015      |
| Soil   | AR          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                                | E015      |
| Soil   | AR          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                               | E015      |
| Soil   | D           | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through extraction with cyclohexane                                                                                       | E011      |
| Soil   | AR          | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of hexane/acetone extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement                             | E022      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of water followed by electrometric measurement                                                  | E023      |
| Soil   | D           | Elemental Sulphur                                                                                                                               | Determination of elemental sulphur by solvent extraction followed by GC-MS                                                                           | E020      |
| Soil   | AR          | EPH (C10 - C40)                                                                                                                                 | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH Product ID                                                                                                                                  | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                                        | E004      |
| Soil   | D           | Fluoride - Water Soluble                                                                                                                        | Determination of Fluoride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | FOC (Fraction Organic Carbon)                                                                                                                   | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate                     | E010      |
| Soil   | D           | Loss on Ignition @ 450°C                                                                                                                        | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace                                       | E019      |
| Soil   | D           | Magnesium - Water Soluble                                                                                                                       | Determination of water soluble magnesium by extraction with water followed by ICP-OES                                                                | E025      |
| Soil   | D           | Metals                                                                                                                                          | Determination of metals by aqua-regia digestion followed by ICP-OES                                                                                  | E002      |
| Soil   | AR          | Mineral Oil (C10 - C40)                                                                                                                         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                  | E004      |
| Soil   | AR          | Moisture Content                                                                                                                                | Moisture content; determined gravimetrically                                                                                                         | E003      |
| Soil   | D           | Nitrate - Water Soluble (2:1)                                                                                                                   | Determination of nitrate by extraction with water & analysed by ion chromatography                                                                   | E009      |
| Soil   | D           | Organic Matter                                                                                                                                  | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards                | E005      |
| Soil   | AR          | PCB - 7 Congeners                                                                                                                               | Determination of PCB by extraction with acetone and hexane followed by GC-MS                                                                         | E008      |
| Soil   | D           | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through extraction with petroleum ether                                                                                   | E011      |
| Soil   | AR          | pH                                                                                                                                              | Determination of pH by addition of water followed by electrometric measurement                                                                       | E007      |
| Soil   | AR          | Phenols - Total (monohydric)                                                                                                                    | Determination of phenols by distillation followed by colorimetry                                                                                     | E021      |
| Soil   | D           | Phosphate - Water Soluble (2:1)                                                                                                                 | Determination of phosphate by extraction with water & analysed by ion chromatography                                                                 | E009      |
| Soil   | D           | Sulphate (as SO4) - Total                                                                                                                       | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES                                                                       | E013      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of sulphate by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of water soluble sulphate by extraction with water followed by ICP-OES                                                                 | E014      |
| Soil   | AR          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                                    | E018      |
| Soil   | D           | Sulphur - Total                                                                                                                                 | Determination of total sulphur by extraction with aqua-regia followed by ICP-OES                                                                     | E024      |
| Soil   | AR          | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS                                               | E006      |
| Soil   | AR          | Thiocyanate (as SCN)                                                                                                                            | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry  | E017      |
| Soil   | D           | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through extraction with toluene                                                                                           | E011      |
| Soil   | D           | Total Organic Carbon (TOC)                                                                                                                      | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                                       | E001      |
| Soil   | AR          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                            | E001      |

**D Dried**  
**AR As Received**

**APPENDIX D**  
**Soil Assessment Criteria**

## Appendix D

### Soil Guideline Values and General Assessment Criteria

#### D1 Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'.

##### D1.1 Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

- 1) EA Science Report SC050021/SR2: *Human health toxicological assessment of contaminants in soil.*
- 2) EA Science Report SC050021/SR3: *Updated technical background to the CLEA model.*
- 3) EA CLEA Bulletin (2009).
- 4) CLEA software version 1.06 (2009)
- 5) Toxicological reports and SGV technical notes.

The CLEA guidance and tools:

- *do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures.*
- *do not cover risks to the environment, such as groundwater, ecosystems or buildings.*
- *do not provide a definitive test for telling when human health risks are significant.*
- *are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.*

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

##### D1.2 Land-use Scenarios

The CLEA model uses a range of standard land-use scenarios to develop conceptual exposure models as follows:

###### 1 Residential (with home grown produce) (RwHP)

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil and indoor dust ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
- Building type is a two-storey small terraced house.

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur. (Residential without homegrown produce (RwoHP)).

## 2) **Allotments**

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
- There is no building.

## 3) **Commercial/Industrial**

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is a working lifetime of 49 years.
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
- Building type is a three-storey office (pre 1970).

### D1.4 **LQM/CIEH SUITABLE 4 USE LEVELS (S4UL)**

For derivation of these S4UL reference must be made to:

Nathanial, P., McCaffrey, C., Gillet, A., Ogden, R., Nathanial, J., *The LQM/CIEH S4UL's for Human Health Risk Assessment*. Land Quality Press. 2015

The LQM/CIEH S4UL for a given land use is the concentration of the contaminant in soil at which the predicted daily exposure, as calculated by the CLEA software, equals the Health Criteria Value.

The final output for each contaminant represents a synthesis of new toxicological (and fate and transport) reviews published since the preparation of the 2<sup>nd</sup> edition LQM/CIEH GAC's (Nathanial et al., 2009).

In the derivation of LQM/CIEH S4UL's the principles of 'minimal' or 'tolerable' risk enshrined in SR2, which has not been withdrawn, has been maintained.

S4UL's have been derived for the basic CLEA land-uses, as described above, and for two new land uses:

- Public Open Spaces near Residential Housing (POSresi)
- Public Park (POSpark).

#### **Public Open Spaces near Residential Housing (POSresi)**

Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930's – 1970's housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.

#### **Public Park (POSpark)**

An area of open space, usually owned and maintained by the local authority, provided for recreational uses including family visits and picnics, children's play area, informal sporting activities (not a dedicated sports pitch), and dog walking. It is assumed that tracking back of soils into places of residence will be negligible.

The following LQM/CIEH S4ULs (Copyright Land Quality Management Limited) have been reproduced with permission, to the publication number S4UL3072.

#### **D1.5 Category 4 Screening Levels (C4SLs)**

In the case of Lead, no SGV or GAC has been published to date. This is likely to be due to the toxicity review that is currently being undertaken by the Environment Agency. In the absence of updated toxicity information the SGV derived using CLEA 1.06 methodology and related toxicity will be used.

The overall objective of the C4SLs research project was to assist the provision of technical guidance in support of Defra's revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A) (Defra, 2012a). Specifically, the project aimed to deliver:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised SG presented a new four category system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high. More specific guidance on what type of land should be considered as Category 4 (Human Health) is provided in Paragraphs 4.21 and 4.22 of the revised SG, as follows:

*“4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:*

*(a) Land where no relevant contaminant linkage has been established.*

*(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.*

*(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.*

*(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).*

*4.22 The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.”*

The C4SLs are intended as “relevant technical tools” (in relation to Paragraph 4.21(c)) to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

*“The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land.”*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):  
*“SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health.”*

The implication of Paragraph 47(h) of the IA is that minimal risk is well within Category 4 and that the C4SLs should describe a higher level of risk which, whilst not minimal, can still be considered low enough to allow a judgement to be made that land containing substances at, or below, the C4SLs would typically fall within Category 4. This reflects Paragraph 4.20 of the revised SG, which states:

*"4.20 The local authority should not assume that land poses a significant possibility of significant harm if it considers that there is no risk or that the level of risk posed is low. For the purposes of this Guidance, such land is referred to as a "Category 4: Human Health" case. The authority may decide that the land is a Category 4: Human Health case as soon as it considers it has evidence to this effect, and this may happen at any stage during risk assessment including the early stages."*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

The generic screening values referred to before usually take the form of risk-based Soil Guideline Values (SGVs) or other Generic Assessment Criteria (GACs) that are most typically derived using the Environment Agency's Contaminated Land Exposure Assessment (CLEA) model, as described in the Environment Agency's SR2, SR3 and SR7 reports (EA, 2009b & c; EA, 2008). It is anticipated that C4SLs will be used in a similar manner; as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the SGVs.

The suggested approach to the development of C4SLs consists of the retention and use of the CLEA framework, modified according to considerations of the underlying science within the context of Defra's policy objectives relating to the revised SG. Within this context, it is suggested that the development of C4SLs may be achieved in one of three ways, namely:

- By modifying the toxicological parameters used within CLEA (while maintaining current exposure parameters);
- By modifying the exposure parameters embedded within CLEA (while maintaining current toxicological "minimal risk" interpretations); and
- By modifying both toxicological and exposure parameters.

There is also a suggested check on "other considerations" (e.g., background levels, epidemiological data, sources of uncertainty) within the approach, applicable to all three options.

It is suggested that a new term is defined for the toxicological guidance values associated with the derivation of C4SLs – a Low Level of Toxicological Concern (LLTC). A LLTC should represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as SPOSH.

#### **D1.6 CL:AIRE Generic Assessment Criteria (GAC)**

For derivation of the CL:AIRE Generic Assessment Criteria (GAC) reference should be made to the following report:

CL:AIRE, *The Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in the Real Environment*. 2009.

Within this report CL:AIRE provided Generic Assessment Criteria (GAC's) in accordance with the CLEA software and the principles outlined above for a further 35 contaminants sometime encountered on land affected by contamination.

#### **D1.7 Detailed Quantitative Risk Assessments (DQRA)**

Where the adoption of an S4UL/GAC/C4SL is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses then a DQRA may be undertaken to develop site specific values for relevant soil contaminants.

- |   |                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------|
| ⇒ | Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation. |
| ⇒ | Developing more accurate parameters using site data.                                                           |

#### **D1.8 Phytotoxicity**

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

- ICRL 70/90: *Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing*.

#### **D1.9 Statistical Tests**

DEFRA R&D Publication CLR 7 (DOE 1994) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95<sup>th</sup> percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

The DEFRA discussion paper *Assessing risks from land contamination – a proportionate approach ('the way forward')* (CLAN06/2006) aimed to increase understanding of the role that statistics can play in quantifying the uncertainty attached to the estimates of the mean concentration of contaminants in soil. In direct response CL:AIRE/CIEH published a joint report, *Guidance in comparing soil contamination data with a critical concentration* (CL:AIRE/CIEH 2008). A software implementation of the statistical techniques given in the report was published by ESI International (2008).

**Treatment of Hot-Spots**

- ⇒ A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
- ⇒ Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.

**D2 Ground and Water Limited Soil Assessment Criteria**

The Soil Assessment Criteria used in the preparation of this report are tabulated in the following pages:

**C4SL Low Level of Toxicological Concern**

| <b>C4SL Low Level of Toxicological Concern</b> |                 |                  |                      |                       |                    |                    |
|------------------------------------------------|-----------------|------------------|----------------------|-----------------------|--------------------|--------------------|
| Contaminant                                    | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg) | Allotment<br>(mg/kg) | Commercial<br>(mg/kg) | POSresi<br>(mg/kg) | POSpark<br>(mg/kg) |
| Lead                                           | <210            | <330             | <84                  | <6000                 | <760               | <1400              |

**Phytotoxicity Recommendations**

ICRCL 70/90 *Restoration of metalliferous mining areas*

| <b>Phytotoxicity (Harmful to Plants) Threshold Trigger Values</b>                                                                                                                                                                              |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Copper</b>                                                                                                                                                                                                                                  | 250mg/kg  |
| <b>Zinc</b>                                                                                                                                                                                                                                    | 1000mg/kg |
| Notes:<br>Many cultivars and specifically grasses have a high tolerance and there will be no ill-effect at the threshold trigger values given for neutral or near neutral pH. Site observation of plant vitality may give additional guidance. |           |

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LQM CIEH Suitable 4 Use Levels (S4UL's)

| LQM/CIEH Suitable 4 Use Levels – Metals and Semi-metals |                 |                  |                      |                       |                    |                    |
|---------------------------------------------------------|-----------------|------------------|----------------------|-----------------------|--------------------|--------------------|
| Contaminant                                             | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg) | Allotment<br>(mg/kg) | Commercial<br>(mg/kg) | POSresi<br>(mg/kg) | POSpark<br>(mg/kg) |
| <i>Metals:</i>                                          |                 |                  |                      |                       |                    |                    |
| Arsenic                                                 | 37              | 40               | 43                   | 640                   | 79                 | 170                |
| Beryllium                                               | 1.7             | 1.7              | 35                   | 12                    | 2.2                | 63                 |
| Boron                                                   | 290             | 11000            | 45                   | 240000                | 21000              | 46000              |
| Cadmium                                                 | 11              | 85               | 1.9                  | 190                   | 120                | 532                |
| Chromium (III)                                          | 910             | 910              | 18000                | 8600                  | 1500               | 33000              |
| Chromium (VI)                                           | 6               | 6                | 1.8                  | 33                    | 7.7                | 20                 |
| Copper                                                  | 2400            | 7100             | 520                  | 68000                 | 12000              | 44000              |
| Elemental Mercury                                       | 1.2             | 1.2              | 21                   | 58                    | 16                 | 30                 |
| Inorganic Mercury                                       | 40              | 56               | 19                   | 1100                  | 120                | 240                |
| Methylmercury                                           | 11              | 15               | 6                    | 320                   | 40                 | 68                 |
| Nickel                                                  | 180             | 180              | 230                  | 980                   | 230                | 3400               |
| Selenium                                                | 250             | 430              | 88                   | 12000                 | 1100               | 1800               |
| Vanadium                                                | 410             | 1200             | 91                   | 9000                  | 2000               | 5000               |
| Zinc                                                    | 3700            | 40000            | 620                  | 730000                | 81000              | 170000             |

| LQM/CIEH Suitable 4 Use Levels – BTEX Compounds                                      |                     |                 |                  |                      |                       |                    |                    |
|--------------------------------------------------------------------------------------|---------------------|-----------------|------------------|----------------------|-----------------------|--------------------|--------------------|
| Contaminant                                                                          | Soil Organic Matter | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg) | Allotment<br>(mg/kg) | Commercial<br>(mg/kg) | POSresi<br>(mg/kg) | POSpark<br>(mg/kg) |
| Benzene                                                                              | 1.0% SOM            | 0.087           | 0.38             | 0.017                | 27                    | 72                 | 90                 |
|                                                                                      | 2.5% SOM            | 0.170           | 0.70             | 0.034                | 47                    | 72                 | 100                |
|                                                                                      | 6.0% SOM            | 0.370           | 1.40             | 0.075                | 90                    | 73                 | 110                |
| Toluene                                                                              | 1.0% SOM            | 130             | 880              | 22                   | 56000                 | 56000              | 87000              |
|                                                                                      | 2.5% SOM            | 290             | 1900             | 51                   | 110000                | 56000              | 95000              |
|                                                                                      | 6.0% SOM            | 660             | 3900             | 120                  | 180000                | 56000              | 100000             |
| Ethylbenzene                                                                         | 1.0% SOM            | 47              | 83               | 16                   | 5700                  | 24000              | 17000              |
|                                                                                      | 2.5% SOM            | 110             | 190              | 39                   | 13000                 | 24000              | 22000              |
|                                                                                      | 6.0% SOM            | 260             | 440              | 91                   | 27000                 | 25000              | 27000              |
| o-Xylene                                                                             | 1.0% SOM            | 60              | 88               | <b>28</b>            | 6600                  | <b>41000</b>       | <b>17000</b>       |
|                                                                                      | 2.5% SOM            | 140             | 210              | <b>67</b>            | 15000                 | <b>42000</b>       | 24000              |
|                                                                                      | 6.0% SOM            | 330             | 480              | <b>160</b>           | 33000                 | <b>43000</b>       | 33000              |
| m-Xylene                                                                             | 1.0% SOM            | 59              | 82               | 31                   | 6200                  | <b>41000</b>       | 17000              |
|                                                                                      | 2.5% SOM            | 140             | 190              | 74                   | <b>14000</b>          | <b>42000</b>       | 24000              |
|                                                                                      | 6.0% SOM            | 320             | 450              | 170                  | 31000                 | <b>43000</b>       | 33000              |
| p-Xylene                                                                             | 1.0% SOM            | 56              | 79               | 29                   | 5900                  | <b>41000</b>       | <b>17000</b>       |
|                                                                                      | 2.5% SOM            | 130             | 180              | 69                   | <b>14000</b>          | <b>42000</b>       | <b>23000</b>       |
|                                                                                      | 6.0% SOM            | 310             | 430              | <b>160</b>           | <b>30000</b>          | <b>43000</b>       | <b>31000</b>       |
| The most health protective value in each scenario for Xylene is highlighted in bold. |                     |                 |                  |                      |                       |                    |                    |

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| LQM/CIEH Suitable 4 Use Levels For TPH |          |                              |                              |                      |                              |                              |                               |
|----------------------------------------|----------|------------------------------|------------------------------|----------------------|------------------------------|------------------------------|-------------------------------|
| Aliphatic                              |          | RwHP<br>(mg/kg)              | RwoHP<br>(mg/kg)             | Allotment<br>(mg/kg) | Commercial<br>(mg/kg)        | POSresi<br>(mg/kg)           | POSpark<br>(mg/kg)            |
| EC 5-6                                 | 1.0% SOM | 42                           | 42                           | 730                  | 3,200 (304) <sup>sol</sup>   | 570,000 (304) <sup>sol</sup> | 95,000 (304) <sup>sol</sup>   |
|                                        | 2.5% SOM | 78                           | 78                           | 1,700                | 5,900 (558) <sup>sol</sup>   | 590,000                      | 130,000 (558) <sup>sol</sup>  |
|                                        | 6.0% SOM | 160                          | 160                          | 3,900                | 12,000 (1150) <sup>sol</sup> | 600,000 <sup>l</sup>         | 180,000 (1150) <sup>sol</sup> |
| EC >6-8                                | 1.0% SOM | 100                          | 100                          | 2,300                | 7,800 (144) <sup>sol</sup>   | 600,000                      | 150,000 (144) <sup>sol</sup>  |
|                                        | 2.5% SOM | 230                          | 230                          | 5,600                | 17,000 (322) <sup>sol</sup>  | 610,000                      | 220,000 (322) <sup>sol</sup>  |
|                                        | 6.0% SOM | 530                          | 530                          | 13,000               | 40,000 (736) <sup>sol</sup>  | 620,000                      | 320,000 (736) <sup>sol</sup>  |
| EC >8-10                               | 1.0% SOM | 27                           | 27                           | 320                  | 2,000 (78) <sup>sol</sup>    | 13,000                       | 14,000 (78) <sup>sol</sup>    |
|                                        | 2.5% SOM | 65                           | 65                           | 770                  | 4,800 (118) <sup>vap</sup>   | 13,000                       | 18,000 (118) <sup>vap</sup>   |
|                                        | 6.0% SOM | 150                          | 150                          | 1,700                | 11,000 (451) <sup>vap</sup>  | 13,000                       | 21,000 (451) <sup>vap</sup>   |
| EC >10-12                              | 1.0% SOM | 130 (48) <sup>vap</sup>      | 130 (48) <sup>vap</sup>      | 2,200                | 9,700 (48) <sup>sol</sup>    | 13,000                       | 21,000 (48) <sup>sol</sup>    |
|                                        | 2.5% SOM | 330 (118) <sup>vap</sup>     | 330 (118) <sup>vap</sup>     | 4,400                | 23,000 (118) <sup>vap</sup>  | 13,000                       | 23,000 (118) <sup>vap</sup>   |
|                                        | 6.0% SOM | 760 (283) <sup>vap</sup>     | 770 (283) <sup>vap</sup>     | 7,300                | 47,000 (283) <sup>vap</sup>  | 13,000                       | 24,000 (283) <sup>vap</sup>   |
| EC >12-16                              | 1.0% SOM | 1,100 (24) <sup>sol</sup>    | 1,100 (24) <sup>sol</sup>    | 11,000               | 59,000 (24) <sup>sol</sup>   | 13,000                       | 25,000 (24) <sup>sol</sup>    |
|                                        | 2.5% SOM | 2,400 (59) <sup>sol</sup>    | 2,400 (59) <sup>sol</sup>    | 13,000               | 82,000 (59) <sup>sol</sup>   | 13,000                       | 25,000 (59) <sup>sol</sup>    |
|                                        | 6.0% SOM | 4,300 (142) <sup>sol</sup>   | 4,400 (142) <sup>sol</sup>   | 13,000               | 90,000 (142) <sup>sol</sup>  | 13,000                       | 26,000 (142) <sup>sol</sup>   |
| EC >16-35                              | 1.0% SOM | 65,000 (8.48) <sup>sol</sup> | 65,000 (8.48) <sup>sol</sup> | 260,000              | 1,600,000                    | 250,000                      | 450,000                       |
|                                        | 2.5% SOM | 92,000 (21) <sup>sol</sup>   | 92,000 (21) <sup>sol</sup>   | 270,000              | 1,700,000                    | 250,000                      | 480,000                       |
|                                        | 6.0% SOM | 110,000                      | 110,000                      | 270,000              | 1,800,000                    | 250,000                      | 490,000                       |
| EC >35-44                              | 1.0% SOM | 65,000 (8.48) <sup>sol</sup> | 65,000 (8.48) <sup>sol</sup> | 260,000              | 1,600,000                    | 250,000                      | 450,000                       |
|                                        | 2.5% SOM | 92,000 (21) <sup>sol</sup>   | 92,000 (21) <sup>sol</sup>   | 270,000              | 1,700,000                    | 250,000                      | 480,000                       |
|                                        | 6.0% SOM | 110,000                      | 110,000                      | 270,000              | 1,800,000                    | 250,000                      | 490,000                       |

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| LQM/CIEH Suitable 4 Use Levels For TPH |          |                 |                            |                      |                               |                    |                               |
|----------------------------------------|----------|-----------------|----------------------------|----------------------|-------------------------------|--------------------|-------------------------------|
| Aromatic                               |          | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)           | Allotment<br>(mg/kg) | Commercial<br>(mg/kg)         | POSresi<br>(mg/kg) | POSpark<br>(mg/kg)            |
| EC 5-7<br>(Benzene)                    | 1.0% SOM | 70              | 370                        | 13                   | 26,000 (1220) <sup>sol</sup>  | 56,000             | 76,000 (1220) <sup>sol</sup>  |
|                                        | 2.5% SOM | 140             | 690                        | 27                   | 46,000 (2260) <sup>sol</sup>  | 56,000             | 84,000 (2260) <sup>sol</sup>  |
|                                        | 6.0% SOM | 300             | 1,400                      | 57                   | 86,000 (4710) <sup>sol</sup>  | 56,000             | 92,000 (4710) <sup>sol</sup>  |
| EC >7-8<br>(Toluene)                   | 1.0% SOM | 130             | 860                        | 22                   | 56,000 (869) <sup>vap</sup>   | 56,000             | 87,000 (869) <sup>sol</sup>   |
|                                        | 2.5% SOM | 290             | 1,800                      | 51                   | 110,000 (1920) <sup>sol</sup> | 56,000             | 95,000 (1920) <sup>sol</sup>  |
|                                        | 6.0% SOM | 660             | 3,900                      | 120                  | 180,000 (4360) <sup>vap</sup> | 56,000             | 100,000 (4360) <sup>vap</sup> |
| EC >8-10                               | 1.0% SOM | 34              | 47                         | 8.6                  | 3,500 (613) <sup>vap</sup>    | 5,000              | 7,200 (613) <sup>vap</sup>    |
|                                        | 2.5% SOM | 83              | 110                        | 21                   | 8,100 (1500) <sup>vap</sup>   | 5,000              | 8,500 (1500) <sup>vap</sup>   |
|                                        | 6.0% SOM | 190             | 270                        | 51                   | 17,000 (3850) <sup>vap</sup>  | 5,000              | 9,300 (3580) <sup>vap</sup>   |
| EC >10-12                              | 1.0% SOM | 74              | 250                        | 13                   | 16,000 (364) <sup>sol</sup>   | 5,000              | 9,200 (364) <sup>sol</sup>    |
|                                        | 2.5% SOM | 180             | 590                        | 31                   | 28,000 (899) <sup>sol</sup>   | 5,000              | 9,700 (889) <sup>sol</sup>    |
|                                        | 6.0% SOM | 380             | 1,200                      | 74                   | 34,000 (2150) <sup>sol</sup>  | 5,000              | 10,000                        |
| EC >12-16                              | 1.0% SOM | 140             | 1,800                      | 23                   | 36,000 (169) <sup>sol</sup>   | 5,100              | 10,000                        |
|                                        | 2.5% SOM | 330             | 2,300 (419) <sup>sol</sup> | 57                   | 37,000                        | 5,100              | 10,000                        |
|                                        | 6.0% SOM | 660             | 2,500                      | 130                  | 38,000                        | 5,000              | 10,000                        |
| EC >16-21                              | 1.0% SOM | 260             | 1,900                      | 46                   | 28,000                        | 3,800              | 7,600                         |
|                                        | 2.5% SOM | 540             | 1,900                      | 110                  | 28,000                        | 3,800              | 7,700                         |
|                                        | 6.0% SOM | 930             | 1,900                      | 260                  | 28,000                        | 3,800              | 7,800                         |
| EC >21-35                              | 1.0% SOM | 1,100           | 1,900                      | 370                  | 28,000                        | 3,800              | 7,800                         |
|                                        | 2.5% SOM | 1,500           | 1,900                      | 820                  | 28,000                        | 3,800              | 7,800                         |
|                                        | 6.0% SOM | 1,700           | 1,900                      | 1,600                | 28,000                        | 3,800              | 7,900                         |
| EC >35-44                              | 1.0% SOM | 1,100           | 1,900                      | 370                  | 28,000                        | 3,800              | 7,800                         |
|                                        | 2.5% SOM | 1,500           | 1,900                      | 820                  | 28,000                        | 3,800              | 7,800                         |
|                                        | 6.0% SOM | 1,700           | 1,900                      | 1,600                | 28,000                        | 3,800              | 7,900                         |
| EC >44-70                              | 1.0% SOM | 1,600           | 1,900                      | 1,200                | 28,000                        | 3,800              | 7,800                         |
|                                        | 2.5% SOM | 1,800           | 1,900                      | 2,100                | 28,000                        | 3,800              | 7,800                         |
|                                        | 6.0% SOM | 1,900           | 1,900                      | 3,000                | 28,000                        | 3,800              | 7,900                         |

SOM = Soil Organic Matter Content (%)

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### LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAH's)

| Determinants          |          | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)            | Allotment<br>(mg/kg) | Commercial<br>(mg/kg)       | POSresi<br>(mg/kg) | POSpark<br>(mg/kg) |
|-----------------------|----------|-----------------|-----------------------------|----------------------|-----------------------------|--------------------|--------------------|
| Acenaphthene          | 1.0% SOM | 210             | 3,000 (57.0) <sup>sol</sup> | 34                   | 84,000(57.0) <sup>sol</sup> | 15,000             | 29,000             |
|                       | 2.5% SOM | 510             | 4,700(141) <sup>sol</sup>   | 85                   | 97,000(141) <sup>sol</sup>  | 15,000             | 30,000             |
|                       | 6.0% SOM | 1100            | 6,000(336) <sup>sol</sup>   | 200                  | 100,000                     | 15,000             | 30,000             |
| Acenaphthylene        | 1.0% SOM | 170             | 2,900(86.1) <sup>sol</sup>  | 28                   | 83,000(86.1) <sup>sol</sup> | 15,000             | 29,000             |
|                       | 2.5% SOM | 420             | 4,600(212) <sup>sol</sup>   | 69                   | 97,000(212) <sup>sol</sup>  | 15,000             | 30,000             |
|                       | 6.0% SOM | 920             | 6,000(506) <sup>sol</sup>   | 160                  | 100,000                     | 15,000             | 30,000             |
| Anthracene            | 1.0% SOM | 2,400           | 31,000(1.17) <sup>vap</sup> | 380                  | 520,000                     | 74,000             | 150,000            |
|                       | 2.5% SOM | 5,400           | 35,000                      | 950                  | 540,000                     | 74,000             | 150,000            |
|                       | 6.0% SOM | 11,000          | 37,000                      | 2,200                | 540,000                     | 74,000             | 150,000            |
| Benzo(a)anthracene    | 1.0% SOM | 7.20            | 11                          | 2.90                 | 170                         | 29                 | 49                 |
|                       | 2.5% SOM | 11              | 14                          | 6.50                 | 170                         | 29                 | 56                 |
|                       | 6.0% SOM | 13              | 15                          | 13                   | 180                         | 29                 | 62                 |
| Benzo(a)pyrene        | 1.0% SOM | 2.20            | 3.20                        | 0.97                 | 35                          | 5.70               | 11                 |
|                       | 2.5% SOM | 2.70            | 3.20                        | 2.00                 | 35                          | 5.70               | 12                 |
|                       | 6.0% SOM | 3.00            | 3.20                        | 3.50                 | 36                          | 5.70               | 13                 |
| Benzo(b)fluoranthene  | 1.0% SOM | 2.60            | 3.90                        | 0.99                 | 44                          | 7.10               | 13                 |
|                       | 2.5% SOM | 3.30            | 4.00                        | 2.10                 | 44                          | 7.20               | 15                 |
|                       | 6.0% SOM | 3.70            | 4.00                        | 3.90                 | 45                          | 7.20               | 16                 |
| Benzo(ghi)perylene    | 1.0% SOM | 320             | 360                         | 290                  | 3,900                       | 640                | 1,400              |
|                       | 2.5% SOM | 340             | 360                         | 470                  | 4,000                       | 640                | 1,500              |
|                       | 6.0% SOM | 350             | 360                         | 640                  | 4,000                       | 640                | 1,600              |
| Benzo(k)fluoranthene  | 1.0% SOM | 77              | 110                         | 37                   | 1,200                       | 190                | 370                |
|                       | 2.5% SOM | 93              | 110                         | 75                   | 1,200                       | 190                | 410                |
|                       | 6.0% SOM | 100             | 110                         | 130                  | 1,200                       | 190                | 440                |
| Chrysene              | 1.0% SOM | 15              | 30                          | 4.10                 | 350                         | 57                 | 93                 |
|                       | 2.5% SOM | 22              | 31                          | 9.40                 | 350                         | 57                 | 110                |
|                       | 6.0% SOM | 27              | 32                          | 19                   | 350                         | 57                 | 120                |
| Dibenzo(ah)anthracene | 1.0% SOM | 0.24            | 0.31                        | 0.14                 | 3.50                        | 0.57               | 1.10               |
|                       | 2.5% SOM | 0.28            | 0.32                        | 0.27                 | 3.60                        | 0.57               | 1.30               |
|                       | 6.0% SOM | 0.30            | 0.32                        | 0.43                 | 3.60                        | 0.58               | 1.40               |

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| LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAH's) |          |                 |                             |                      |                                         |                    |                                          |
|-----------------------------------------------------------------------------|----------|-----------------|-----------------------------|----------------------|-----------------------------------------|--------------------|------------------------------------------|
| Determinants                                                                |          | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)            | Allotment<br>(mg/kg) | Commercial<br>(mg/kg)                   | POSresi<br>(mg/kg) | POSpark<br>(mg/kg)                       |
| Flouranthene                                                                | 1.0% SOM | 280             | 1,500                       | 52                   | 2,3000                                  | 3,100              | 6,300                                    |
|                                                                             | 2.5% SOM | 560             | 1,600                       | 130                  | 2,3000                                  | 3,100              | 6,300                                    |
|                                                                             | 6.0% SOM | 890             | 1,600                       | 290                  | 2,3000                                  | 3,100              | 6,300                                    |
| Flourene                                                                    | 1.0% SOM | 170             | 2,800 (30.9) <sup>sol</sup> | 27                   | 63,000(30.9) <sup>sol</sup>             | 9,900              | 20,000                                   |
|                                                                             | 2.5% SOM | 400             | 3,800(76.5) <sup>sol</sup>  | 67                   | 68,000                                  | 9,900              | 20,000                                   |
|                                                                             | 6.0% SOM | 860             | 4,500(183) <sup>sol</sup>   | 160                  | 71,000                                  | 9,900              | 20,000                                   |
| Indeno(123-cd)pyrene                                                        | 1.0% SOM | 27              | 45                          | 9.50                 | 500                                     | 82                 | 150                                      |
|                                                                             | 2.5% SOM | 36              | 46                          | 21                   | 510                                     | 82                 | 170                                      |
|                                                                             | 6.0% SOM | 41              | 46                          | 39                   | 510                                     | 82                 | 180                                      |
| Napthalene                                                                  | 1.0% SOM | 2.30            | 2.6                         | 4.10                 | 190 <sup>f</sup> (76.4) <sup>sol</sup>  | 4,900 <sup>f</sup> | 1,200 <sup>f</sup> (76.4) <sup>sol</sup> |
|                                                                             | 2.5% SOM | 5.60            | 5.6                         | 10                   | 460 <sup>f</sup> (183) <sup>sol</sup>   | 4,900 <sup>f</sup> | 1,900 <sup>f</sup> (183) <sup>sol</sup>  |
|                                                                             | 6.0% SOM | 13              | 13                          | 24                   | 1,100 <sup>f</sup> (432) <sup>sol</sup> | 4,900 <sup>f</sup> | 3,000                                    |
| Phenanthrene                                                                | 1.0% SOM | 95              | 1,300(183) <sup>sol</sup>   | 18                   | 22,000                                  | 3,100              | 6,200                                    |
|                                                                             | 2.5% SOM | 220             | 1,500                       | 38                   | 22,000                                  | 3,100              | 6,200                                    |
|                                                                             | 6.0% SOM | 440             | 1,500                       | 90                   | 23,000                                  | 3,100              | 6,300                                    |
| Pyrene                                                                      | 1.0% SOM | 620             | 3,700                       | 110                  | 54,000                                  | 7,400              | 15,000                                   |
|                                                                             | 2.5% SOM | 1200            | 3,800                       | 270                  | 54,000                                  | 7,400              | 15,000                                   |
|                                                                             | 6.0% SOM | 2000            | 3,800                       | 620                  | 54,000                                  | 7,400              | 15,000                                   |
| Coal Tar<br>(Benzo(a)pyrene used<br>as marker compound)                     | 1.0% SOM | 0.79            | 1.2                         | 0.32                 | 15                                      | 2.20               | 4.40                                     |
|                                                                             | 2.5% SOM | 0.98            | 1.2                         | 0.67                 | 15                                      | 2.20               | 4.70                                     |
|                                                                             | 6.0% SOM | 1.10            | 1.2                         | 1.20                 | 15                                      | 2.20               | 4.80                                     |

<sup>vap</sup> – GAC presented exceeds the vapour saturation limit, which is presented in brackets.

<sup>sol</sup> – GAC presented exceeds the soil saturation limit, which is presented in brackets.

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LQM/CIEH Suitable 4 Use Levels (cont.)

| LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds |                 |                  |                   |                       |                    |                               |
|------------------------------------------------------------------------------------|-----------------|------------------|-------------------|-----------------------|--------------------|-------------------------------|
| Contaminant                                                                        | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg) | Allotment (mg/kg) | Commercial<br>(mg/kg) | POSresi<br>(mg/kg) | POSpark<br>(mg/kg)            |
| <i>Chloroalkanes &amp; alkenes</i>                                                 |                 |                  |                   |                       |                    |                               |
| <b>1,2 Dichloroethane</b>                                                          |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.0071          | 0.0092           | 0.0046            | 0.67                  | 29                 | 21                            |
| 2.5% SOM                                                                           | 0.011           | 0.013            | 0.0083            | 0.97                  | 29                 | 24                            |
| 6.0% SOM                                                                           | 0.019           | 0.023            | 0.016             | 1.70                  | 29                 | 28                            |
| <b>1,1,2,2 Tetrachloroethane</b>                                                   |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 1.60            | 3.90             | 0.41              | 270                   | 1,400              | 1,800                         |
| 2.5% SOM                                                                           | 3.40            | 8.00             | 0.89              | 550                   | 1,400              | 2,100                         |
| 6.0% SOM                                                                           | 7.50            | 17               | 2.00              | 1,100                 | 1,400              | 2,300                         |
| <b>1,1,1,2 Tetrachloroethane</b>                                                   |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 1.20            | 1.50             | 0.79              | 110                   | 1,400              | 1,500                         |
| 2.5% SOM                                                                           | 2.80            | 3.50             | 1.90              | 250                   | 1,400              | 1,800                         |
| 6.0% SOM                                                                           | 6.40            | 8.20             | 4.40              | 560                   | 1,400              | 2,100                         |
| <b>Tetrachloroethene</b>                                                           |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.18            | 0.18             | 0.65              | 19                    | 1,400              | 810 <sup>sol</sup> (424)      |
| 2.5% SOM                                                                           | 0.39            | 0.40             | 1.50              | 42                    | 1,400              | 1,100 <sup>sol</sup> (951)    |
| 6.0% SOM                                                                           | 0.90            | 0.92             | 3.60              | 95                    | 1,400              | 1,500                         |
| <b>1,1,1 Trichloroethane</b>                                                       |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 8.80            | 9.00             | 48                | 660                   | 140,000            | 57,000 <sup>vap</sup> (1425)  |
| 2.5% SOM                                                                           | 18              | 18               | 110               | 1,300                 | 140,000            | 76,000 <sup>vap</sup> (2915)  |
| 6.0% SOM                                                                           | 39              | 40               | 240               | 3,000                 | 140,000            | 100,000 <sup>vap</sup> (6392) |
| <b>Tetrachloromethene</b>                                                          |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.026           | 0.026            | 0.45              | 2.90                  | 890                | 190                           |
| 2.5% SOM                                                                           | 0.056           | 0.056            | 1.00              | 6.30                  | 920                | 270                           |
| 6.0% SOM                                                                           | 0.130           | 0.130            | 2.40              | 14                    | 950                | 400                           |
| <b>Trichloroethene</b>                                                             |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.016           | 0.017            | 0.041             | 1.20                  | 120                | 70                            |
| 2.5% SOM                                                                           | 0.034           | 0.036            | 0.091             | 2.60                  | 120                | 91                            |
| 6.0% SOM                                                                           | 0.075           | 0.080            | 0.210             | 5.70                  | 120                | 120                           |
| <b>Trichloromethane</b>                                                            |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.91            | 1.20             | 0.42              | 99                    | 2,500              | 2,600                         |
| 2.5% SOM                                                                           | 1.70            | 2.10             | 0.83              | 170                   | 2,500              | 2,800                         |
| 6.0% SOM                                                                           | 3.40            | 4.20             | 1.70              | 350                   | 2,500              | 3,100                         |
| <b>Vinyl Chloride</b>                                                              |                 |                  |                   |                       |                    |                               |
| 1.0% SOM                                                                           | 0.00064         | 0.00077          | 0.00055           | 0.059                 | 3.50               | 4.80                          |
| 2.5% SOM                                                                           | 0.00087         | 0.00100          | 0.00100           | 0.077                 | 3.50               | 5.00                          |
| 6.0% SOM                                                                           | 0.00014         | 0.00150          | 0.00180           | 0.120                 | 3.50               | 5.40                          |

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**LQM CIEH General Assessment Criteria:  
Volatile and Semi-Volatile Organic Compounds**

| Contaminant                                                                         | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)          | Allotment (mg/kg) | Commercial<br>(mg/kg)       | POSresi<br>(mg/kg) | POSpark<br>(mg/kg)          |
|-------------------------------------------------------------------------------------|-----------------|---------------------------|-------------------|-----------------------------|--------------------|-----------------------------|
| <b>Explosives</b>                                                                   |                 |                           |                   |                             |                    |                             |
| <b>2,4,6 Trinitrotoluene</b>                                                        |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 1.60            | 65                        | 0.24              | 1,000                       | 130                | 260                         |
| 2.5% SOM                                                                            | 3.70            | 66                        | 0.58              | 1,000                       | 130                | 270                         |
| 6.0% SOM                                                                            | 8.10            | 66                        | 1.40              | 1,000                       | 130                | 270                         |
| <b>RDX<br/>(Hexogen/Cyclonite/1,3,5-<br/>trinitro-1,3,5-<br/>triazacyclohexane)</b> |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 120             | 13,000                    | 17                | 210,000                     | 26,000             | 49,000(18.7) <sup>sol</sup> |
| 2.5% SOM                                                                            | 250             | 13,000                    | 38                | 210,000                     | 26,000             | 51,000                      |
| 6.0% SOM                                                                            | 540             | 13,000                    | 85                | 210,000                     | 27,000             | 53,000                      |
| <b>HMX (Octogen/1,3,5,7-<br/>tetrenitro-1,3,5,7-<br/>tetrazacyclo-octane)</b>       |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 5.70            | 67,00                     | 0.86              | 110,000                     | 13,000             | 23,000(0.35) <sup>vap</sup> |
| 2.5% SOM                                                                            | 13              | 67,00                     | 1.90              | 110,000                     | 13,000             | 23,000(0.39) <sup>vap</sup> |
| 6.0% SOM                                                                            | 26              | 67,00                     | 3.90              | 110,000                     | 13,000             | 24,000(0.48) <sup>vap</sup> |
| <b>Atrazine</b>                                                                     |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 3.30            | 610                       | 0.50              | 9,300                       | 1,200              | 2,300                       |
| 2.5% SOM                                                                            | 7.60            | 620                       | 1.20              | 9,400                       | 1,200              | 2,400                       |
| 6.0% SOM                                                                            | 17.40           | 620                       | 2.70              | 9,400                       | 1,200              | 2,400                       |
| <b>Pesticides</b>                                                                   |                 |                           |                   |                             |                    |                             |
| <b>Aldrin</b>                                                                       |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 5.70            | 7.30                      | 3.20              | 170                         | 18                 | 30                          |
| 2.5% SOM                                                                            | 6.60            | 7.40                      | 6.10              | 170                         | 18                 | 31                          |
| 6.0% SOM                                                                            | 7.10            | 7.50                      | 9.60              | 170                         | 18                 | 31                          |
| <b>Dieldrin</b>                                                                     |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 0.97            | 7.00                      | 0.17              | 170                         | 18                 | 30                          |
| 2.5% SOM                                                                            | 2.00            | 7.30                      | 0.41              | 170                         | 18                 | 30                          |
| 6.0% SOM                                                                            | 3.50            | 7.40                      | 0.96              | 170                         | 18                 | 31                          |
| <b>Dichlorvos</b>                                                                   |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 0.032           | 6.40                      | 0.0049            | 140                         | 16                 | 26                          |
| 2.5% SOM                                                                            | 0.066           | 6.50                      | 0.0100            | 140                         | 16                 | 26                          |
| 6.0% SOM                                                                            | 0.140           | 6.60                      | 0.0220            | 140                         | 16                 | 27                          |
| <b>Alpha - Endosulfan</b>                                                           |                 |                           |                   |                             |                    |                             |
| 1.0% SOM                                                                            | 7.40            | 160(0.003) <sup>vap</sup> | 1.20              | 5,600(0.003) <sup>vap</sup> | 1,200              | 2,400                       |
| 2.5% SOM                                                                            | 18              | 280(0.007) <sup>vap</sup> | 2.90              | 7,400(0.007) <sup>vap</sup> | 1,200              | 2,400                       |
| 6.0% SOM                                                                            | 41              | 410(0.016) <sup>vap</sup> | 6.80              | 8,400(0.016) <sup>vap</sup> | 1,200              | 2,400                       |

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| LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds |                 |                             |                   |                               |                     |                              |
|------------------------------------------------------------------------------------|-----------------|-----------------------------|-------------------|-------------------------------|---------------------|------------------------------|
| Contaminant                                                                        | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)            | Allotment (mg/kg) | Commercial<br>(mg/kg)         | POSresi<br>(mg/kg)  | POSpark<br>(mg/kg)           |
| <b>Pesticides</b>                                                                  |                 |                             |                   |                               |                     |                              |
| <b>Beta - Endosulfan</b>                                                           |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 7.00            | 190(0.00007) <sup>vap</sup> | 1.10              | 6,300(0.00007) <sup>vap</sup> | 1,200               | 2,400                        |
| 2.5% SOM                                                                           | 17              | 320(0.0002) <sup>vap</sup>  | 2.70              | 7,800(0.0002) <sup>vap</sup>  | 1,200               | 2,400                        |
| 6.0% SOM                                                                           | 39              | 440(0.0004) <sup>vap</sup>  | 6.40              | 8700                          | 1,200               | 2,500                        |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>Alpha - Hexachlorocyclohexanes</b>                                              |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 0.23            | 6.90                        | 0.035             | 170                           | 24                  | 47                           |
| 2.5% SOM                                                                           | 0.55            | 9.20                        | 0.087             | 180                           | 24                  | 48                           |
| 6.0% SOM                                                                           | 1.20            | 11                          | 0.210             | 180                           | 24                  | 48                           |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>Beta - Hexachlorocyclohexanes</b>                                               |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 0.085           | 3.70                        | 0.013             | 65                            | 8.10                | 15                           |
| 2.5% SOM                                                                           | 0.200           | 3.80                        | 0.032             | 65                            | 8.10                | 15                           |
| 6.0% SOM                                                                           | 0.460           | 3.80                        | 0.077             | 65                            | 8.10                | 16                           |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>Gamma - Hexachlorocyclohexanes</b>                                              |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 0.06            | 2.90                        | 0.0092            | 67                            | 8.2                 | 14                           |
| 2.5% SOM                                                                           | 0.14            | 3.30                        | 0.0230            | 69                            | 8.2                 | 15                           |
| 6.0% SOM                                                                           | 0.33            | 3.50                        | 0.0540            | 70                            | 8.2                 | 15                           |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>Chlorobenzenes</b>                                                              |                 |                             |                   |                               |                     |                              |
| <b>Chlorobenzene</b>                                                               |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 0.46            | 0.46                        | 5.90              | 56                            | 11,000              | 1,300(675) <sup>sol</sup>    |
| 2.5% SOM                                                                           | 1.00            | 1.00                        | 14                | 130                           | 13,000              | 2,000(1520) <sup>sol</sup>   |
| 6.0% SOM                                                                           | 2.40            | 2.40                        | 32                | 290                           | 14,000              | 2,900                        |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>1,2-Dichlorobenzene</b>                                                         |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 23              | 24                          | 94                | 2,000 (571) <sup>sol</sup>    | 90,000              | 24,000(571) <sup>sol</sup>   |
| 2.5% SOM                                                                           | 55              | 57                          | 230               | 4,800 (1370) <sup>sol</sup>   | 95,000              | 36,000(1370) <sup>sol</sup>  |
| 6.0% SOM                                                                           | 130             | 130                         | 540               | 11,000 (3240) <sup>sol</sup>  | 98,000              | 51,000(3240) <sup>sol</sup>  |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>1,3-Dichlorobenzene</b>                                                         |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 0.40            | 0.44                        | 0.25              | 30                            | 300                 | 390                          |
| 2.5% SOM                                                                           | 1.00            | 1.10                        | 0.60              | 73                            | 300                 | 440                          |
| 6.0% SOM                                                                           | 2.30            | 2.50                        | 1.50              | 170                           | 300                 | 470                          |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>1,4-Dichlorobenzene</b>                                                         |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 61              | 61                          | 15                | 4,400 (224) <sup>vap</sup>    | 17,000 <sup>g</sup> | 36,000 (224) <sup>vap</sup>  |
| 2.5% SOM                                                                           | 150             | 150                         | 37                | 10,000 (540) <sup>vap</sup>   | 17,000 <sup>g</sup> | 36,000 (540) <sup>vap</sup>  |
| 6.0% SOM                                                                           | 350             | 350                         | 88 <sup>g</sup>   | 25,000 (1280) <sup>vap</sup>  | 17,000 <sup>g</sup> | 36,000 (1280) <sup>vap</sup> |
|                                                                                    |                 |                             |                   |                               |                     |                              |
| <b>1,2,3,-Trichlorobenzene</b>                                                     |                 |                             |                   |                               |                     |                              |
| 1.0% SOM                                                                           | 1.50            | 1.50                        | 4.70              | 102                           | 1,800               | 770(134) <sup>vap</sup>      |
| 2.5% SOM                                                                           | 3.60            | 3.70                        | 12                | 250                           | 1,800               | 1,100(330) <sup>vap</sup>    |
| 6.0% SOM                                                                           | 8.60            | 8.80                        | 28                | 590                           | 1,800               | 1,600(789) <sup>vap</sup>    |

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**LQM CIEH General Assessment Criteria:  
Volatile and Semi-Volatile Organic Compounds**

| Contaminant                              | RwHP<br>(mg/kg)           | RwoHP<br>(mg/kg)           | Allotment (mg/kg) | Commercial<br>(mg/kg)     | POSresi<br>(mg/kg) | POSpark<br>(mg/kg)         |
|------------------------------------------|---------------------------|----------------------------|-------------------|---------------------------|--------------------|----------------------------|
| <b>Chlorobenzenes</b>                    |                           |                            |                   |                           |                    |                            |
| <b>1,2,3,-<br/>Trichlorobenzene</b>      |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 1.50                      | 1.50                       | 4.70              | 102                       | 1,800              | 770(134) <sup>vap</sup>    |
| 2.5% SOM                                 | 3.60                      | 3.70                       | 12                | 250                       | 1,800              | 1,100(330) <sup>vap</sup>  |
| 6.0% SOM                                 | 8.60                      | 8.80                       | 28                | 590                       | 1,800              | 1,600(789) <sup>vap</sup>  |
| <b>1,2,4,-<br/>Trichlorobenzene</b>      |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 2.60                      | 2.60                       | 55                | 220                       | 15,000             | 1,700(318) <sup>vap</sup>  |
| 2.5% SOM                                 | 6.40                      | 6.40                       | 140               | 530                       | 17,000             | 2,600(786) <sup>vap</sup>  |
| 6.0% SOM                                 | 15                        | 15                         | 320               | 1,300                     | 19,000             | 4,000(1880) <sup>vap</sup> |
| <b>1,3,5,-<br/>Trichlorobenzene</b>      |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 0.33                      | 0.33                       | 4.70              | 23                        | 1,700              | 380(36.7) <sup>vap</sup>   |
| 2.5% SOM                                 | 0.81                      | 0.81                       | 12                | 55                        | 1,700              | 590(90.8) <sup>vap</sup>   |
| 6.0% SOM                                 | 1.90                      | 1.90                       | 140               | 130                       | 1,800              | 860(217) <sup>vap</sup>    |
| <b>1,2,3,4,-<br/>Tetrachlorobenzene</b>  |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 15                        | 24                         | 4.40              | 1,700(122) <sup>vap</sup> | 830                | 1,500(122) <sup>vap</sup>  |
| 2.5% SOM                                 | 36                        | 56                         | 11                | 3,080(304) <sup>vap</sup> | 830                | 1,600                      |
| 6.0% SOM                                 | 78                        | 120                        | 26                | 4,400(728) <sup>vap</sup> | 830                | 1,600                      |
| <b>1,2,3,5,-<br/>Tetrachlorobenzene</b>  |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 0.66                      | 0.75                       | 0.38              | 49(39.4) <sup>vap</sup>   | 78                 | 110(39) <sup>vap</sup>     |
| 2.5% SOM                                 | 1.60                      | 1.90                       | 0.90              | 120(98.1) <sup>vap</sup>  | 79                 | 120                        |
| 6.0% SOM                                 | 3.70                      | 4.30                       | 2.20              | 240(235) <sup>vap</sup>   | 79                 | 130                        |
| <b>1,2,4, 5,-<br/>Tetrachlorobenzene</b> |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 0.33                      | 0.73                       | 0.06              | 42(19.7) <sup>sol</sup>   | 13                 | 25                         |
| 2.5% SOM                                 | 0.77                      | 1.70                       | 0.16              | 72(49.1) <sup>sol</sup>   | 13                 | 26                         |
| 6.0% SOM                                 | 1.60                      | 3.50                       | 0.37              | 96                        | 13                 | 26                         |
| <b>Pentachlorobenzene</b>                |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 5.80                      | 19                         | 1.20              | 640(43.0) <sup>sol</sup>  | 100                | 190                        |
| 2.5% SOM                                 | 12                        | 30                         | 3.10              | 770(107) <sup>sol</sup>   | 100                | 190                        |
| 6.0% SOM                                 | 22                        | 38                         | 7.00              | 830                       | 100                | 190                        |
| <b>Hexachlorobenzene</b>                 |                           |                            |                   |                           |                    |                            |
| 1.0% SOM                                 | 1.80(0.20) <sup>vap</sup> | 4.10 (0.20) <sup>vap</sup> | 0.47              | 110(0.20) <sup>vap</sup>  | 16                 | 30                         |
| 2.5% SOM                                 | 3.30(0.50) <sup>vap</sup> | 5.70 (0.50) <sup>vap</sup> | 1.10              | 120                       | 16                 | 30                         |
| 6.0% SOM                                 | 4.90                      | 6.70 (1.2) <sup>vap</sup>  | 2.50              | 120                       | 16                 | 30                         |

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**LQM CIEH General Assessment Criteria:  
Volatile and Semi-Volatile Organic Compounds**

| Contaminant                        | RwHP<br>(mg/kg) | RwoHP<br>(mg/kg)        | Allotment (mg/kg) | Commercial<br>(mg/kg)         | POSresi<br>(mg/kg)            | POSpark<br>(mg/kg)            |
|------------------------------------|-----------------|-------------------------|-------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Phenols &amp; Chlorophenols</b> |                 |                         |                   |                               |                               |                               |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Phenols</b>                     |                 |                         |                   |                               |                               |                               |
| 1.0% SOM                           | 280             | 750                     | 66                | 760 <sup>dir</sup> (31,000)   | 760 <sup>dir</sup> (11,000)   | 760 <sup>dir</sup> (8,600)    |
| 2.5% SOM                           | 550             | 1,300                   | 140               | 1,500 <sup>dir</sup> (35,000) | 1,500 <sup>dir</sup> (11,000) | 1,500 <sup>dir</sup> (9,700)  |
| 6.0% SOM                           | 1100            | 2,300                   | 280               | 3,200 <sup>dir</sup> (37,000) | 3,200 <sup>dir</sup> (11,000) | 3,200 <sup>dir</sup> (11,000) |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Chlorophenols (4 Congeners)</b> |                 |                         |                   |                               |                               |                               |
| 1.0% SOM                           | 0.87            | 94                      | 0.13              | 3,500                         | 620                           | 1,100                         |
| 2.5% SOM                           | 2.00            | 150                     | 0.30              | 4,000                         | 620                           | 1,100                         |
| 6.0% SOM                           | 4.50            | 210                     | 0.70              | 4,300                         | 620                           | 1,100                         |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Pentachlorophenols</b>          |                 |                         |                   |                               |                               |                               |
| 1.0% SOM                           | 0.22            | 27(16.4) <sup>vap</sup> | 0.03              | 400                           | 60                            | 110                           |
| 2.5% SOM                           | 0.52            | 29                      | 0.08              | 400                           | 60                            | 120                           |
| 6.0% SOM                           | 1.20            | 31                      | 0.19              | 400                           | 60                            | 120                           |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Others</b>                      |                 |                         |                   |                               |                               |                               |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Carbon Disulphide</b>           |                 |                         |                   |                               |                               |                               |
| 1.0% SOM                           | 0.14            | 0.14                    | 4.80              | 11                            | 11,000                        | 1,300                         |
| 2.5% SOM                           | 0.29            | 0.29                    | 10                | 22                            | 11,000                        | 1,900                         |
| 6.0% SOM                           | 0.62            | 0.62                    | 23                | 47                            | 12,000                        | 2,700                         |
|                                    |                 |                         |                   |                               |                               |                               |
| <b>Hexachloro-1,3-Butadiene</b>    |                 |                         |                   |                               |                               |                               |
| 1.0% SOM                           | 0.29            | 0.32                    | 0.25              | 31                            | 25                            | 48                            |
| 2.5% SOM                           | 0.70            | 0.78                    | 0.61              | 68                            | 25                            | 50                            |
| 6.0% SOM                           | 1.60            | 1.80                    | 1.40              | 120                           | 25                            | 51                            |
|                                    |                 |                         |                   |                               |                               |                               |

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| CL:AIRE Soil Generic Assessment Criteria |                     |                                          |                   |                    |
|------------------------------------------|---------------------|------------------------------------------|-------------------|--------------------|
| Contaminant                              | Residential (mg/kg) | Residential without plant uptake (mg/kg) | Allotment (mg/kg) | Commercial (mg/kg) |
| <i>Metals:</i>                           |                     |                                          |                   |                    |
|                                          |                     |                                          |                   |                    |
| Antimony                                 | ND                  | 550                                      | ND                | 7500               |
| Barium                                   | ND                  | 1300                                     | ND                | 22000              |
| Molybdenum                               | ND                  | 670                                      | ND                | 17000              |
|                                          |                     |                                          |                   |                    |

ND – Not Derived.  
NA – Not Applicable

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| CL:AIRE General Assessment Criteria:<br>Volatile and Semi-Volatile Organic Compounds |                     |                                             |                   |                    |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-------------------|--------------------|
| Contaminant                                                                          | Residential (mg/kg) | Residential without<br>plant uptake (mg/kg) | Allotment (mg/kg) | Commercial (mg/kg) |
| <b>1,1,2 Trichloroethane</b>                                                         |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.60                | 0.88                                        | 0.28              | 94                 |
| 2.5% SOM                                                                             | 1.20                | 1.8                                         | 0.61              | 190                |
| 6.0% SOM                                                                             | 2.70                | 3.9                                         | 1.40              | 400                |
| <b>1,1-Dichloroethane</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 2.40                | 2.50                                        | 9.20              | 280                |
| 2.5% SOM                                                                             | 3.90                | 4.10                                        | 17                | 450                |
| 6.0% SOM                                                                             | 7.40                | 7.70                                        | 35                | 850                |
| <b>1,1-Dichloroethene</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.23                | 0.23                                        | 2.80              | 26                 |
| 2.5% SOM                                                                             | 0.40                | 0.41                                        | 5.60              | 46                 |
| 6.0% SOM                                                                             | 0.82                | 0.82                                        | 12                | 92                 |
| <b>1,2,4-Trimethylbenzene</b>                                                        |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.35                | 0.41                                        | 0.38              | 42                 |
| 2.5% SOM                                                                             | 0.85                | 0.99                                        | 0.93              | 99                 |
| 6.0% SOM                                                                             | 2.00                | 2.30                                        | 2.20              | 220                |
| <b>1,2-Dichloropropane</b>                                                           |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.024               | 0.024                                       | 0.62              | 3.3                |
| 2.5% SOM                                                                             | 0.042               | 0.042                                       | 1.20              | 5.9                |
| 6.0% SOM                                                                             | 0.084               | 0.085                                       | 2.60              | 12                 |
| <b>2,4-Dimethylphenol</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 19                  | 210                                         | 3.10              | 16000*             |
| 2.5% SOM                                                                             | 43                  | 410                                         | 7.20              | 24000*             |
| 6.0% SOM                                                                             | 97                  | 730                                         | 17                | 30000*             |
| <b>2,4-Dinitrotoluene</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 1.50                | 170*                                        | 0.22              | 3700*              |
| 2.5% SOM                                                                             | 3.20                | 170                                         | 0.49              | 3700*              |
| 6.0% SOM                                                                             | 7.20                | 170                                         | 1.10              | 3800*              |
| <b>2,6-Dinitrotoluene</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.78                | 78                                          | 0.12              | 1900*              |
| 2.5% SOM                                                                             | 1.70                | 84                                          | 0.27              | 1900*              |
| 6.0% SOM                                                                             | 3.90                | 87                                          | 0.61              | 1900*              |
| <b>2-Chloronaphthalene</b>                                                           |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 3.70                | 3.80                                        | 40                | 390*               |
| 2.5% SOM                                                                             | 9.20                | 9.30                                        | 98                | 960*               |
| 6.0% SOM                                                                             | 22                  | 22                                          | 230               | 2200*              |

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| CL:AIRE General Assessment Criteria:<br>Volatile and Semi-Volatile Organic Compounds |                     |                                             |                   |                    |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-------------------|--------------------|
| Contaminant                                                                          | Residential (mg/kg) | Residential without<br>plant uptake (mg/kg) | Allotment (mg/kg) | Commercial (mg/kg) |
| <b>Biphenyl</b>                                                                      |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 66*                 | 220*                                        | 14                | 18000*             |
| 2.5% SOM                                                                             | 160                 | 500*                                        | 35                | 33000*             |
| 6.0% SOM                                                                             | 360                 | 980*                                        | 83                | 48000*             |
| <b>Bis (2-ethylhexyl) phthalate</b>                                                  |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 280*                | 2700*                                       | 47*               | 85000*             |
| 2.5% SOM                                                                             | 610*                | 2800*                                       | 120*              | 86000*             |
| 6.0% SOM                                                                             | 1100*               | 2800*                                       | 280*              | 86000*             |
| <b>Bromobenzene</b>                                                                  |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.87                | 0.91                                        | 3.2               | 97                 |
| 2.5% SOM                                                                             | 2.0                 | 2.1                                         | 7.6               | 220                |
| 6.0% SOM                                                                             | 4.7                 | 4.9                                         | 18                | 520                |
| <b>Bromodichloromethane</b>                                                          |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.016               | 0.019                                       | 0.016             | 2.1                |
| 2.5% SOM                                                                             | 0.030               | 0.034                                       | 0.032             | 3.7                |
| 6.0% SOM                                                                             | 0.061               | 0.070                                       | 0.068             | 7.6                |
| <b>Bromoform</b>                                                                     |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 2.8                 | 5.2                                         | 0.95              | 760                |
| 2.5% SOM                                                                             | 5.9                 | 11                                          | 2.1               | 1500               |
| 6.0% SOM                                                                             | 13                  | 23                                          | 4.6               | 3100               |
| <b>Butyl benzyl phthalate</b>                                                        |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 1400*               | 42000*                                      | 220*              | 940000*            |
| 2.5% SOM                                                                             | 3300*               | 44000*                                      | 550*              | 940000*            |
| 6.0% SOM                                                                             | 7200*               | 44000*                                      | 1300*             | 950000*            |
| <b>Chloroethane</b>                                                                  |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 8.3                 | 8.4                                         | 110               | 960                |
| 2.5% SOM                                                                             | 11                  | 11                                          | 200               | 1300               |
| 6.0% SOM                                                                             | 18                  | 18                                          | 380               | 2100               |
| <b>Chloromethane</b>                                                                 |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.0083              | 0.0085                                      | 0.066             | 1.0                |
| 2.5% SOM                                                                             | 0.0098              | 0.0099                                      | 0.13              | 1.2                |
| 6.0% SOM                                                                             | 0.013               | 0.013                                       | 0.23              | 1.6                |
| <b>Cis 1,2 Dichloroethene</b>                                                        |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.11                | 0.12                                        | 0.26              | 14                 |
| 2.5% SOM                                                                             | 0.19                | 0.20                                        | 0.50              | 24                 |
| 6.0% SOM                                                                             | 0.37                | 0.39                                        | 1.0               | 47                 |

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| CL:AIRE General Assessment Criteria:<br>Volatile and Semi-Volatile Organic Compounds |                     |                                             |                   |                    |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-------------------|--------------------|
| Contaminant                                                                          | Residential (mg/kg) | Residential without<br>plant uptake (mg/kg) | Allotment (mg/kg) | Commercial (mg/kg) |
| <b>Dichloromethane</b>                                                               |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.58                | 2.10                                        | 0.10              | 270                |
| 2.5% SOM                                                                             | 0.98                | 2.80                                        | 0.19              | 360                |
| 6.0% SOM                                                                             | 1.70                | 4.50                                        | 0.34              | 560                |
| <b>Diethyl Phthalate</b>                                                             |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 120*                | 1800*                                       | 19*               | 150000*            |
| 2.5% SOM                                                                             | 260*                | 3500*                                       | 41*               | 220000*            |
| 6.0% SOM                                                                             | 570*                | 6300*                                       | 94*               | 290000*            |
| <b>Di-n-butyl phthalate</b>                                                          |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 13*                 | 450*                                        | 2.00              | 15000*             |
| 2.5% SOM                                                                             | 31*                 | 450*                                        | 5.00              | 15000*             |
| 6.0% SOM                                                                             | 67*                 | 450*                                        | 12                | 15000*             |
| <b>Di-n-octyl phthalate</b>                                                          |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 2300*               | 3400*                                       | 940*              | 89000*             |
| 2.5% SOM                                                                             | 2800*               | 3400*                                       | 2100*             | 89000*             |
| 6.0% SOM                                                                             | 3100*               | 3400*                                       | 3900*             | 89000*             |
| <b>Hexachloroethane</b>                                                              |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.20                | 0.22                                        | 0.27              | 22*                |
| 2.5% SOM                                                                             | 0.48                | 0.54                                        | 0.67              | 53*                |
| 6.0% SOM                                                                             | 1.10                | 1.30                                        | 1.60              | 120*               |
| <b>Isopropylbenzene</b>                                                              |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 11                  | 12                                          | 32                | 1400*              |
| 2.5% SOM                                                                             | 27                  | 28                                          | 79                | 3300*              |
| 6.0% SOM                                                                             | 64                  | 67                                          | 190               | 7700*              |
| <b>Methyl tert-butyl ether</b>                                                       |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 49                  | 73                                          | 23                | 7900               |
| 2.5% SOM                                                                             | 84                  | 120                                         | 44                | 13000              |
| 6.0% SOM                                                                             | 160                 | 220                                         | 90                | 24000              |
| <b>Propylbenzene</b>                                                                 |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 34                  | 40                                          | 34                | 4100*              |
| 2.5% SOM                                                                             | 82                  | 97                                          | 83                | 9700*              |
| 6.0% SOM                                                                             | 190                 | 230                                         | 200               | 21000*             |
| <b>Styrene</b>                                                                       |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 8.10                | 35                                          | 1.60              | 3300*              |
| 2.5% SOM                                                                             | 19                  | 78                                          | 3.70              | 6500*              |
| 6.0% SOM                                                                             | 43                  | 170                                         | 8.70              | 11000*             |

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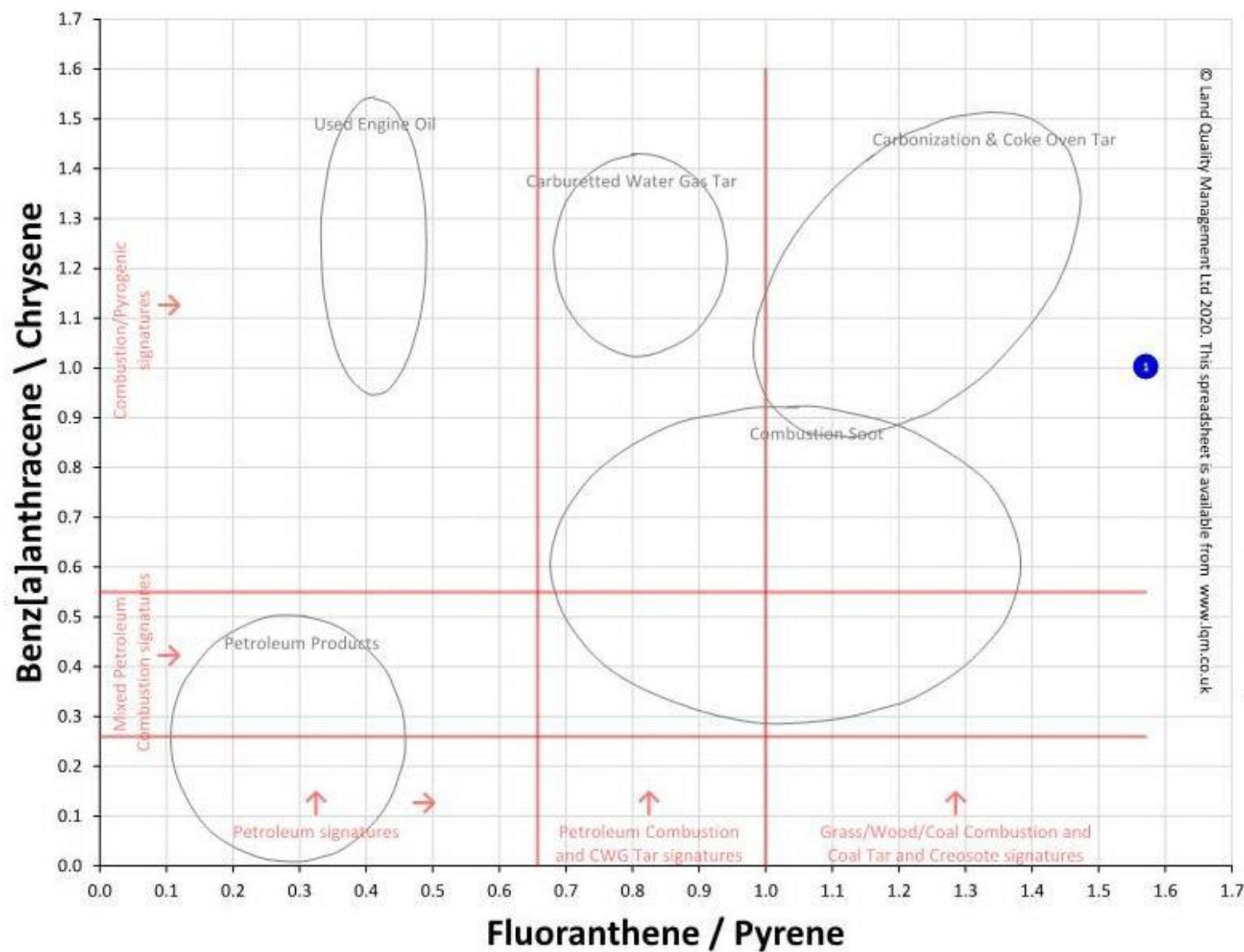
| CL:AIRE General Assessment Criteria:<br>Volatile and Semi-Volatile Organic Compounds |                     |                                             |                   |                    |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-------------------|--------------------|
| Contaminant                                                                          | Residential (mg/kg) | Residential without<br>plant uptake (mg/kg) | Allotment (mg/kg) | Commercial (mg/kg) |
| <b>Total Cresols (2-, 3-, and 4-methylphenol)</b>                                    |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 80                  | 3700                                        | 12                | 160000             |
| 2.5% SOM                                                                             | 180                 | 5400                                        | 27                | 180000*            |
| 6.0% SOM                                                                             | 400                 | 6900                                        | 63                | 180000*            |
| <b>Trans 1,2 Dichloroethene</b>                                                      |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.19                | 0.19                                        | 0.93              | 22                 |
| 2.5% SOM                                                                             | 0.34                | 0.35                                        | 1.90              | 40                 |
| 6.0% SOM                                                                             | 0.70                | 0.71                                        | 0.24              | 81                 |
| <b>Tributyl tin oxide</b>                                                            |                     |                                             |                   |                    |
| 1.0% SOM                                                                             | 0.25                | 1.40                                        | 0.042             | 130*               |
| 2.5% SOM                                                                             | 0.59                | 3.10                                        | 0.100             | 180*               |
| 6.0% SOM                                                                             | 1.30                | 5.70                                        | 0.240             | 200*               |

Notes: \*Soil concentration above soil saturation limit

**APPENDIX E**  
**LQM PAH Profiling Tool**

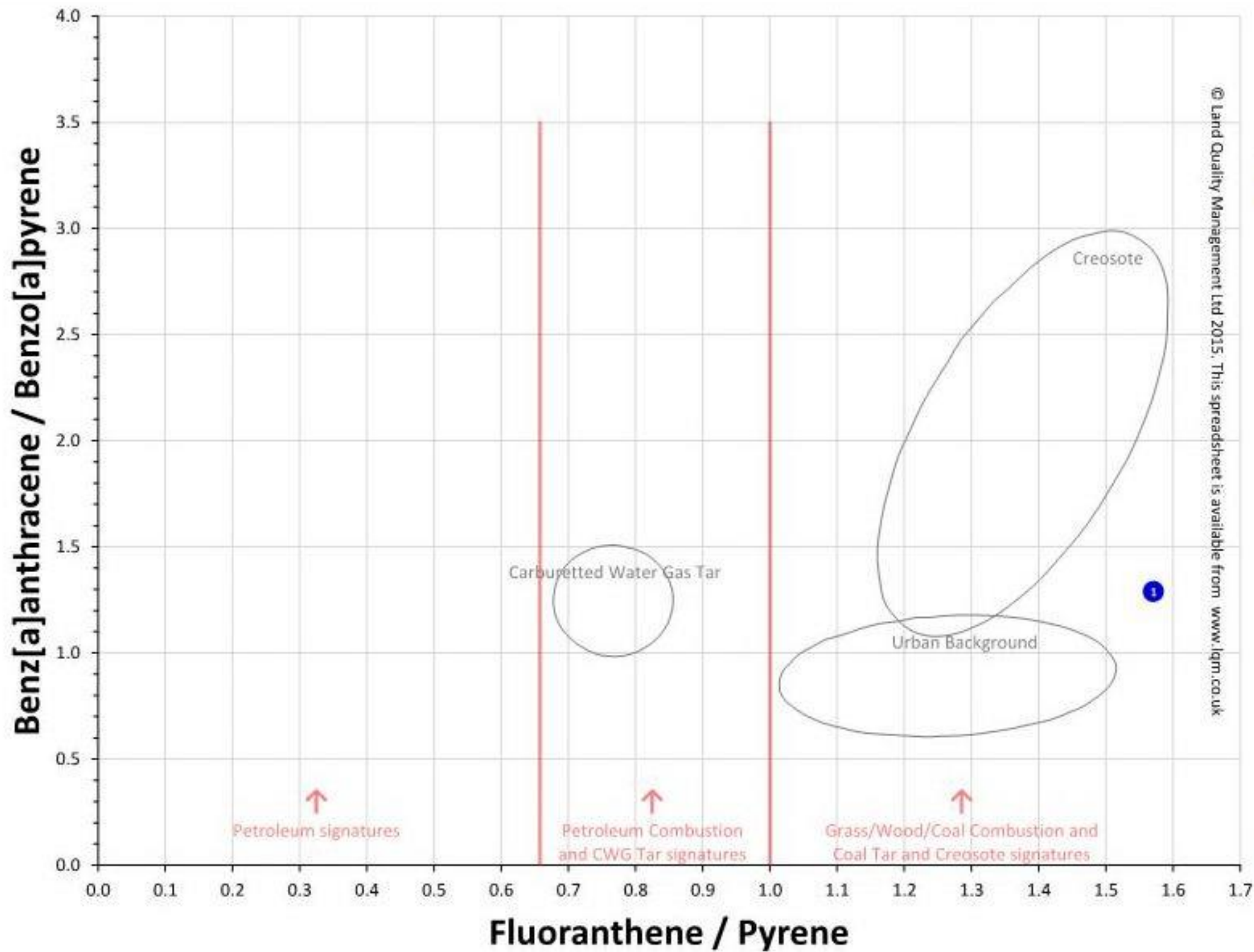
mg/kg

[illegible]



Based on Figure 6 in Costa & Sauer (2005) with additional details based on a conference presentation by Costa (2005) in San Diego. The potential sources shown are indicative only.

**ground  
&water**

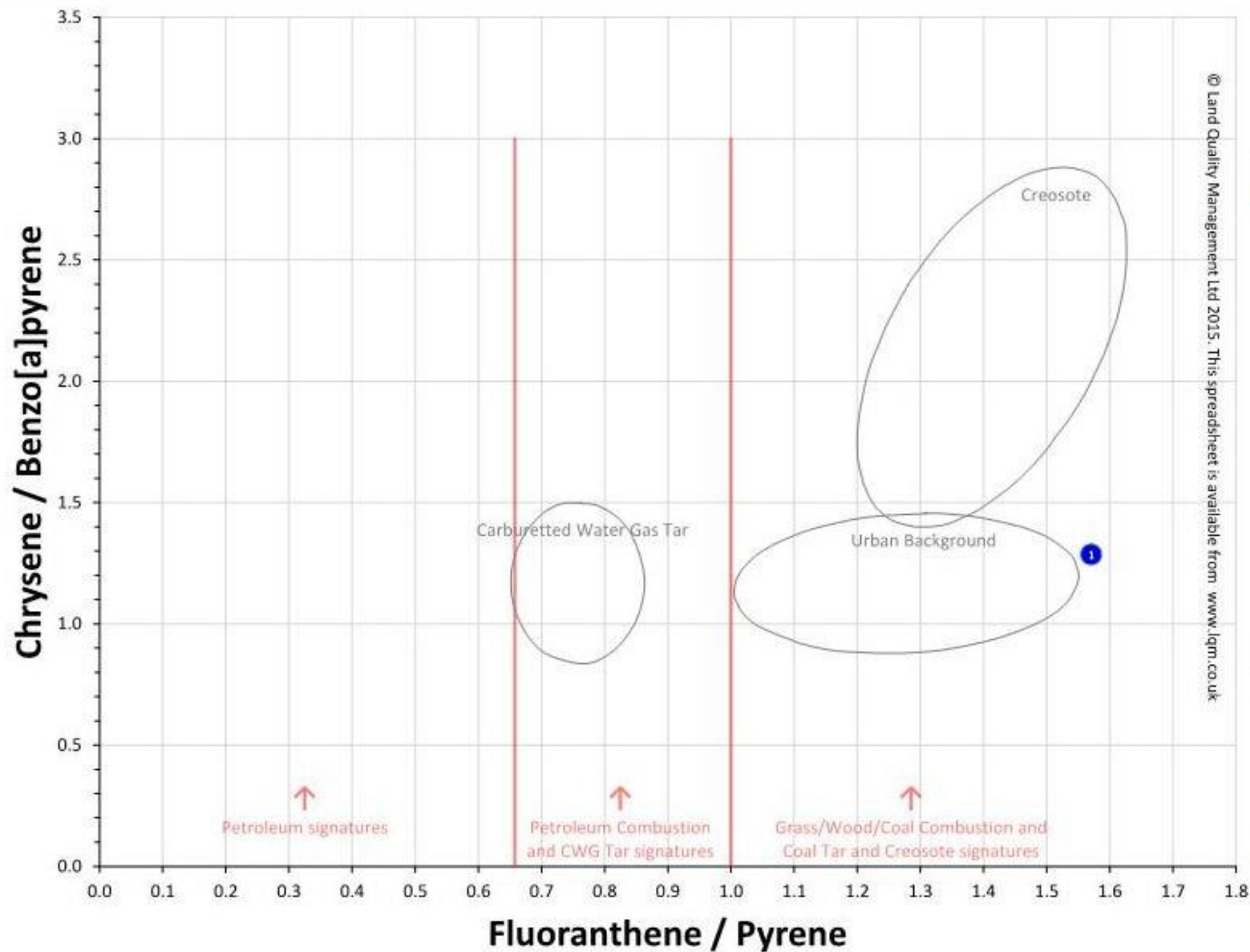


Key:

● Samples collected on site

Based on Figure 7 in Costa & Sauer (2005). The potential sources shown are indicative only.

ground  
& water



Key:

● Samples collected on site

Based on Figure 8 in Costa & Sauer (2005). The potential sources shown are indicative only.

ground  
& water

**APPENDIX F**  
**CLAIRE Statistical Analysis**

|                   |                                                                           |   |  |
|-------------------|---------------------------------------------------------------------------|---|--|
| Client/client ref | Drew Smith Group                                                          |   |  |
| Project ref       | Former Colt International, New Lane, Havant PO9 2LZ                       |   |  |
| Site ref          | GWPR3514                                                                  |   |  |
| Data description  |                                                                           |   |  |
| Contaminant(s)    | Lead, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene         |   |  |
| Test scenario     | Planning: is true mean lower than critical concentration ( $\mu < C_c$ )? | ▼ |  |
| Date              | 27 February 2020                                                          |   |  |
| User details      | Francis Williams                                                          |   |  |

Statistics calculator (version 1)



This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

ESI Ltd (ESI) do not promise that the spreadsheet will provide any particular facilities or functions. The user must ensure that the spreadsheet meets their needs and they remain solely responsible for the competent use of the spreadsheet. Users are entirely responsible for the consequences of any use of the spreadsheet. ESI do not provide any warranty about the fitness for purpose or performance of any part of the spreadsheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the spreadsheet will be uninterrupted or error free. The user should carry out all necessary virus checks prior to installing on their computing system.



Client/client ref: Drew Smith Group  
Project ref: Former Colt International, New  
Lane, Havant PO9 2LZ  
Site ref: GWPR3514  
Data description:  
Contaminant(s): Lead, Benzo(b)fluoranthene,  
Benzo(a)pyrene, Dibenz(a,h)anthracene  
Test scenario: Planning  
Date: 27 February 2009

|                                                                                                                                                                                                                                                                                               |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |         |         |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|---------|---------|
| Client/client ref: Drew Smith Group<br>Project ref: Former Colt International, New Lane, Havant PO9 2LZ<br>Site ref: GWPR3514<br>Data description:<br>Contaminant(s): Lead, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene<br>Test scenario: Planning<br>Date: 27 February 2020 |                      |                      |                      |                      | Lead (mg/kg)         | B(b)F (mg/kg)        | B(a)P (mg/kg)        | D(ah)A (mg/kg)       | (mg/kg)              | (mg/kg)              | (mg/kg) | (mg/kg) | (mg/kg) |
| Critical concentration, $C_c$                                                                                                                                                                                                                                                                 | 210                  | 2.6                  | 2.2                  | 0.24                 | 46                   | 2.6                  | 2.2                  | 27                   | 0.24                 |                      |         |         |         |
| Notes                                                                                                                                                                                                                                                                                         |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |         |         |         |
| Sample size, $n$                                                                                                                                                                                                                                                                              | 27                   | 27                   | 27                   | 27                   | 0                    | 0                    | 0                    | 0                    | 0                    | 0                    |         |         |         |
| Sample mean, $\bar{x}$                                                                                                                                                                                                                                                                        | 106.259259           | 1.08259259           | 0.70074074           | 0.07518519           | No Data              | No Data              | No Data              | No Data              | No Data              | No Data              |         |         |         |
| Standard deviation, $s$                                                                                                                                                                                                                                                                       | 57.6391911           | 1.28946797           | 0.88172875           | 0.13086606           |                      |                      |                      |                      |                      |                      |         |         |         |
| Number of non-detects                                                                                                                                                                                                                                                                         | 0                    | 0                    | 0                    | 26                   |                      |                      |                      |                      |                      |                      |         |         |         |
| Set non-detect values to:                                                                                                                                                                                                                                                                     | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit | Half detection limit |         |         |         |
| Outliers?                                                                                                                                                                                                                                                                                     | Yes                  | Yes                  | Yes                  | Yes                  |                      |                      |                      |                      |                      |                      |         |         |         |
| Distribution                                                                                                                                                                                                                                                                                  | Non-normal           | Non-normal           | Non-normal           | Non-normal           |                      |                      |                      |                      |                      |                      |         |         |         |
| Statistical approach                                                                                                                                                                                                                                                                          | Auto: Chebyshev      | Auto: Chebyshev      | Auto: Chebyshev      | Auto: Chebyshev      | Auto                 | Auto                 | Auto                 | Auto                 | Auto                 | Auto                 |         |         |         |

|                                                             |                                                                          |                         |                         |                                    |                          |                         |                         |                                              |                         |                         |
|-------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|-------------------------|------------------------------------|--------------------------|-------------------------|-------------------------|----------------------------------------------|-------------------------|-------------------------|
| Test scenario:                                              | Planning: is true mean lower than critical concentration ( $\mu < C_c$ ) |                         |                         |                                    | Evidence level required: |                         | 95%                     | Use Normal distribution to test for outliers |                         |                         |
| t statistic, $t_0$ (or $k_0$ )                              | -9.352190599                                                             | -6.114677048            | -8.835347214            | -6.544117647                       |                          |                         |                         |                                              |                         |                         |
| Upper confidence limit (on true mean concentration, $\mu$ ) | 154.611076                                                               | 2.16428922              | 1.44039697              | 0.18496486                         |                          |                         |                         |                                              |                         |                         |
| Evidence level                                              | 99%                                                                      | 97%                     | 99%                     | 98%                                |                          |                         |                         |                                              |                         |                         |
| Base decision on:                                           | evidence level                                                           | evidence level          | evidence level          | evidence level                     |                          |                         |                         |                                              |                         |                         |
| Result                                                      | $\mu < C_c$                                                              | $\mu < C_c$             | $\mu < C_c$             | $\mu < C_c$                        |                          |                         |                         |                                              |                         |                         |
| Select dataset                                              | <input type="radio"/> Y                                                  | <input type="radio"/> Y | <input type="radio"/> Y | <input checked="" type="radio"/> Y | <input type="radio"/> Y  | <input type="radio"/> Y | <input type="radio"/> Y | <input type="radio"/> Y                      | <input type="radio"/> Y | <input type="radio"/> Y |

Back to data

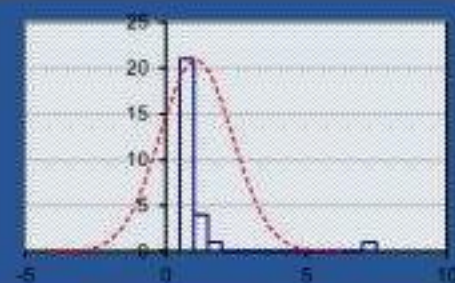
Go to outlier test

Go to normality test

Show individual summary





[illegible]

**Sample mean,**  
1.083

**Standard deviation, s**  
1.289

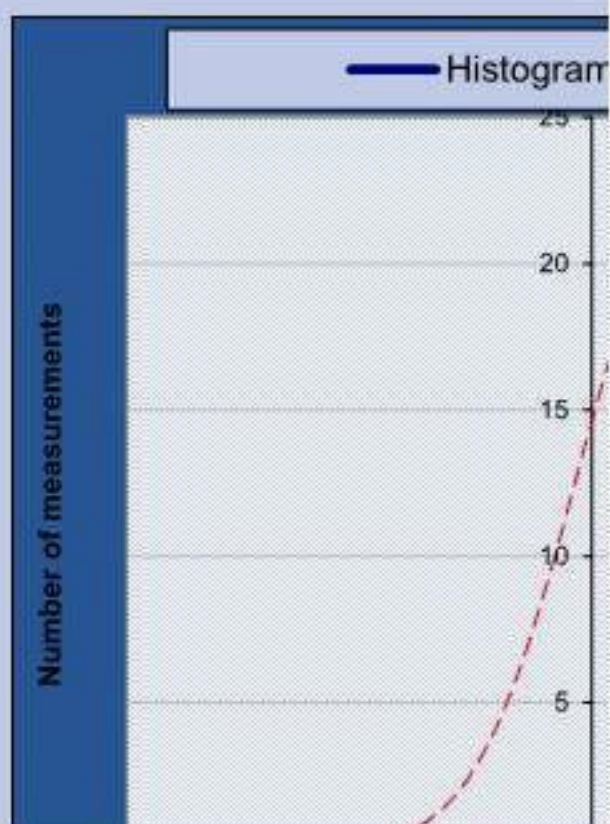
**Sample size, n**  
27

**Maximum**  
7.350

**Test Applicability**  
**Applicable**

**Level of Significance,**  
5%

**Test Statistic**  
Tn = 4.860  
Tcrit = 2.698





# Test Results

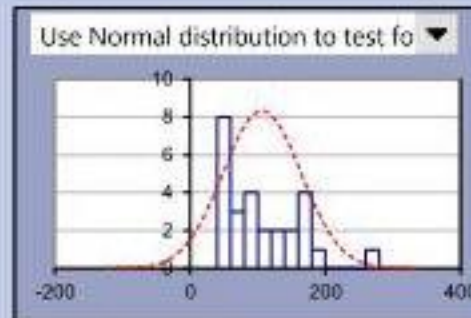
Client/client ref: Drew Smith Gro Site ref: GWPR3514

Project ref: Former Colt Internati Data description:

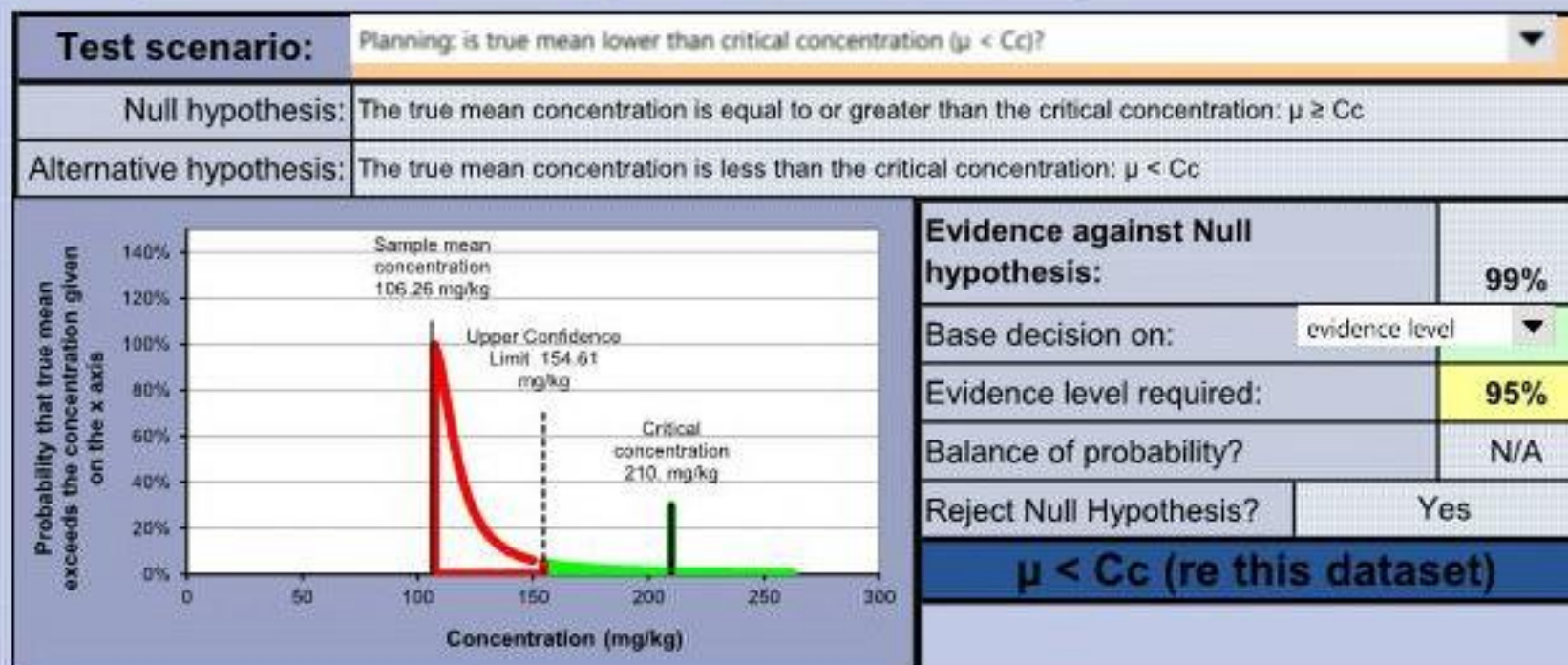
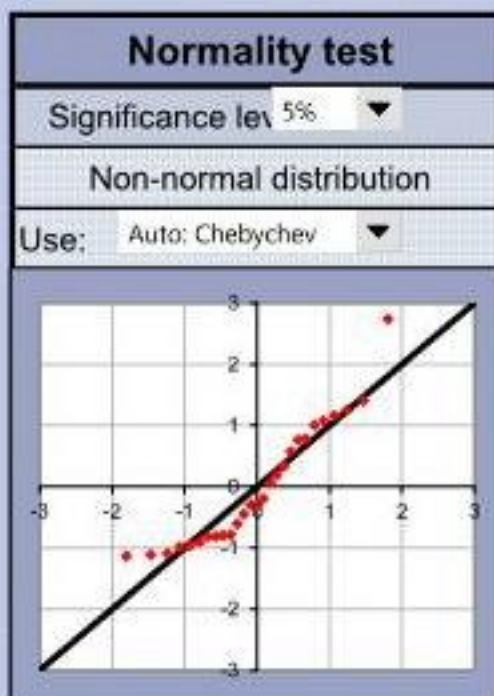
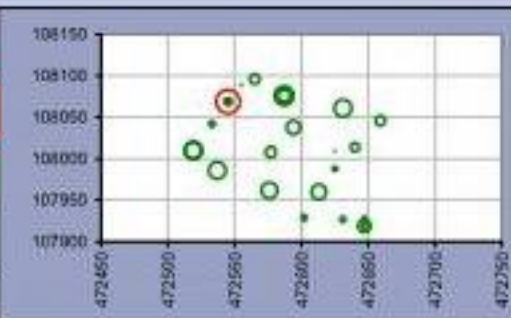
Date: 27-Feb-2020

User details: Francis Williams

|                                    |              |
|------------------------------------|--------------|
| <b>Dataset</b>                     | Lead (mg/kg) |
| Sample mean, $\bar{x}$ (mg/kg)     | 106.26       |
| Sample standard deviation, s       | 57.639       |
| Sample size, n                     | 27           |
| Critical concentration, Cc (mg/kg) | 210          |



|                                   |     |
|-----------------------------------|-----|
| <b>Outliers &amp; non-detects</b> |     |
| Outliers present?                 | YES |
| Significance level                | 5%  |
| Outliers removed?                 | 0   |
| Non-detects                       | 0   |



[Back to data](#)

[Back to summary](#)

[Go to outlier test](#)

[Go to normality test](#)

# Test Results

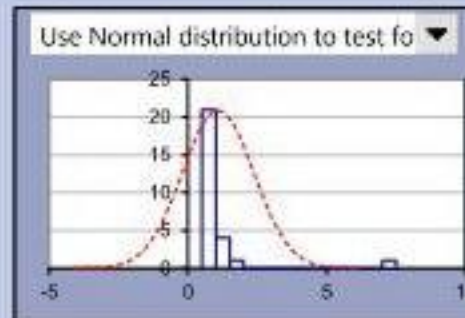
Client/client ref: Drew Smith Gro Site ref: GWPR3514

Project ref: Former Colt Internati Data description:

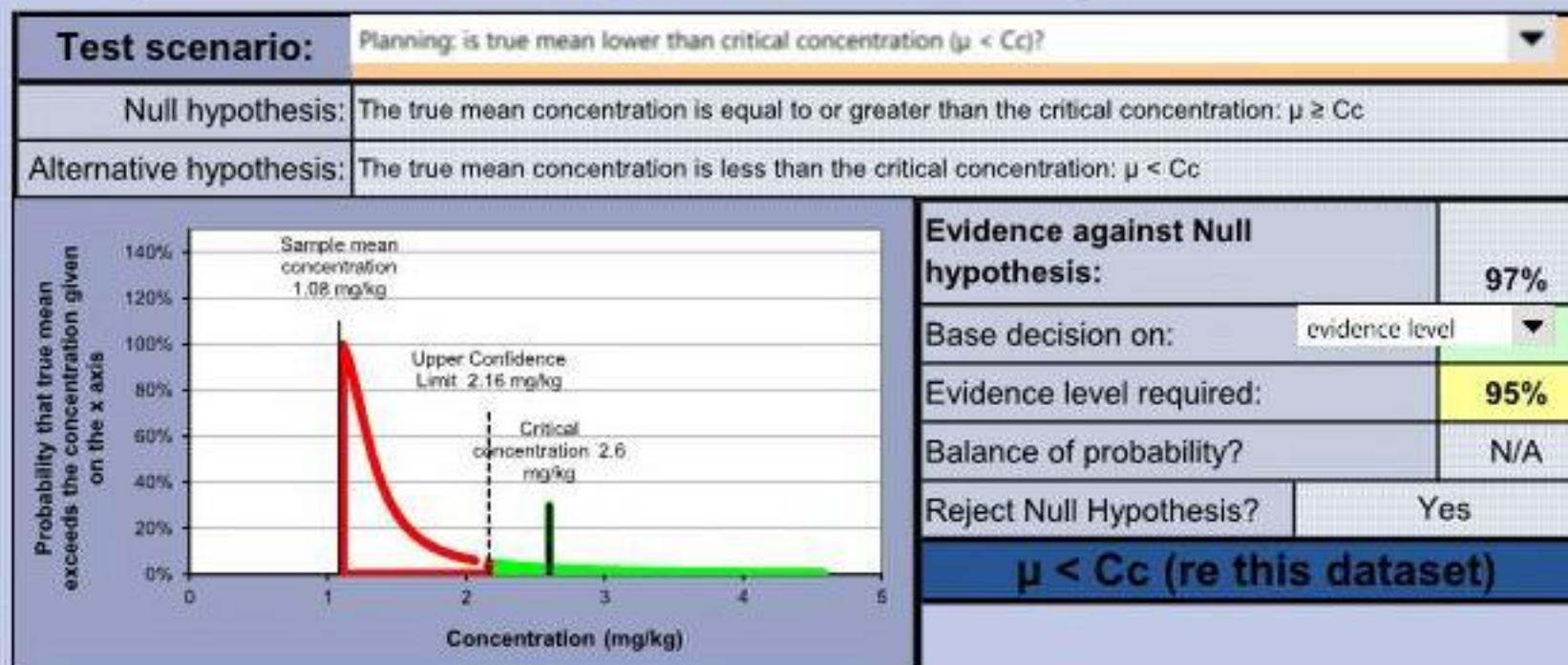
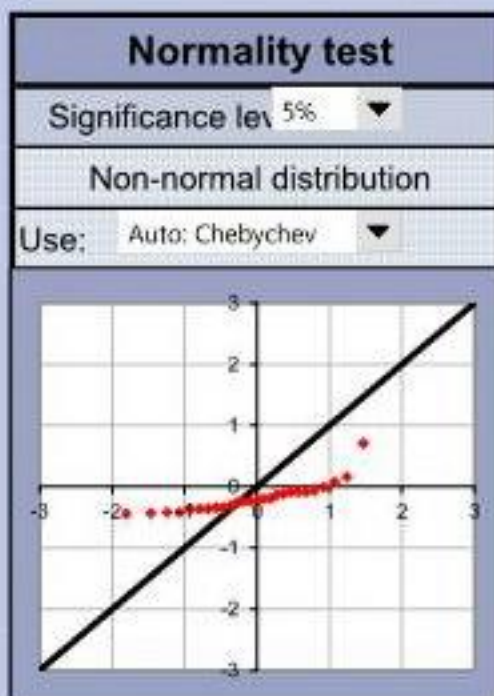
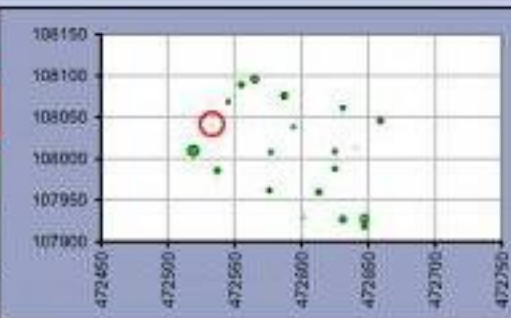
Date: 27-Feb-2020

User details: Francis Williams

|                                    |               |
|------------------------------------|---------------|
| <b>Dataset</b>                     | B(b)F (mg/kg) |
| Sample mean, $\bar{x}$ (mg/kg)     | 1.0826        |
| Sample standard deviation, s       | 1.2895        |
| Sample size, n                     | 27            |
| Critical concentration, Cc (mg/kg) | 2.6           |



|                                   |     |
|-----------------------------------|-----|
| <b>Outliers &amp; non-detects</b> |     |
| Outliers present?                 | YES |
| Significance level                | 5%  |
| Outliers removed?                 | 0   |
| Non-detects                       | 0   |



Back to data

Back to summary

Go to outlier test

Go to normality test

# Test Results

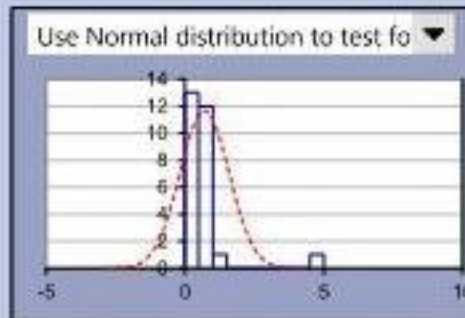
Client/client ref: Drew Smith Gro Site ref: GWPR3514

Project ref: Former Colt Internati Data description:

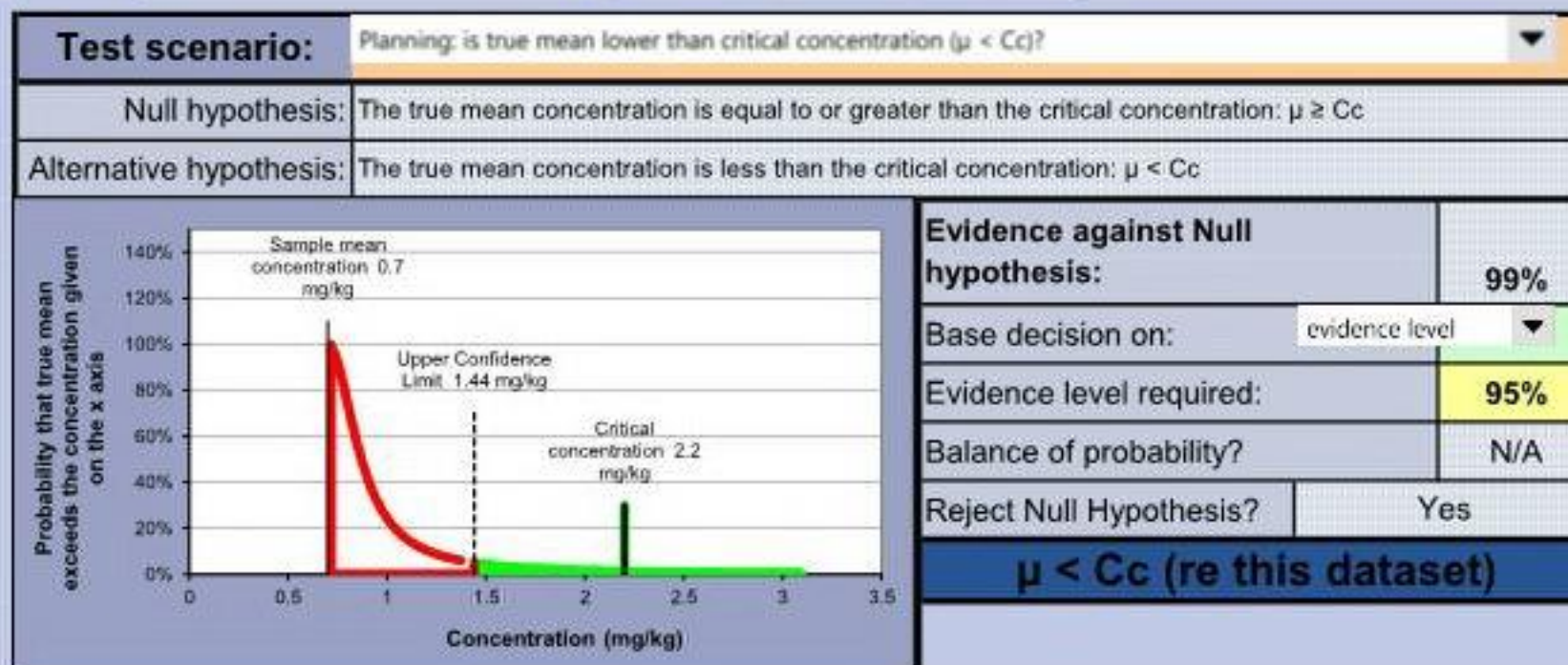
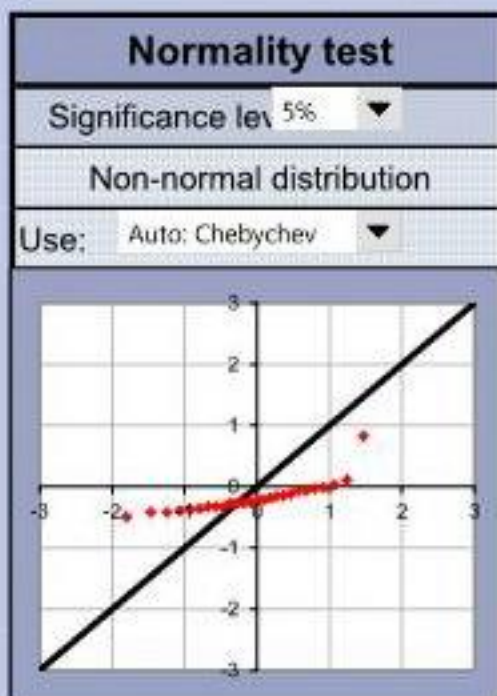
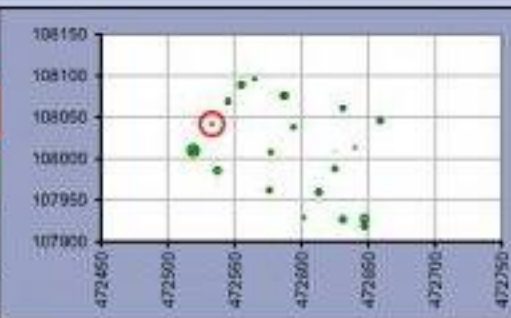
Date: 27-Feb-2020

User details: Francis Williams

|                                    |               |
|------------------------------------|---------------|
| <b>Dataset</b>                     | B(a)P (mg/kg) |
| Sample mean, $\bar{x}$ (mg/kg)     | 0.7007        |
| Sample standard deviation, s       | 0.8817        |
| Sample size, n                     | 27            |
| Critical concentration, Cc (mg/kg) | 2.2           |



|                                   |     |
|-----------------------------------|-----|
| <b>Outliers &amp; non-detects</b> |     |
| Outliers present?                 | YES |
| Significance level                | 5%  |
| Outliers removed?                 | 0   |
| Non-detects                       | 0   |



Back to data

Back to summary

Go to outlier test

Go to normality test

# Test Results

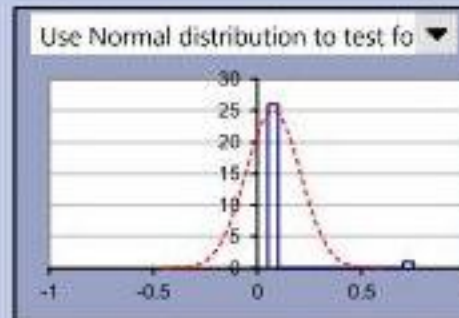
Client/client ref: Drew Smith Gro Site ref: GWPR3514

Project ref: Former Colt Internati Data description:

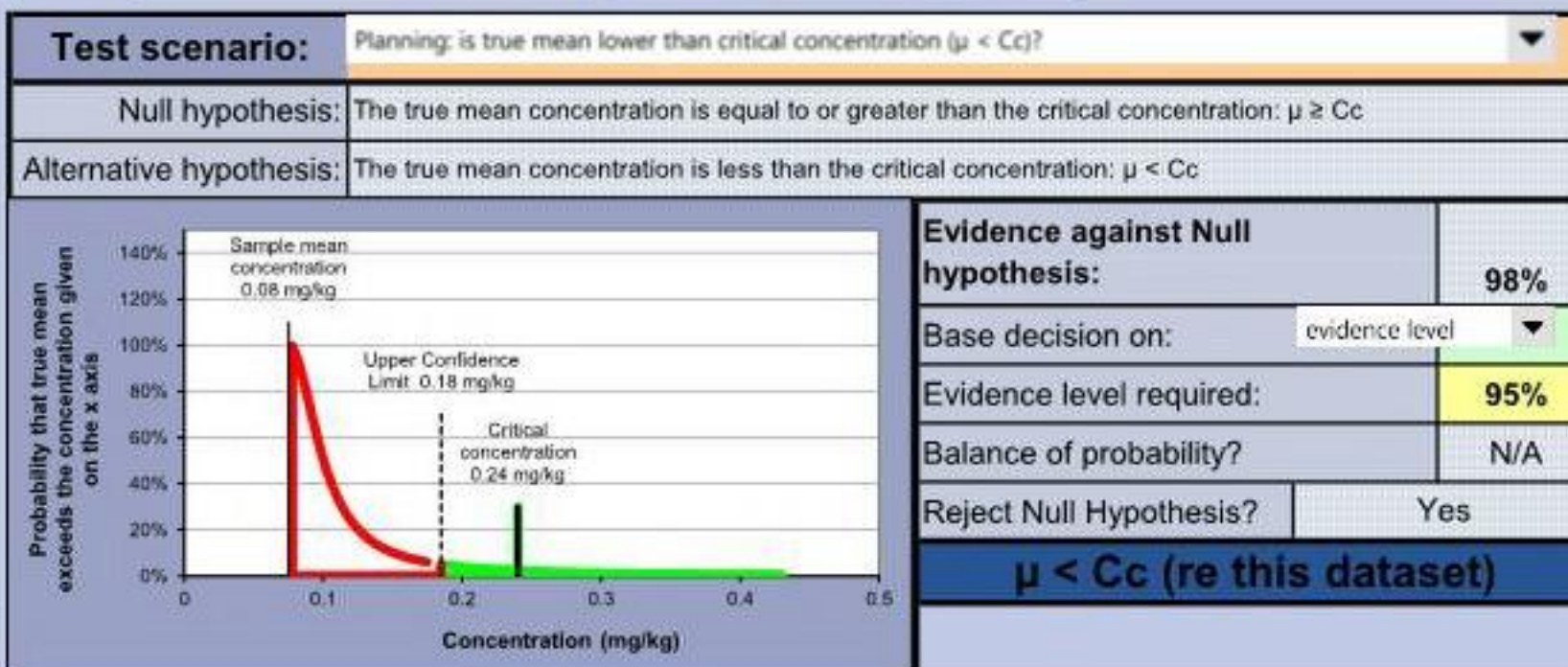
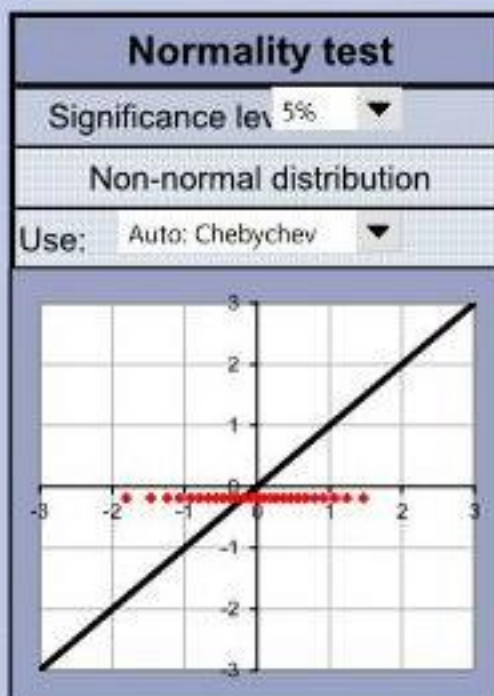
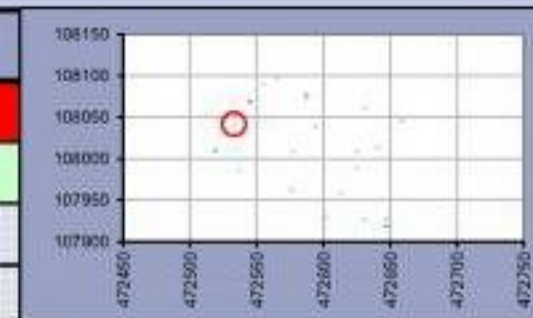
Date: 27-Feb-2020

User details: Francis Williams

|                                    |                |
|------------------------------------|----------------|
| <b>Dataset</b>                     | D(ah)A (mg/kg) |
| Sample mean, $\bar{x}$ (mg/kg)     | 0.0752         |
| Sample standard deviation, s       | 0.1309         |
| Sample size, n                     | 27             |
| Critical concentration, Cc (mg/kg) | 0.24           |



|                                   |     |
|-----------------------------------|-----|
| <b>Outliers &amp; non-detects</b> |     |
| Outliers present?                 | YES |
| Significance level                | 5%  |
| Outliers removed?                 | 0   |
| Non-detects                       | 26  |



Back to data

Back to summary

Go to outlier test

Go to normality test

**APPENDIX G**  
**Asbestos Risk Assessment**

|                               |                                                 |            |            |      |          |            |      |             |            |      |
|-------------------------------|-------------------------------------------------|------------|------------|------|----------|------------|------|-------------|------------|------|
| Site information              | Job Number                                      | GWPR3192   |            |      |          |            |      |             |            |      |
|                               | Trial Hole                                      |            |            |      | TP21     |            |      |             |            |      |
|                               | Depth (m bgl)                                   |            |            |      | 0.1      |            |      |             |            |      |
| Asbestos Type Considerations  | Abestos type                                    | Chrysotile |            |      | Amosite  |            |      | Crocidolite |            |      |
|                               | Kasbestos                                       | 1.3        |            |      | 1.7      |            |      | 2.0         |            |      |
|                               | Soil Concentration (Quantification Result in %) |            |            |      | 0.001    |            |      |             |            |      |
| Soil Type Considerations      | Soil Type                                       | Sand       | Sandy Clay | Clay | Sand     | Sandy Clay | Clay | Sand        | Sandy Clay | Clay |
|                               | Ksoil                                           | 2.9        | 1.7        | 0.93 | 2.9      | 1.7        | 0.93 | 2.9         | 1.7        | 0.93 |
|                               | Enter the relevant from the above               |            |            |      | 2.9      |            |      |             |            |      |
| Constants                     | Koverall                                        | 1.6        |            |      | 1.6      |            |      | 1.6         |            |      |
|                               | Dust Concentration (mg/m3)                      | 0.1        |            |      | 0.1      |            |      | 0.1         |            |      |
|                               | Dry Conditions Exposure (hrs)                   | 750        |            |      | 750      |            |      | 750         |            |      |
|                               | Occupation hours in a year                      | 1920       |            |      | 1920     |            |      | 1920        |            |      |
| Calculation Results           | fibre/ml per mg/m3                              |            |            |      | 0.0031   |            |      |             |            |      |
|                               | fibre/ml                                        |            |            |      | 0.00031  |            |      |             |            |      |
|                               | fibre/ml.hr                                     |            |            |      | 0.231    |            |      |             |            |      |
|                               | fibre/ml.year                                   |            |            |      | 0.000120 |            |      |             |            |      |
| Mesothelioma Accumulated Risk | Age (exposure commences)                        | 0          |            |      | 0        |            |      | 0           |            |      |
|                               | Risk persists for (Years)                       | 60         |            |      | 60       |            |      | 60          |            |      |
|                               | Cummulative Age Adjustment Factor               | 16.8       |            |      | 16.8     |            |      | 16.8        |            |      |
|                               | fibre/ml.year (cumulative)                      |            |            |      | 0.00202  |            |      |             |            |      |
| Lung Cancer Accumulated Risk  | Risk persists for (Years)                       | 60         |            |      | 60       |            |      | 60          |            |      |
|                               | fibre/ml.year (cumulative)                      |            |            |      | 0.00144  |            |      |             |            |      |

## BACKGROUND

This asbestos risk assessment has been undertaken in accordance with the guidance within CIRIA733.

The fibre concentration within the airborne soil dust (in fibres/ml per mg/m3) was calculated based on the results of Addison et al 1988 and the CIRIA Masterclass presentation "Estimating cumulative exposure to airborne asbestos from asbestos in soil" by Alan Jones.

The airborne concentration of soil dust (0.1mg/m3) was based on ambient urban dust levels and ART modelling.

The dry conditions exposure (750hrs) was based upon regional meteorological data suggesting 150hrs of dry conditions per year, when applied over a 5-year segment this equates to 750hours.

The occupational hours per year (1920hrs) is based on a 40-hour working week and 48 working weeks in a year.

A worst-case exposure scenario has been considered for residents, groundworkers or generally end-users. This was based on the risk persisting for a period of 60 years, accumulated in 5-year increments. As the risk of mesothelioma is age dependent, this considered the exposure commencing at age 0 with the relevant age adjustment factor applied for each 5-year increment.

Based on the above considerations, the following equations have been used:

$$[(\text{Kasbestos type} \times \text{Ksoil}) \div \text{Koverall}] \times \text{Soil Concentration} = \text{fibre/ml per mg/m3}$$

$$\text{Fibre/ml per mg/m3} \times \text{Dust Concentration} = \text{fibre/ml}$$

$$(\text{f/ml} \times \text{Dry Conditions Exposure (hrs)}) = \text{fibre/ml.hr}$$

$$\text{Fibre/ml.hr} \div \text{occupational hours per year} = \text{fibre/ml.year}$$

$$\text{Mesothelioma: fibre/ml.year} \times 16.8 \text{ (cumulative age adjustment factor for 60 years)}$$

$$\text{Lung Cancer: fibre/ml.year} \times 12 \text{ (60 years in 5-year increments)}$$

**APPENDIX H**  
**Cable Percussion Borehole Logs**

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH1                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 1 of 2 |

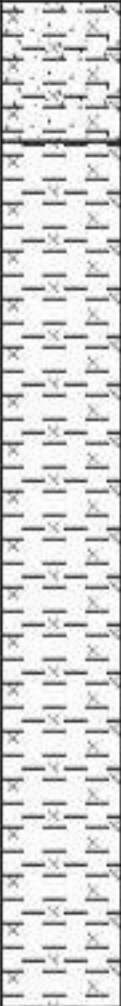
| Well                                                                               | Water Strikes                                                                      | Sample and In Situ Testing |      |                         | Depth (m) | Level (m) | Legend                                                                               | Stratum Description                                                                                                                                                                                                 |   |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------|------|-------------------------|-----------|-----------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                                    |                                                                                    | Depth (m)                  | Type | Results                 |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|  |  | 0.20                       | D    |                         | 0.40      |           |   | MADE GROUND: Greyish brown sandy gravel. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to sub-rounded, slate, brick, flint, and concrete. Occasional fragments of metal, glass and plastic. | 1 |
|                                                                                    |                                                                                    | 0.50                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 1.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 2.00                       | D    |                         | 1.60      |           |  | HEAD DEPOSITS: Orangish brown and brown gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded, flint.                                                                                               | 2 |
|                                                                                    |                                                                                    | 2.00                       | SPT  | N=16 (2,2/2,4,4,6)      |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 3.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 3.00                       | SPT  | 50 (10,12/50 for 250mm) |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 4.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 4.00                       | SPT  | N=33 (4,5/7,9,9,8)      |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 5.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 5.00                       | SPT  | N=31 (4,6/7,8,8,8)      |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 6.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 6.50                       | SPT  | N=32 (5,6/8,7,8,9)      |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 7.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
|                                                                                    |                                                                                    | 8.00                       | D    |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
| 8.00                                                                               | SPT                                                                                | N=29 (4,5/6,7,8,8)         |      |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
| 9.00                                                                               | D                                                                                  |                            |      |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
| 9.50                                                                               | SPT                                                                                | N=30 (5,5/7,7,8,8)         |      |                         |           |           |                                                                                      |                                                                                                                                                                                                                     |   |
| 10.00                                                                              | D                                                                                  |                            |      |                         |           |           |                                                                                      | 10                                                                                                                                                                                                                  |   |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                                                                |  |  |  |  |  |  |  |  |  |                                                                                       |
|------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. Groundwater was noted at 11.50m bgl one hour after drilling. |  |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH1                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 2 of 2 |

| Well                                                                               | Water Strikes | Sample and In Situ Testing |          |                         | Depth (m) | Level (m)                                                                            | Legend                                                                                                  | Stratum Description |    |
|------------------------------------------------------------------------------------|---------------|----------------------------|----------|-------------------------|-----------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------|----|
|                                                                                    |               | Depth (m)                  | Type     | Results                 |           |                                                                                      |                                                                                                         |                     |    |
|  |               |                            |          |                         | 10.70     |  | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite throughout. Shell fragments from 12.00m bgl. |                     |    |
|                                                                                    |               | 11.00<br>11.00             | D<br>SPT | N=31 (4,5/7,8,8,8)      |           |                                                                                      |                                                                                                         | 11                  |    |
|                                                                                    |               | 12.00                      | D        |                         | 12        |                                                                                      |                                                                                                         |                     |    |
|                                                                                    |               | 12.50                      | SPT      | N=33 (4,5/7,8,9,9)      |           |                                                                                      |                                                                                                         |                     |    |
|                                                                                    |               | 13.00                      | D        |                         | 13        |                                                                                      |                                                                                                         |                     |    |
|                                                                                    |               | 14.00                      | D        |                         | 14        |                                                                                      |                                                                                                         |                     |    |
|                                                                                    |               | 14.50                      | SPT      | N=38<br>(5,6/8,10,9,11) |           |                                                                                      |                                                                                                         |                     |    |
|                                                                                    |               | 15.00                      | D        |                         | 15.00     |                                                                                      |                                                                                                         | 15                  |    |
|                                                                                    |               | End of Borehole at 15.000m |          |                         |           |                                                                                      |                                                                                                         |                     | 15 |
|                                                                                    |               |                            |          |                         |           |                                                                                      |                                                                                                         |                     | 16 |
|                                                                                    |               |                            |          |                         |           |                                                                                      |                                                                                                         |                     | 17 |
|                                                                                    |               |                            |          |                         |           |                                                                                      |                                                                                                         |                     | 18 |
|                                                                                    |               |                            |          |                         |           |                                                                                      |                                                                                                         |                     | 19 |
|                                                                                    |               |                            |          |                         |           |                                                                                      |                                                                                                         |                     | 20 |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

**Remarks**  
No roots noted. Groundwater was noted at 11.50m bgl one hour after drilling.

# Percussion Drilling Log

|                                         |  |                 |  |                          |  |                  |  |                     |  |                             |  |
|-----------------------------------------|--|-----------------|--|--------------------------|--|------------------|--|---------------------|--|-----------------------------|--|
| Project Name: Former Colt International |  |                 |  | Client: Drew Smith Group |  |                  |  | Date: 21/01/2020    |  |                             |  |
| Location: New Lane, Havant PO9 2LZ      |  |                 |  | Contractor:              |  |                  |  |                     |  |                             |  |
| Project No. : GWPR3514                  |  |                 |  | Crew Name:               |  |                  |  | Drilling Equipment: |  |                             |  |
| Borehole Number<br>BH2                  |  | Hole Type<br>CP |  | Level                    |  | Logged By<br>RJT |  | Scale<br>1:50       |  | Page Number<br>Sheet 1 of 2 |  |

| Well | Water Strikes | Sample and In Situ Testing |      |         | Depth (m) | Level (m) | Legend                                                                                                  | Stratum Description                                                                                                                                                                       |    |
|------|---------------|----------------------------|------|---------|-----------|-----------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|      |               | Depth (m)                  | Type | Results |           |           |                                                                                                         |                                                                                                                                                                                           |    |
|      |               |                            |      |         | 0.20      |           |                                                                                                         | MADE GROUND: Greyish brown sandy gravel. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to sub-rounded, slate, brick, flint, and concrete.                         |    |
|      |               |                            |      |         | 0.50      |           |                                                                                                         | MADE GROUND: Orangish brown and grey sandy gravelly clay. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to sub-rounded, brick (20%), concrete (20%), flint (60%). | 1  |
|      |               |                            |      |         | 0.80      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly gravelly silty clayey SAND. Sand is fine to medium grained. Gravel is fine to coarse, sub-angular to rounded, flint.                               |    |
|      |               |                            |      |         | 1.00      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly clayey silty SAND. Sand is fine to medium grained. Occasional fine to coarse, sub-rounded to rounded, flint.                                       | 2  |
|      |               |                            |      |         | 1.50      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly gravelly silty clayey SAND. Sand is fine to medium grained. Gravel is fine to coarse, sub-angular to rounded, flint.                               |    |
|      |               |                            |      |         | 2.00      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly clayey silty SAND. Sand is fine to medium grained. Occasional fine to coarse, sub-rounded to rounded, flint.                                       | 3  |
|      |               |                            |      |         | 2.50      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly gravelly silty clayey SAND. Sand is fine to medium grained. Gravel is fine to coarse, sub-angular to rounded, flint.                               |    |
|      |               |                            |      |         | 3.00      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly clayey silty SAND. Sand is fine to medium grained. Occasional fine to coarse, sub-rounded to rounded, flint.                                       | 4  |
|      |               |                            |      |         | 3.50      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly gravelly silty clayey SAND. Sand is fine to medium grained. Gravel is fine to coarse, sub-angular to rounded, flint.                               |    |
|      |               |                            |      |         | 4.00      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly clayey silty SAND. Sand is fine to medium grained. Occasional fine to coarse, sub-rounded to rounded, flint.                                       | 5  |
|      |               |                            |      |         | 4.50      |           |                                                                                                         | HEAD DEPOSITS: Orangish brown slightly gravelly silty clayey SAND. Sand is fine to medium grained. Gravel is fine to coarse, sub-angular to rounded, flint.                               |    |
|      |               |                            |      |         | 5.00      | 5.00      |                                                                                                         | LONDON CLAY FORMATION: Orangish brown and grey silty sandy CLAY. Sand is fine to medium grained.                                                                                          | 6  |
|      |               |                            |      |         | 6.00      | 6.00      |                                                                                                         | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl.                                                                                   | 7  |
|      |               |                            |      |         | 6.00      | 6.00      |                                                                                                         | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl.                                                                                   | 8  |
|      |               |                            |      |         | 7.00      |           |                                                                                                         | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl.                                                                                   | 9  |
|      |               |                            |      |         | 7.50      |           |                                                                                                         | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl.                                                                                   | 10 |
|      |               |                            |      | 8.00    |           |           | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl. |                                                                                                                                                                                           |    |
|      |               |                            |      | 9.00    |           |           | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl. |                                                                                                                                                                                           |    |
|      |               |                            |      | 9.00    |           |           | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl. |                                                                                                                                                                                           |    |
|      |               |                            |      | 10.00   |           |           | LONDON CLAY FORMATION: Dark grey silty CLAY. Fine selenite noted. Small shell fragments from 8.00m bgl. |                                                                                                                                                                                           |    |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

Remarks

No roots noted. Groundwater seepage at 8.00m bgl.

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH2                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 2 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |      |                              | Depth (m) | Level (m) | Legend | Stratum Description |  |
|------|---------------|----------------------------|------|------------------------------|-----------|-----------|--------|---------------------|--|
|      |               | Depth (m)                  | Type | Results                      |           |           |        |                     |  |
|      |               | 10.50                      | SPT  | N=30 (9,5/7,7,8,8)           |           |           |        |                     |  |
|      |               | 11.00                      | D    |                              |           |           |        |                     |  |
|      |               | 12.00                      | D    |                              |           |           |        |                     |  |
|      |               | 12.00                      | SPT  | N=37 (5,5/8,9,9,11)          |           |           |        |                     |  |
|      |               | 13.00                      | D    |                              |           |           |        |                     |  |
|      |               | 13.50                      | SPT  | N=37 (13 for 27mm/7,9,10,11) |           |           |        |                     |  |
|      |               | 14.00                      | D    |                              |           |           |        |                     |  |
|      |               | 15.00                      | D    |                              |           |           |        |                     |  |
|      |               | 15.00                      | SPT  | N=48 (7,8/10,11,13,14)       |           |           |        |                     |  |
|      |               | 16.00                      | D    |                              |           |           |        |                     |  |
|      |               | 16.50                      | SPT  | N=50 (8,9/50 for 267mm)      |           |           |        |                     |  |
|      |               | 17.00                      | D    |                              |           |           |        |                     |  |
|      |               | 18.00                      | D    |                              |           |           |        |                     |  |
|      |               | 18.00                      | SPT  | N=50 (7,9/50 for 251mm)      |           |           |        |                     |  |
|      |               | 19.00                      | D    |                              |           |           |        |                     |  |
|      |               | 19.50                      | SPT  | N=50 (9,8/50 for 254mm)      |           |           |        |                     |  |
|      |               | 20.00                      | D    |                              |           |           |        |                     |  |
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| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

**Remarks**  
No roots noted. Groundwater seepage at 8.00m bgl.

## Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH3                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 1 of 2 |

| Well                                                                               | Water Strikes | Sample and In Situ Testing |      |                                                                                       | Depth (m)                                                                                                                                              | Level (m)                                                                             | Legend                                                                                                                                                                                | Stratum Description |  |
|------------------------------------------------------------------------------------|---------------|----------------------------|------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--|
|                                                                                    |               | Depth (m)                  | Type | Results                                                                               |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|  |               | 0.20                       | D    | N=9 (2,1/2,2,3,2)                                                                     | 1.00                                                                                                                                                   |    | MADE GROUND: Greyish brown sandy gravel. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to sub-rounded, slate, brick, flint, and concrete.                     | 1                   |  |
|                                                                                    |               | 0.50                       | D    |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 1.00                       | D    |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 1.20                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 2.00                       | D    | N=7 (2,2/1,2,2,2)                                                                     | 3.00                                                                                                                                                   |   | HEAD DEPOSITS: Brown to orangish brown and grey slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to rounded, flint. | 2                   |  |
|                                                                                    |               | 2.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 3.00                       | D    |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 3.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 3.00                       | D    | N=11 (2,3/3,2,3,3)                                                                    | 3.00                                                                                                                                                   |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl.                                | 3                   |  |
|                                                                                    |               | 3.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 4.00                       | D    |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 4.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 4.00                       | D    | N=12 (3,3/2,3,4,3)                                                                    |                                                                                                                                                        |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl.                                | 4                   |  |
|                                                                                    |               | 4.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 5.00                       | D    |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
|                                                                                    |               | 5.00                       | SPT  |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 5.00                                                                               | D             | N=14 (3,4/3,3,4,4)         |      |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl. | 5                                                                                     |                                                                                                                                                                                       |                     |  |
| 5.00                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 6.00                                                                               | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 6.50                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 6.50                                                                               | SPT           | N=14 (3,3/4,3,3,4)         |      |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl. | 6                                                                                     |                                                                                                                                                                                       |                     |  |
| 7.00                                                                               | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 8.00                                                                               | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 8.00                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 8.00                                                                               | D             | N=18 (4,3/5,4,4,5)         |      |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl. | 8                                                                                     |                                                                                                                                                                                       |                     |  |
| 8.00                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 9.00                                                                               | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 9.50                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 9.50                                                                               | SPT           | N=21 (4,5/6,5,5,5)         |      |  | LONDON CLAY FORMATION: Dark grey slightly sandy silty CLAY. Sand is fine grained. Selenite noted from 3.00m bgl. Shell fragments noted from 9.00m bgl. | 9                                                                                     |                                                                                                                                                                                       |                     |  |
| 9.50                                                                               | SPT           |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 10.00                                                                              | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |
| 10.00                                                                              | D             |                            |      |                                                                                       |                                                                                                                                                        |                                                                                       |                                                                                                                                                                                       |                     |  |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

## Remarks

No roots noted. No groundwater encountered.

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH3                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 2 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |          |                             | Depth (m) | Level (m) | Legend | Stratum Description        |    |
|------|---------------|----------------------------|----------|-----------------------------|-----------|-----------|--------|----------------------------|----|
|      |               | Depth (m)                  | Type     | Results                     |           |           |        |                            |    |
|      |               | 11.00<br>11.00             | D<br>SPT | N=29 (5,6/7,7,8,7)          |           |           |        |                            | 11 |
|      |               | 12.00                      | D        |                             |           |           |        |                            | 12 |
|      |               | 12.50                      | SPT      | N=28 (7,8/7,6,7,8)          |           |           |        |                            |    |
|      |               | 13.00                      | D        |                             |           |           |        |                            | 13 |
|      |               | 14.00<br>14.00             | D<br>SPT | N=44<br>(10,10/10,12,10,12) |           |           |        |                            | 14 |
|      |               | 15.00                      | D        |                             |           |           |        |                            | 15 |
|      |               | 15.50                      | SPT      | N=46<br>(10,10/11,11,12,12) |           |           |        |                            |    |
|      |               | 16.00                      | D        |                             |           |           |        |                            | 16 |
|      |               | 17.00<br>17.00             | D<br>SPT | N=48<br>(10,12/12,11,12,13) |           |           |        |                            | 17 |
|      |               | 18.00<br>18.00             | D<br>SPT | 82 (10,15/82 for 225mm)     |           |           |        |                            | 18 |
|      |               |                            |          |                             | 18.45     |           |        | End of Borehole at 18.450m | 19 |
|      |               |                            |          |                             |           |           |        |                            | 20 |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                               |  |  |  |  |  |  |  |  |  |                                                                                       |
|---------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. No groundwater encountered. |  |  |  |  |  |  |  |  |  |  |
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# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH4                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 1 of 2 |

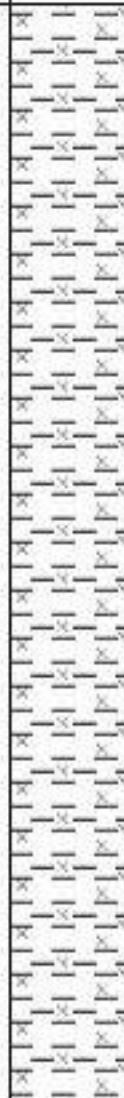
| Well                                                                               | Water Strikes | Sample and In Situ Testing |      |                    | Depth (m) | Level (m) | Legend                                                                                | Stratum Description                                                                                                                                                                                                 |    |
|------------------------------------------------------------------------------------|---------------|----------------------------|------|--------------------|-----------|-----------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|                                                                                    |               | Depth (m)                  | Type | Results            |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|  |               | 1.00                       | D    |                    | 1.00      |           |    | MADE GROUND: Greyish brown sandy gravel. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to sub-rounded, slate, brick, flint, and concrete. Occasional fragments of metal, glass and plastic. | 1  |
|                                                                                    |               | 1.20                       | SPT  | N=8 (2,3/2,2,2,2)  |           |           |    | HEAD DEPOSITS: Orangish brown sandy gravelly CLAY. Sand is fine to coarse grained. Gravel is fine to coarse, angular to sub-rounded, flint and claystone.                                                           |    |
|                                                                                    |               | 2.00                       | D    |                    | 2.00      |           |   | LONDON CLAY FORMATION: Greenish grey sandy CLAY. Sand is fine to medium grained.                                                                                                                                    | 2  |
|                                                                                    |               | 2.00                       | SPT  | N=9 (2,1/2,3,2,2)  |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 3.00                       | D    |                    |           |           |  |                                                                                                                                                                                                                     | 3  |
|                                                                                    |               | 3.00                       | SPT  | N=12 (3,3/4,3,2,3) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 4.00                       | D    |                    |           |           |  |                                                                                                                                                                                                                     | 4  |
|                                                                                    |               | 4.00                       | SPT  | N=14 (3,4/3,4,4,3) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 5.00                       | D    |                    | 5.00      |           |  | LONDON CLAY FORMATION: Orangish brown and grey silty sandy CLAY. Sand is fine to medium grained.                                                                                                                    | 5  |
|                                                                                    |               | 5.00                       | SPT  | N=14 (4,3/3,4,3,4) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 6.00                       | D    |                    | 6.00      |           |  | LONDON CLAY FORMATION: Dark grey silty CLAY. Small shell fragments from 9.00m bgl and fine selenite crystals from 10.00m bgl.                                                                                       | 6  |
|                                                                                    |               | 6.50                       | SPT  | N=17 (4,4/4,4,4,5) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 7.00                       | D    |                    |           |           |  |                                                                                                                                                                                                                     | 7  |
|                                                                                    |               | 8.00                       | D    |                    |           |           |  |                                                                                                                                                                                                                     | 8  |
|                                                                                    |               | 8.00                       | SPT  | N=18 (5,4/4,5,4,5) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 9.00                       | D    |                    |           |           |  |                                                                                                                                                                                                                     | 9  |
|                                                                                    |               | 9.50                       | SPT  | N=22 (5,6/5,5,5,7) |           |           |                                                                                       |                                                                                                                                                                                                                     |    |
|                                                                                    |               | 10.00                      | D    |                    |           |           |  |                                                                                                                                                                                                                     | 10 |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                                                             |  |  |  |  |  |  |  |  |  |                                                                                       |
|---------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. Groundwater encountered at 12.50m, 13.20m and 13.80m bgl. |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH4                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 2 of 2 |

| Well                                                                               | Water Strikes                                                                      | Sample and In Situ Testing |          |                                 | Depth (m) | Level (m) | Legend                                                                               | Stratum Description |    |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------|----------|---------------------------------|-----------|-----------|--------------------------------------------------------------------------------------|---------------------|----|
|                                                                                    |                                                                                    | Depth (m)                  | Type     | Results                         |           |           |                                                                                      |                     |    |
|  |  | 11.00<br>11.00             | D<br>SPT | N=28 (7,8/7,7,6,8)              | 15.45     |           |  |                     | 11 |
|                                                                                    |                                                                                    | 12.00                      | D        |                                 |           |           |                                                                                      |                     | 12 |
|                                                                                    |                                                                                    | 12.50                      | SPT      | N=39<br>(8,8/10,8,10,11)        |           |           |                                                                                      |                     | 13 |
|                                                                                    |                                                                                    | 13.00                      | D        |                                 |           |           |                                                                                      |                     | 14 |
|                                                                                    |                                                                                    | 14.00<br>14.00             | D<br>SPT | N=45<br>(10,11/11,12,10,12<br>) |           |           |                                                                                      |                     | 15 |
|                                                                                    |                                                                                    | 15.00<br>15.00             | D<br>SPT | N=50 (10,12/50<br>for 285mm)    |           |           |                                                                                      |                     | 16 |
|                                                                                    |                                                                                    |                            |          |                                 |           |           |                                                                                      |                     | 17 |
|                                                                                    |                                                                                    |                            |          |                                 |           |           |                                                                                      |                     | 18 |
|                                                                                    |                                                                                    |                            |          |                                 |           |           |                                                                                      |                     | 19 |
|                                                                                    |                                                                                    |                            |          |                                 |           |           |                                                                                      |                     | 20 |
| End of Borehole at 15.450m                                                         |                                                                                    |                            |          |                                 |           |           |                                                                                      |                     |    |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                                                             |  |  |  |  |  |  |  |  |  |                                                                                       |
|---------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. Groundwater encountered at 12.50m, 13.20m and 13.80m bgl. |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH5                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 1 of 2 |

| Well                                                                               | Water Strikes                                                                       | Sample and In Situ Testing |      |                    | Depth (m) | Level (m) | Legend                                                                                | Stratum Description                                                                                                                                                                  |    |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------|------|--------------------|-----------|-----------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|                                                                                    |                                                                                     | Depth (m)                  | Type | Results            |           |           |                                                                                       |                                                                                                                                                                                      |    |
|  |  | 0.20                       |      |                    | 0.20      |           |    | TOPSOIL: (Drillers Description).                                                                                                                                                     |    |
|                                                                                    |                                                                                     | 1.00                       | D    |                    | 1.00      |           |    | MADE GROUND: Orangish brown and grey sandy gravelly clay. Sand is fine to coarse grained. Gravel is fine to coarse, angular to sub-rounded, glass (1%), brick (19%) and flint (80%). | 1  |
|                                                                                    |                                                                                     | 1.20                       | SPT  | N=9 (2,1/2,3,2,2)  |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 2.00                       | D    |                    |           |           |   | HEAD DEPOSITS: Orangish brown and grey sandy gravelly CLAY. Sand is fine to coarse grained. Gravel is fine to coarse, sub-angular to rounded, flint. Notably soft at 3.00m bgl.      | 2  |
|                                                                                    |                                                                                     | 2.00                       | SPT  | N=11 (2,3/3,2,3,3) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 3.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 3  |
|                                                                                    |                                                                                     | 3.00                       | SPT  | N=11 (3,4/3,3,2,3) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 4.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 4  |
|                                                                                    |                                                                                     | 4.00                       | SPT  | N=15 (3,3/4,4,4,3) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 4.50                       |      |                    | 4.50      |           |  | LONDON CLAY FORMATION: Dark grey silty CLAY. Very fine selenite crystals from 5.00m bgl.                                                                                             | 5  |
|                                                                                    |                                                                                     | 5.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 5.00                       | SPT  | N=15 (3,4/3,4,4,4) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 6.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 6  |
|                                                                                    |                                                                                     | 6.50                       | SPT  | N=17 (4,5/4,5,4,4) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 7.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 7  |
|                                                                                    |                                                                                     | 8.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 8  |
|                                                                                    |                                                                                     | 8.00                       | SPT  | N=15 (4,5/4,4,3,4) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 9.00                       | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 9  |
|                                                                                    |                                                                                     | 9.50                       | SPT  | N=23 (4,4/5,6,5,7) |           |           |                                                                                       |                                                                                                                                                                                      |    |
|                                                                                    |                                                                                     | 10.00                      | D    |                    |           |           |                                                                                       |                                                                                                                                                                                      | 10 |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                                         |  |  |  |  |  |  |  |  |  |                                                                                       |
|-------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. Groundwater encountered at 3.00m bgl. |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

# Percussion Drilling Log

|                                         |                 |                          |                  |                     |                             |
|-----------------------------------------|-----------------|--------------------------|------------------|---------------------|-----------------------------|
| Project Name: Former Colt International |                 | Client: Drew Smith Group |                  | Date: 21/01/2020    |                             |
| Location: New Lane, Havant PO9 2LZ      |                 | Contractor:              |                  |                     |                             |
| Project No. : GWPR3514                  |                 | Crew Name:               |                  | Drilling Equipment: |                             |
| Borehole Number<br>BH5                  | Hole Type<br>CP | Level                    | Logged By<br>RJT | Scale<br>1:50       | Page Number<br>Sheet 2 of 2 |

| Well                                                                               | Water Strikes | Sample and In Situ Testing |          |                            | Depth (m) | Level (m) | Legend                                                                               | Stratum Description |    |    |  |  |  |  |
|------------------------------------------------------------------------------------|---------------|----------------------------|----------|----------------------------|-----------|-----------|--------------------------------------------------------------------------------------|---------------------|----|----|--|--|--|--|
|                                                                                    |               | Depth (m)                  | Type     | Results                    |           |           |                                                                                      |                     |    |    |  |  |  |  |
|  |               | 11.00<br>11.00             | D<br>SPT | N=29 (5,5/6,7,8,8)         | 15.45     |           |  |                     | 11 |    |  |  |  |  |
|                                                                                    |               | 12.00                      | D        |                            |           |           |                                                                                      |                     | 12 |    |  |  |  |  |
|                                                                                    |               | 12.50                      | SPT      | N=30 (5,6/7,7,8,8)         |           |           |                                                                                      |                     |    |    |  |  |  |  |
|                                                                                    |               | 13.00                      | D        |                            |           |           |                                                                                      |                     | 13 |    |  |  |  |  |
|                                                                                    |               | 14.00<br>14.00             | D<br>SPT | N=45<br>(8,10/10,10,12,13) |           |           |                                                                                      |                     | 14 |    |  |  |  |  |
|                                                                                    |               | 15.00                      | D        |                            |           |           |                                                                                      |                     | 15 |    |  |  |  |  |
|                                                                                    |               | End of Borehole at 15.450m |          |                            |           |           |                                                                                      |                     |    | 16 |  |  |  |  |
|                                                                                    |               |                            |          |                            |           |           |                                                                                      |                     |    | 17 |  |  |  |  |
|                                                                                    |               |                            |          |                            |           |           |                                                                                      |                     |    | 18 |  |  |  |  |
|                                                                                    |               |                            |          |                            |           |           |                                                                                      |                     |    | 19 |  |  |  |  |
|                                                                                    |               |                            |          |                            |           |           |                                                                                      | 20                  |    |    |  |  |  |  |

| Hole Diameter  |               | Casing Diameter |               | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|----------------|---------------|-----------------|---------------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base (m) | Diameter (mm) | Depth Base (m)  | Diameter (mm) | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|                |               |                 |               |            |            |          |      |                             |            |             |             |

|                                                                         |  |  |  |  |  |  |  |  |  |                                                                                       |
|-------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| <b>Remarks</b><br>No roots noted. Groundwater encountered at 3.00m bgl. |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

**APPENDIX I**  
**Chemical Laboratory Testing – Groundwater**



Francis Williams  
Ground & Water Ltd  
2 The Long Barn  
Norton Farm  
Selborne Road  
Alton  
Hampshire  
GU34 3NB

**DETS Ltd**  
Unit 1  
Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Kent  
ME17 2JN  
t: 01622 850410

## **DETS Report No: 20-02880**

**Site Reference:** Former Colt International, New Lane, Havant, PO9 2LZ

**Project / Job Ref:** GWPR3514

**Order No:** None Supplied

**Sample Receipt Date:** 04/03/2020

**Sample Scheduled Date:** 04/03/2020

**Report Issue Number:** 1

**Reporting Date:** 10/03/2020

**Authorised by:**

Eia Mysiara  
Quality Manager

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



DETS Ltd  
Unit 1, Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Maidstone  
Kent ME17 2JN  
Tel : 01622 850410



| Water Analysis Certificate                                           |                 |               |               |               |               |               |
|----------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 20-02880                                             | Date Sampled    | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      |
| Ground & Water Ltd                                                   | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International, New Lane, Havant, PO9 2LZ | TP / BH No      | BH1           | BH2           | BH3           | BH4           | BH5           |
| Project / Job Ref: GWPR3514                                          | Additional Refs | GW            | GW            | GW            | GW            | GW            |
| Order No: None Supplied                                              | Depth (m)       | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Reporting Date: 10/03/2020                                           | DETS Sample No  | 466776        | 466777        | 466778        | 466779        | 466780        |

| Determinand                 | Unit     | RL     | Accreditation |        |        |        |        |        |
|-----------------------------|----------|--------|---------------|--------|--------|--------|--------|--------|
| pH                          | pH Units | N/a    | ISO17025      | 7.0    | 7.7    | 9.9    | 11.9   | 7.6    |
| Total Cyanide               | ug/l     | < 5    | NONE          | < 5    | < 5    | 10     | 17     | < 5    |
| Sulphate as SO <sub>4</sub> | mg/l     | < 1    | ISO17025      | 518    | 85     | 67     | 16     | 104    |
| Arsenic (dissolved)         | ug/l     | < 5    | ISO17025      | < 5    | < 5    | 6      | < 5    | < 5    |
| Boron (dissolved)           | ug/l     | < 5    | ISO17025      | 24     | 63     | 115    | 7      | 165    |
| Cadmium (dissolved)         | ug/l     | < 0.4  | ISO17025      | < 0.4  | < 0.4  | < 0.4  | < 0.4  | < 0.4  |
| Chromium (dissolved)        | ug/l     | < 5    | ISO17025      | < 5    | < 5    | < 5    | 17     | < 5    |
| Chromium (hexavalent)       | ug/l     | < 20   | NONE          | < 20   | < 20   | < 20   | < 20   | < 20   |
| Copper (dissolved)          | ug/l     | < 5    | ISO17025      | 15     | 11     | 8      | 42     | 8      |
| Lead (dissolved)            | ug/l     | < 5    | ISO17025      | < 5    | < 5    | < 5    | < 5    | < 5    |
| Mercury (dissolved)         | ug/l     | < 0.05 | ISO17025      | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel (dissolved)          | ug/l     | < 5    | ISO17025      | 14     | < 5    | < 5    | 15     | < 5    |
| Selenium (dissolved)        | ug/l     | < 5    | ISO17025      | < 5    | < 5    | < 5    | < 5    | < 5    |
| Vanadium (dissolved)        | ug/l     | < 5    | ISO17025      | < 5    | < 5    | 29     | 14     | < 5    |
| Zinc (dissolved)            | ug/l     | < 2    | ISO17025      | 22     | 20     | 16     | 14     | 16     |
| Total Phenols (monohydric)  | ug/l     | < 10   | NONE          | < 10   | < 10   | 19     | 44     | < 10   |

Subcontracted analysis <sup>SD</sup>  
Insufficient sample <sup>US</sup>  
Unsuitable Sample <sup>US</sup>



**DETS Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
**Lenham Heath**  
**Maidstone**  
**Kent ME17 2JN**  
**Tel : 01622 850410**

| Water Analysis Certificate - Speciated PAH                              |                 |               |               |               |               |               |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 20-02880                                                | Date Sampled    | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | BH1           | BH2           | BH3           | BH4           | BH5           |
| Project / Job Ref: GWPR3514                                             | Additional Refs | GW            | GW            | GW            | GW            | GW            |
| Order No: None Supplied                                                 | Depth (m)       | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Reporting Date: 10/03/2020                                              | DETS Sample No  | 466776        | 466777        | 466778        | 466779        | 466780        |

| Determinand            | Unit | RL     | Accreditation |         |         |         |         |         |
|------------------------|------|--------|---------------|---------|---------|---------|---------|---------|
| Naphthalene            | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.13    | < 0.01  | < 0.01  |
| Acenaphthylene         | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Acenaphthene           | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.08    | 0.45    | < 0.01  |
| Fluorene               | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.05    | 0.16    | < 0.01  |
| Phenanthrene           | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.09    | 0.45    | < 0.01  |
| Anthracene             | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.02    | 0.11    | < 0.01  |
| Fluoranthene           | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.05    | 0.19    | < 0.01  |
| Pyrene                 | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.03    | 0.12    | < 0.01  |
| Benzo(a)anthracene     | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | 0.01    | < 0.01  |
| Chrysene               | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | 0.02    | < 0.01  |
| Benzo(b)fluoranthene   | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Benzo(k)fluoranthene   | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Benzo(a)pyrene         | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Dibenz(a,h)anthracene  | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| Benzo(ghi)perylene     | ug/l | 0.008  | NONE          | < 0.008 | < 0.008 | < 0.008 | < 0.008 | < 0.008 |
| Total EPA-16 PAHs      | ug/l | < 0.01 | NONE          | < 0.01  | < 0.01  | 0.45    | 1.51    | < 0.01  |



**DETS Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
**Lenham Heath**  
**Maidstone**  
**Kent ME17 2JN**  
**Tel : 01622 850410**

| Water Analysis Certificate - TPH CWG Banded                                     |                        |               |               |               |               |               |
|---------------------------------------------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 20-02880</b>                                                 | <b>Date Sampled</b>    | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      |
| <b>Ground &amp; Water Ltd</b>                                                   | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Former Colt International,<br/>New Lane, Havant, PO9 2LZ</b> | <b>TP / BH No</b>      | BH1           | BH2           | BH3           | BH4           | BH5           |
| <b>Project / Job Ref: GWPR3514</b>                                              | <b>Additional Refs</b> | GW            | GW            | GW            | GW            | GW            |
| <b>Order No: None Supplied</b>                                                  | <b>Depth (m)</b>       | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Reporting Date: 10/03/2020</b>                                               | <b>DETS Sample No</b>  | 466776        | 466777        | 466778        | 466779        | 466780        |

| Determinand          | Unit | RL    | Accreditation |       |       |       |       |       |
|----------------------|------|-------|---------------|-------|-------|-------|-------|-------|
| Aliphatic >C5 - C6   | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C6 - C8   | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C8 - C10  | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C10 - C12 | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C12 - C16 | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C16 - C21 | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic >C21 - C34 | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aliphatic (C5 - C34) | ug/l | < 70  | NONE          | < 70  | < 70  | < 70  | < 70  | < 70  |
| Aromatic >C5 - C7    | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C7 - C8    | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C8 - C10   | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C10 - C12  | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C12 - C16  | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C16 - C21  | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic >C21 - C35  | ug/l | < 10  | NONE          | < 10  | < 10  | < 10  | < 10  | < 10  |
| Aromatic (C5 - C35)  | ug/l | < 70  | NONE          | < 70  | < 70  | < 70  | < 70  | < 70  |
| Total >C5 - C35      | ug/l | < 140 | NONE          | < 140 | < 140 | < 140 | < 140 | < 140 |



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| Water Analysis Certificate - BTEX / MTBE                                |                 |               |               |               |               |               |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 20-02880                                                | Date Sampled    | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      | 26/02/20      |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | BH1           | BH2           | BH3           | BH4           | BH5           |
| Project / Job Ref: GWPR3514                                             | Additional Refs | GW            | GW            | GW            | GW            | GW            |
| Order No: None Supplied                                                 | Depth (m)       | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Reporting Date: 10/03/2020                                              | DETS Sample No  | 466776        | 466777        | 466778        | 466779        | 466780        |

| Determinand  | Unit | RL   | Accreditation |      |      |      |      |      |
|--------------|------|------|---------------|------|------|------|------|------|
| Benzene      | ug/l | < 1  | ISO17025      | < 1  | < 1  | < 1  | < 1  | < 1  |
| Toluene      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  | < 5  | < 5  |
| Ethylbenzene | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  | < 5  | < 5  |
| p & m-xylene | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 | < 10 | < 10 |
| o-xylene     | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  | < 5  | < 5  |
| MTBE         | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 | < 10 | < 10 |



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# Water Analysis Certificate - Volatile Organic Compounds (VOC)

|                                                                         |                 |               |               |               |  |  |
|-------------------------------------------------------------------------|-----------------|---------------|---------------|---------------|--|--|
| DETS Report No: 20-02880                                                | Date Sampled    | 26/02/20      | 26/02/20      | 26/02/20      |  |  |
| Ground & Water Ltd                                                      | Time Sampled    | None Supplied | None Supplied | None Supplied |  |  |
| Site Reference: Former Colt International,<br>New Lane, Havant, PO9 2LZ | TP / BH No      | BH1           | BH4           | BH5           |  |  |
| Project / Job Ref: GWPR3514                                             | Additional Refs | GW            | GW            | GW            |  |  |
| Order No: None Supplied                                                 | Depth (m)       | None Supplied | None Supplied | None Supplied |  |  |
| Reporting Date: 10/03/2020                                              | DETS Sample No  | 466776        | 466779        | 466780        |  |  |

| Determinand                 | Unit | RL   | Accreditation |      |      |      |  |
|-----------------------------|------|------|---------------|------|------|------|--|
| Dichlorodifluoromethane     | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Vinyl Chloride              | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Chloromethane               | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Chloroethane                | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Bromomethane                | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Trichlorofluoromethane      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1-Dichloroethene          | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| MTBE                        | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| trans-1,2-Dichloroethene    | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1-Dichloroethane          | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| cis-1,2-Dichloroethene      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 2,2-Dichloropropane         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Chloroform                  | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Bromochloromethane          | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| 1,1,1-Trichloroethane       | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1-Dichloropropene         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Carbon Tetrachloride        | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,2-Dichloroethane          | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| Benzene                     | ug/l | < 1  | ISO17025      | < 1  | < 1  | < 1  |  |
| 1,2-Dichloropropane         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Trichloroethene             | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Bromodichloromethane        | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Dibromomethane              | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| TAME                        | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| cis-1,3-Dichloropropene     | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Toluene                     | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| trans-1,3-Dichloropropene   | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1,2-Trichloroethane       | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| 1,3-Dichloropropane         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Tetrachloroethene           | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Dibromochloromethane        | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,2-Dibromoethane           | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Chlorobenzene               | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1,1,2-Tetrachloroethane   | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Ethyl Benzene               | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| m,p-Xylene                  | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| o-Xylene                    | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Styrene                     | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Bromoform                   | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| Isopropylbenzene            | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,1,2,2-Tetrachloroethane   | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| 1,2,3-Trichloropropane      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| n-Propylbenzene             | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| Bromobenzene                | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 2-Chlorotoluene             | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,3,5-Trimethylbenzene      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 4-Chlorotoluene             | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| tert-Butylbenzene           | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,2,4-Trimethylbenzene      | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| sec-Butylbenzene            | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| p-Isopropyltoluene          | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,3-Dichlorobenzene         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,4-Dichlorobenzene         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| n-Butylbenzene              | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,2-Dichlorobenzene         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |
| 1,2-Dibromo-3-chloropropane | ug/l | < 10 | ISO17025      | < 10 | < 10 | < 10 |  |
| Hexachlorobutadiene         | ug/l | < 5  | ISO17025      | < 5  | < 5  | < 5  |  |



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| Water Analysis Certificate - Methodology & Miscellaneous Information |                                                      |
|----------------------------------------------------------------------|------------------------------------------------------|
| DETS Report No:                                                      | 20-02880                                             |
| Ground & Water Ltd                                                   |                                                      |
| Site Reference:                                                      | Former Colt International, New Lane, Havant, PO9 2LZ |
| Project / Job Ref:                                                   | GWPR3514                                             |
| Order No:                                                            | None Supplied                                        |
| Reporting Date:                                                      | 10/03/2020                                           |

| Matrix   | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                    | Method No |
|----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Water    | UF          | Alkalinity                                                                                                                                      | Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point                                 | E103      |
| Water    | UF          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                    | E101      |
| Water    | F           | Cations                                                                                                                                         | Determination of cations by filtration followed by ICP-MS                                                                                   | E102      |
| Water    | UF          | Chemical Oxygen Demand (COD)                                                                                                                    | Determination using a COD reactor followed by colorimetry                                                                                   | E112      |
| Water    | F           | Chloride                                                                                                                                        | Determination of chloride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by                                        | E116      |
| Water    | UF          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                    | E115      |
| Water    | UF          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                       | E115      |
| Water    | UF          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                      | E115      |
| Water    | UF          | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through liquid:liquid extraction with cyclohexane                                                                | E111      |
| Water    | F           | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | Dissolved Organic Content (DOC)                                                                                                                 | Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection                                  | E110      |
| Water    | UF          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by electrometric measurement                                                                       | E123      |
| Water    | F           | EPH (C10 - C40)                                                                                                                                 | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                         | E104      |
| Water    | F           | Fluoride                                                                                                                                        | Determination of Fluoride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Hardness                                                                                                                                        | Determination of Ca and Mg by ICP-MS followed by calculation                                                                                | E102      |
| Leachate | F           | Leachate Preparation - NRA                                                                                                                      | Based on National Rivers Authority leaching test 1994                                                                                       | E301      |
| Leachate | F           | Leachate Preparation - WAC                                                                                                                      | Based on BS EN 12457 Pt1, 2, 3                                                                                                              | E302      |
| Water    | F           | Metals                                                                                                                                          | Determination of metals by filtration followed by ICP-MS                                                                                    | E102      |
| Water    | F           | Mineral Oil (C10 - C40)                                                                                                                         | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | Nitrate                                                                                                                                         | Determination of nitrate by filtration & analysed by ion chromatography                                                                     | E109      |
| Water    | UF          | Monohydric Phenol                                                                                                                               | Determination of phenols by distillation followed by colorimetry                                                                            | E121      |
| Water    | F           | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E105      |
| Water    | F           | PCB - 7 Congeners                                                                                                                               | Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E108      |
| Water    | UF          | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through liquid:liquid extraction with petroleum ether                                                            | E111      |
| Water    | UF          | pH                                                                                                                                              | Determination of pH by electrometric measurement                                                                                            | E107      |
| Water    | F           | Phosphate                                                                                                                                       | Determination of phosphate by filtration & analysed by ion chromatography                                                                   | E109      |
| Water    | UF          | Redox Potential                                                                                                                                 | Determination of redox potential by electrometric measurement                                                                               | E113      |
| Water    | F           | Sulphate (as SO4)                                                                                                                               | Determination of sulphate by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | UF          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                           | E118      |
| Water    | F           | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS    | E106      |
| Water    | UF          | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through liquid:liquid extraction with toluene                                                                    | E111      |
| Water    | UF          | Total Organic Carbon (TOC)                                                                                                                      | Low heat with persulphate addition followed by IR detection                                                                                 | E110      |
| Water    | F           | TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)          | Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS | E104      |
| Water    | F           | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS | E104      |
| Water    | UF          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                              | E101      |
| Water    | UF          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                   | E101      |

Key

**F Filtered**  
**UF Unfiltered**