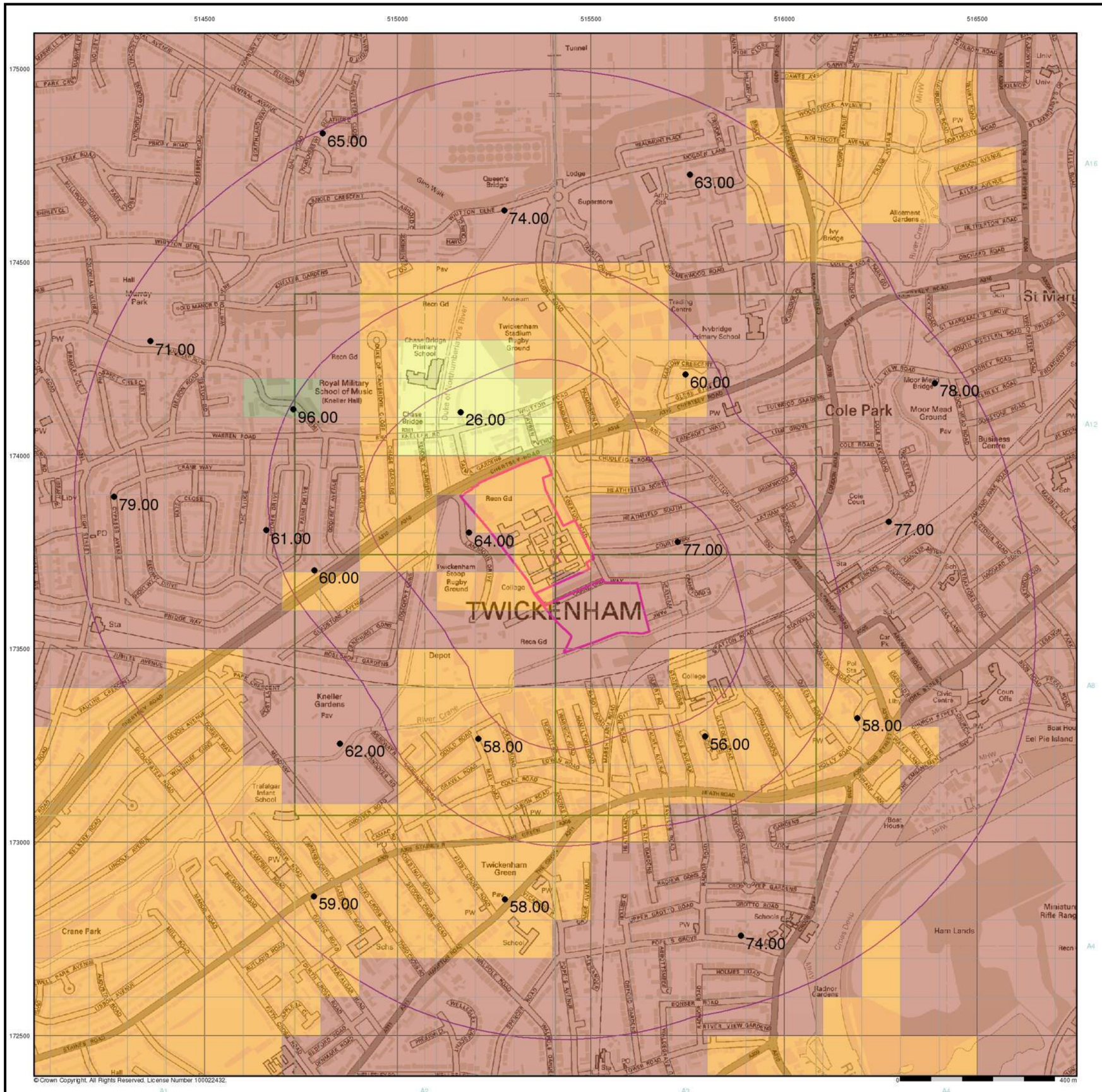



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## General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

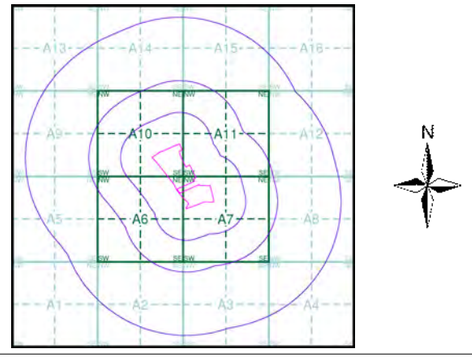
## Urban Soil Chemistry Chromium

● BGS Urban Soil Chemistry Measured Concentration Values (mg/kg)

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

## Urban Soil Chemistry Chromium - Slice A



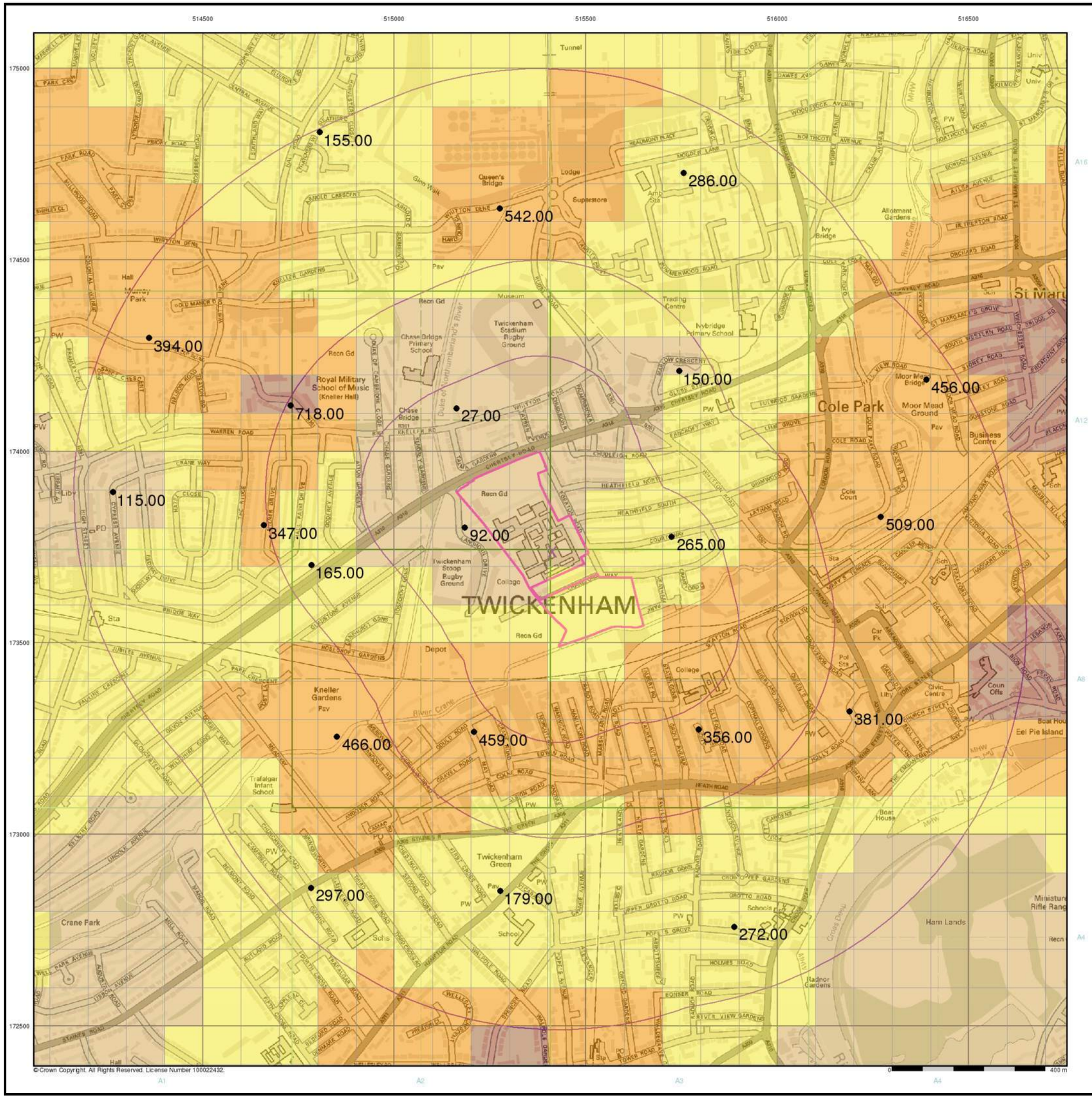

## Order Details

| | |
|---|---|
| Order Details: | 72837622_1_1 |
| Customer Ref: | STM3361D |
| National Grid Reference: | 515410, 173740 |
| Slice: | A |
| Site Area (Ha) | 9.08 |
| Search Buffer (m) | 1000 |

## Site Details

Richmond Upon Thames College

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





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## General

Specified Site  Specified Buffer(s)  X Bearing Reference Point

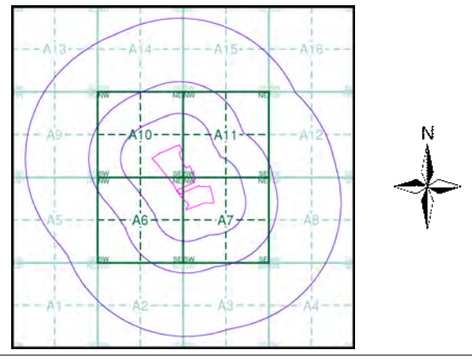
## Urban Soil Chemistry Lead

● BGS Urban Soil Chemistry Measured Concentration Values (mg/kg)

Lead Concentrations mg/kg

- < 150
- 150 - 300
- 300 - 600
- 600 - 900
- > 900

## Urban Soil Chemistry Lead - Slice A




## Order Details

| | |
|---|---|
| Order Details: | 72837622_1_1 |
| Customer Ref: | STM3361D |
| National Grid Reference: | 515410, 173740 |
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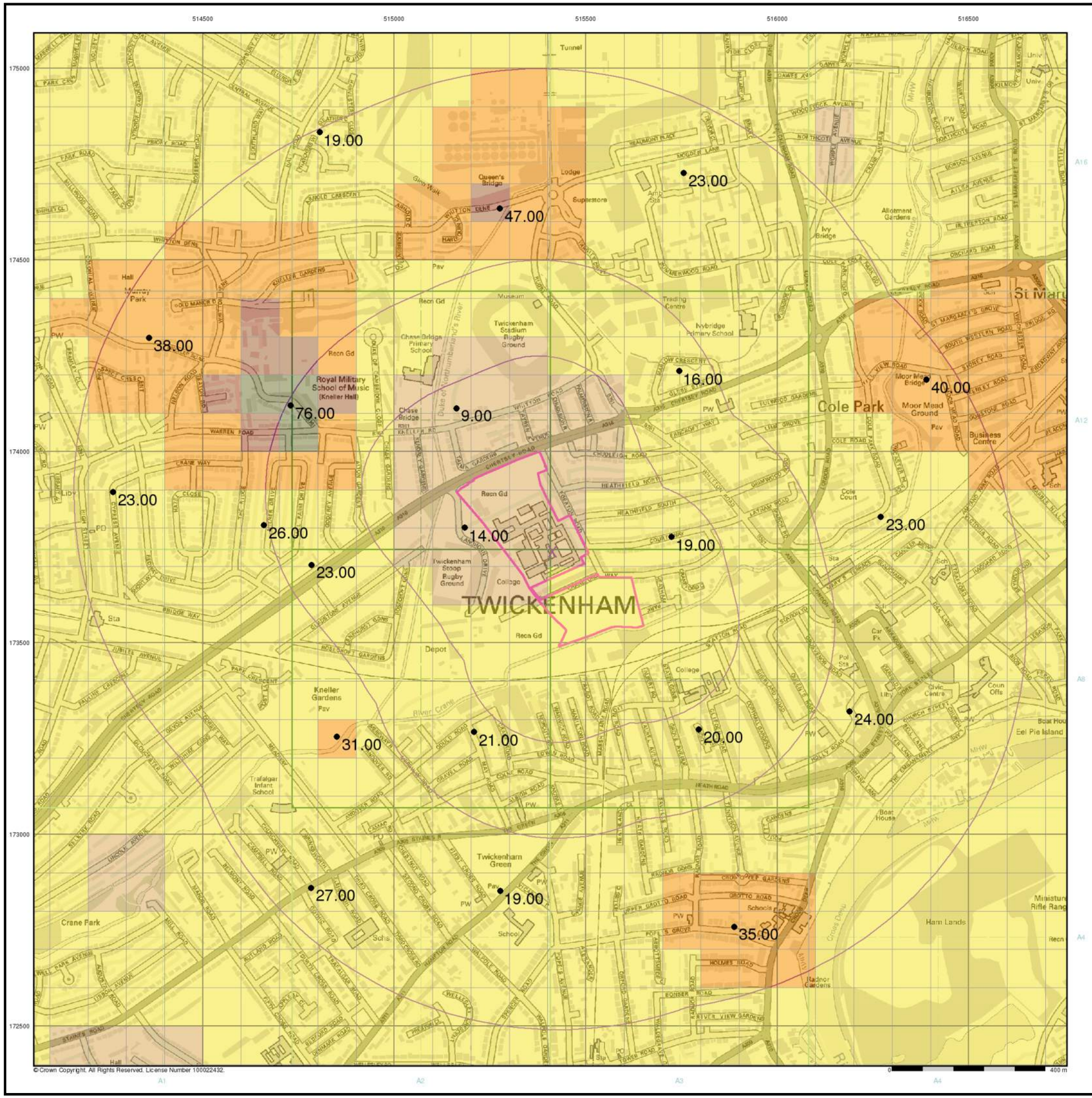


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## General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

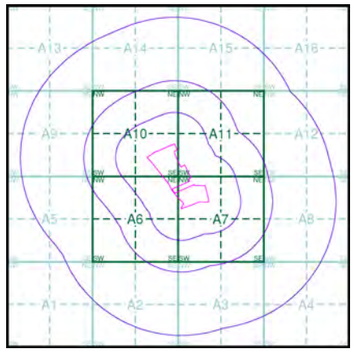
## Urban Soil Chemistry Nickel

● BGS Urban Soil Chemistry Measured Concentration Values (mg/kg)

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

## Urban Soil Chemistry Nickel - Slice A




## Order Details

| | |
|---|---|
| Order Details: | 72837622_1_1 |
| Customer Ref: | STM3361D |
| National Grid Reference: | 515410, 173740 |
| Slice: | A |
| Site Area (Ha) | 9.08 |
| Search Buffer (m) | 1000 |

## Site Details

Richmond Upon Thames College

Landmark Information Group
Tel: 0844 844 9952
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Mr D. Porter
Fusion PM

Via email:
DPorter@Fusionpm.co.uk

Date: 01.02.2016
Your Ref:
Our Ref: L-STM3361D-003

Dear Dan

**Re: Ground Investigation at Richmond Upon Thames College**

## Background

Further to our recent investigation at Richmond College, we are pleased to provide the following contamination assessment. This investigation follows recommendations outlined within our ground investigation (report ref: STM3361D-G01, dated November 2015). This investigation was undertaken in December 2015 and reported in February 2015, acting on instructions received from Fusion PM on behalf of our mutual Client Richmond upon Thames College. This report and its contents remains the property of Soiltechnics Limited until payment in full of our invoices in connection with production of this report.

The purpose of this investigation was to further define the extent of previously identified contamination (leachable organics, leachable PAHs and total PAHs). Based on the further testing and definition of the extent of such contamination, an updated remediation strategy could be derived as necessary.

## Fieldwork

Fieldwork was undertaken on 22nd December and comprised the formation of 18 hand dug trial pits to a maximum depth of 0.7m within proposed garden, public open space and school soft landscaping areas. A plan showing the hand pit locations is appended. Our investigatory locations were limited to areas outside the footprint of existing buildings as the investigation took place pre-demolition. Trial pits were logged by a geo-environmental engineer. Samples were taken as the excavation progressed and stored in sealable plastic tubs. Upon completion, all pits were backfilled with arisings and compacted using hand held ramming tools. Surfaces were reinstated to match surroundings.

## Ground conditions encountered

During our investigation, we encountered Made Ground overlying Kempton Park Gravel Formation, consistent with conditions encountered in previous investigations. **Made Ground** generally comprised dark brown sand with varying proportions of clay and gravel. Where encountered, gravel comprised a combination of sandstone, quartzite, slag, brick, crushed concrete, igneous rock, pottery, plastic and wire. **Kempton Park Gravel Formation** was encountered below the Made Ground in some locations, typically below circa 0.5-0.6m depth. Where encountered, Kempton Park Gravel comprised light and orange brown gravelly sand and clay. Gravels consisted of flint, sandstone and quartzite.

No groundwater was encountered within any trial pit location; which extended to a maximum depth of 0.7m. Fieldwork records are appended, providing full details of each exploratory location.

## Laboratory testing

20 samples were obtained from the 18 exploratory locations and all were scheduled for the following testing:

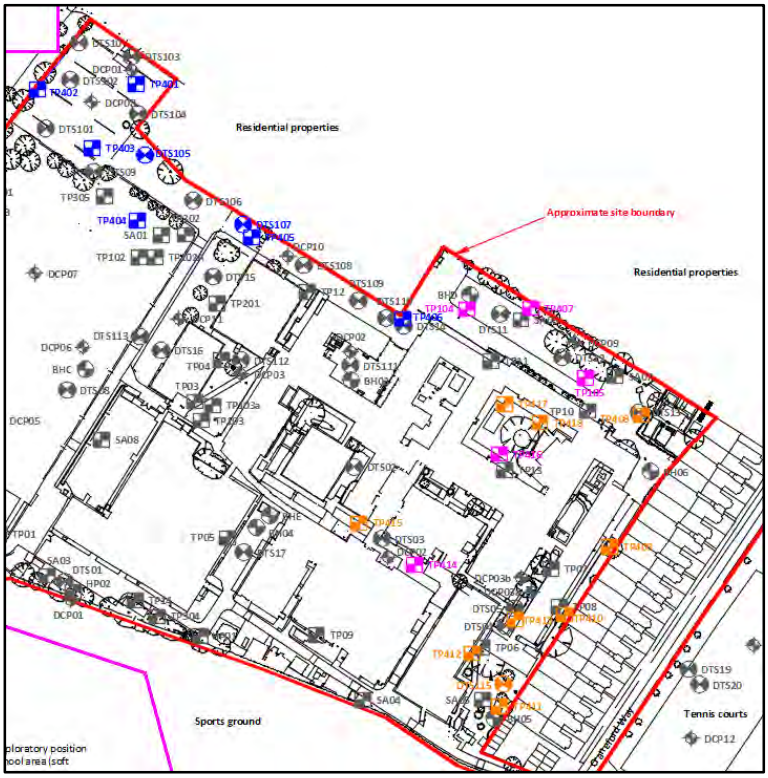
- Determination of leachable concentration of commonly occurring organic contaminants, using inductively coupled plasma mass spectrometry (ICP-MS)
- Determination of total concentration and leachable concentration of polycyclic aromatic hydrocarbons (PAH), using gas chromatography flame ionisation detection methods (GC–FID)

Testing was undertaken by an independent, specialist laboratory which is accredited under the MCERTS accreditation scheme. Results certificates are appended. The following samples of Made Ground were tested as outlined above:

| | | | |
|---|---|---|---|
| TP401 – 0.5m | TP406 – 0.3m | TP410 – 0.5m | TP415 – 0.5m |
| TP402 – 0.6m | TP406 – 0.5m | TP411 – 0.5m | TP416 – 0.3m |
| TP403 – 0.5m | TP407 – 0.4m | TP412 – 0.3m | TP417 – 0.45m |
| TP404 – 0.6m | TP408 – 0.5m | TP413 – 0.3m | TP418 – 0.2m |
| TP405 – 0.5m | TP409 – 0.2m | TP414 – 0.5m | TP418 – 0.5m |

## Contamination assessment

In order to define the extent of the identified contamination, the site has been divided into three areas, according to their proposed end use. All areas below proposed buildings, roadways or hardstandings have been discounted for this investigation. A plan showing the location of the tested locations is appended however an extract, with reference to existing site features is included below for ease of reference:



The following table summarises the division of tested areas:

| Table summarising test area division | | | | |
|---|---|---|---|---|
| **Proposed end use** | **Test locations used in analysis** | **Colour on plan** | **Contamination tables** | **Adopted guideline values for total PAH levels** |
| **School** (soft landscaped areas) | TP401, TP402, TP403, TP404, TP405, TP406 | Blue | 101 and 104 | LQM S4UL 6% SOM residential (no plant uptake) and site specifically derived CLEA model values |
| **Residential** (Public open space) | TP407, TP414, TP416, TP104, TP105 | Pink | 102 and 105 | LQM S4UL 6% SOM public open space |
| **Residential** (garden areas) | TP408, TP409, TP410, TP411, TP412, TP413, TP415, TP417, TP418, DTS115 | Orange | 103 and 106 | LQM S4UL 6% SOM residential (with plant uptake) |
| **Table 1** | | | | |

**A. Human end users**

Where they exist, we have adopted the LQM (Land Quality Management) derived S4UL (Suitable for Use Level) values for total PAH test interpretation as an initial screening value. The average SOM (Soil Organic Matter) within soils tested was calculated at 6.7%, therefore we have utilised the 6% guideline values (as the average was in excess of the 6% marker). The model adopted for each area of the site is outlined above. Where required and appropriate, we have derived site specific values, which are discussed in the following sections as and where necessary.

We have followed procedures outlined by the CIEH to compare measured concentrations of PAH contaminants against guideline values. The guidance presents an approach to data analysis and includes the examination of data for potential outliers, assessment of the normality of the test data and the calculation of a 95% Upper Confidence Limit (UCL). The UCL provides an estimate of the population mean, based on test data, with a 95% confidence that the actual mean does not exceed this value. The UCL is compared to the guideline value for the site.

**School (soft landscaped areas)**

The following assessment is with reference to Table 103. As an initial screen for the soft landscaped area of the school site (coloured blue), we have adopted S4UL values derived for residential end use with no plant uptake. The generic values are considered a worst case scenario. Where the measured values exceeded the cautious S4UL values, we have derived site specific values to account for actual time likely to be spent on site and likely age ranges of end users. Where necessary, the CLEA model parameters have been altered to 190 days present at the site (accounting for 14 weeks off school per year and assuming a 5 day week). The age classes considered are 4-12, due to the nature of the site (a primary school). We have assumed 6 hours inside and 2 hours outside every day that the receptors are present at the site. The appended spreadsheets are marked accordingly where either S4UL values or site specific guideline values have been determined using the CLEA model parameters described above.

When the measured values and the UCL values are compared to the relevant guideline values described above, none of the results exceed the adopted guideline levels. A such, we consider the soils in proposed soft landscaping areas of the school to not pose a significant risk to the proposed end users' health and therefore, no remediation is considered necessary in these areas.

**Residential (public open space)**

The following assessment is with reference to Tale 104. We have adopted S4UL public open space guideline values for the areas of public open space within the proposed residential area of the redevelopment (coloured pink). All of the measured results and UCL values are below the guideline values for each contaminant. Based on this, no remediation is recommended for the proposed public open space areas of the residential portion of the site.

**Residential (garden areas)**

The following assessment is with reference to table 105. We have adopted the S4UL residential with plant uptake model for all productive garden areas of the proposed residential development. As the model accounts for the likely age/ duration parameters, we are unable to derive a site specific model using the CLEA software which would be any more accurate. When compared to the guideline values, the majority of the measured and UCL values are well within the limits, with the exception of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and pyrene. All of these contaminants produced at least one elevated result. When the mean of all tested locations was calculated, both dibenzo(a,h)anthracene and pyrene both produced mean results greater than the guideline value.

In order to identify any particular hotspots of contamination, we have analysed location of individual test results which exceeded the guideline values. Whilst TP417 is consistently high, elevated results are also present in TP408, TP409 and TP411-413 inclusive. As such, we cannot identify any single localised area of contamination and therefore recommend that any productive garden space is remediated to make the area fit for proposed purpose.

We recommend that in proposed garden areas, an imported capping layer (cover system) of chemically 'clean' soils will be introduced to sever the pathway between contaminants and end-users, thus minimising the risk of human contact with soils containing contaminants which have the potential to cause harm to human health. The capping layer will be agreed with the Local Authority prior to implementation. We recommend a minimum of 600mm thick in any productive rear garden areas which may be reduced to 300mm in front garden areas.

Following installation of the cover system described above, the capping thickness will require independent measurement to validate the correct thicknesses have been provided in garden areas.

**B. Leachable Contamination impacting water receptors**

We have undertaken testing of the leachable concentration of 18 samples of Made Ground. Samples were taken from across the site and for the purpose of analysis are divided into discrete zones of proposed ownerships. The zones comprise proposed school area (blue area) and proposed residential area (combined pink and orange areas).

**Proposed school**

With reference to Table 101, the leachable concentration of commonly occurring organic and inorganic contaminants have been compared to the guideline values. All tested contaminants were below the guideline values, with the exception of one elevated zinc result in one location (TP402). The average of the seven results is 151µg/l which is well below the guideline value of 500µg/l. On this basis, we do not consider the soils within proposed soft landscaped areas at the school to pose a significant risk to water receptors.

The above assessment is in relation to areas of proposed soft landscaping only. It should be noted that leachable contamination encountered in our previous ground investigation report indicates that areas under proposed permeable paving exhibit elevated contamination, considered to pose a risk to groundwater. We therefore recommend that all the Made Ground is removed from below the proposed permeable paving (as discussed in our ground investigation report).

**Proposed residential area**

With reference to Table 102 (appended) all tested contaminants were below the guideline values, with the exception of three elevated copper results in three locations (TP407, TP104 and TP418). The average value of the 14 results is 15µg/l which is well below the guideline value of 28µg/l. On this basis, we do not consider the soils within proposed public open space/ garden areas to pose a significant risk to water receptors.

We trust that the above and the attached provide the information you require. Should require any additional information, please do not hesitate to contact us.

Yours sincerely

Charlotte Murray B.Sc, (Hons) FGS
Geo-environmental Engineer for Soiltechnics Limited

Reviewed by:

Sarah Drage B.Sc, (Hons)
Senior geo-environmental Engineer, Soiltechnics Limited

**Encs:**
Fieldwork records for TP401-418
Laboratory test results certificates
Contamination analysis tables 101-105

Drawing 01- Plan showing existing site layout and zoned location of exploratory trial pits
Drawing 02- Plan showing proposed site layout and zoned location of exploratory trial pits

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## Key to legends

### Composite materials, soils and lithology

| | | |
|---|---|---|
| Topsoil | Made Ground | Boulders |
| Chalk | Clay | Coal |
| Cobbles | Cobbles & Boulders | Concrete |
| Gravel | Limestone | Mudstone |
| Peat | Sand | Sand and Gravel |
| Sandstone | Silt | Silt / Clay |
| | | Siltstone |

*Note: Composite soil types are signified by combined symbols.*

## Key to 'test results' and 'sampling' columns

| Test result | |
|---|---|
| Depth | Records depth that the test was carried out (i.e.: at 2.10m or between 2.10m and 2.55m) |
| Result | PID - Photo Ionisation Detector result (ppm equivalent Isobutylene)<br><br>PP – Pocket penetrometer result ($kN/m^2$)<br>HVP – Hand held shear vane result ($kN/m^2$)<br><br>*PP result converted to an equivalent undrained shear strength by applying a factor of 50. Where at least 3 results obtained at same depth then an average value may be reported.* |

| Sampling | | |
|---|---|---|
| From (m)<br>To (m) | Records depth of sampling | |
| Type | D | Disturbed sample |
| | B | Bulk disturbed sample |
| | ES | Environmental sample comprising plastic and/or glass container |
| | W | Water sample |
| | CBR | Undisturbed sample in mould (California Bearing Ratio) |

## Water observations

Described at foot of log and shown in the 'water strike' column.

▼ = water level observed after specified delay in excavation

▽ = water strike

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Black BITUMINOUS BOUND MATERIAL. | | 0.07 | | | | | | |
| MADE GROUND | | | | | | | | |
| Medium dense light brown slightly clayey very gravelly medium SAND. Gravel consists of brick, crushed concrete, slag and sandstone. | | | | | | | | |
| MADE GROUND | | | | | | 0.50 | | ES |
| TRIAL PIT TERMINATED AT 0.60m | | 0.60 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
Yes

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.15m x 0.15m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP401**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Loose dark brown very clayey slightly gravelly fine SAND with frequent rootlets. Gravel consists of sub-rounded to rounded quartzite and flint. MADE GROUND | | 0.20 | | | | | | |
| Loose to medium dense light brown slightly gravelly fine SAND with frequent rootlets. Gravel consists of sub-rounded to rounded quartzite and flint. KEMPTON PARK GRAVEL FORMATION | | | | | | 0.60 | | ES |
| TRIAL PIT TERMINATED AT 0.65m | | 0.65 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP402**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Black BITUMINOUS BOUND MATERIAL. MADE GROUND | | 0.05 | | | | | | |
| Medium dense light brown slightly clayey very gravelly medium SAND. Gravel consists of brick, crushed concrete, slag, sandstone, wire and plastic. MADE GROUND | | | | | | 0.50 | | ES |
| *...from 0.2m depth, becoming very dark grey/black with organic odour.* | | | | | | | | |
| *...from 0.35m depth, becoming fine grained sand.* | | | | | | | | |
| Medium dense very dark grey and orange brown silty very clayey fine SAND with occasional gravels of sub-rounded to rounded flint. KEMPTON PARK GRAVEL FORMATION | | 0.55 | | | | | | |
| TRIAL PIT TERMINATED AT 0.65m | | 0.65 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
Yes

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.20m x 0.20m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP403**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto medium dense dark brown slightly gravelly very clayey fine to medium SAND with many rootlets. Gravel consists of brick and sub-rounded to rounded flint.<br>MADE GROUND | | | | | | | | |
| | | 0.35 | | | | | | |
| Medium dense very dark brown to grey clayey very gravelly fine to medium SAND. Gravel consists of pottery, brick ash and metal.<br>MADE GROUND | | | | | | 0.60 | | ES |
| | | 0.65 | | | | | | |
| TRIAL PIT TERMINATED AT 0.65m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP404**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Loose to medium dense dark grey slightly sandy clayey GRAVEL. Gravel consists of sub-angular to angular igneous rock, brick, quartzite and flint.<br>MADE GROUND | | | | | | | | |
| | | 0.30 | | | | | | |
| Very soft dark brown slightly gravelly very silty sandy CLAY. Gravel consists of sub-rounded to rounded quartzite and flint.<br>KEMPTON PARK GRAVEL FORMATION | | | | | | 0.50 | | ES |
| | | 0.60 | | | | | | |
| TRIAL PIT TERMINATED AT 0.60m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP405**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Black BITUMINOUS BOUND MATERIAL. | | | | | | | | |
| MADE GROUND | | 0.10 | | | | | | |
| Medium dense to dense black very sandy GRAVEL. Gravel consists of bituminous coated material, igneous rock and brick. | | | | | | | | |
| MADE GROUND | | 0.25 | | | | 0.30 | | ES |
| Medium dense to dense light brown clayey very sandy GRAVEL. Gravel consists of brick and sandstone. | | | | | | | | |
| MADE GROUND | | 0.40 | | | | 0.50 | | ES |
| Very soft dark grey gravelly very silty CLAY. Gravel consists of brick. | | | | | | | | |
| MADE GROUND | | 0.60 | | | | | | |
| Medium dense very dark grey and orange brown silty very clayey fine SAND with occasional gravels of sub-rounded to rounded flint. | | 0.70 | | | | | | |
| KEMPTON PARK GRAVEL FORMATION | | | | | | | | |
| TRIAL PIT TERMINATED AT 0.70m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
Yes

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP406**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Medium dense dark brown silty gravelly very clayey fine SAND. Gravel consists of sub-rounded to rounded flint, pottery and brick. MADE GROUND | | | | | | | | |
| *...from 0.3m depth, becoming light brown.* | | | | | | 0.40 | | ES |
| TRIAL PIT TERMINATED AT 0.55m | | 0.55 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP407**

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| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Black BITUMINOUS BOUND MATERIAL. | | | | | | | | |
| MADE GROUND | | 0.05 | | | | | | |
| Black/grey slightly sandy GRAVEL. Gravel consists of bituminous coated material, igneous rock and brick. Fabric membrane present at 0.25m depth. | | | | | | | | |
| MADE GROUND | | 0.25 | | | | | | |
| Loose light brown gravelly very clayey medium to coarse SAND. | | | | | | | | |
| KEMPTON PARK GRAVEL FORMATION | | 0.45 | | | | 0.50 | | ES |
| Medium dense light brown silty slightly clayey very gravelly fine SAND. Gravel consists of sub-rounded to rounded quartzite and flint. | | | | | | | | |
| KEMPTON PARK GRAVEL FORMATION | | 0.65 | | | | | | |
| TRIAL PIT TERMINATED AT 0.65m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
Yes

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP408**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose dark brown gravelly very clayey fine to medium SAND with frequent rootlets. Gravel consists of pottery, quartzite and flint.<br>MADE GROUND | | | | | | 0.20 | | ES |
| Medium dense orange brown silty very clayey fine SAND with frequent rootlets.<br>KEMPTON PARK GRAVEL FORMATION | | 0.50 | | | | | | |
| TRIAL PIT TERMINATED AT 0.70m | | 0.70 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP409**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose dark brown gravelly very clayey fine to medium SAND with frequent rootlets. Gravel consists of pottery, quartzite and flint. MADE GROUND | | | | | | | | |
| | | 0.30 | | | | | | |
| Loose orange brown slightly gravelly very clayey fine to medium SAND. Gravel consists of sub-angular to sub-rounded flint and brick fragments. MADE GROUND | | | | | | 0.50 | | ES |
| | | 0.60 | | | | | | |
| Medium dense orange brown silty very clayey fine SAND with frequent rootlets. KEMPTON PARK GRAVEL FORMATION | | 0.70 | | | | | | |
| TRIAL PIT TERMINATED AT 0.70m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.20m x 0.20m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP410**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose dark brown gravelly very clayey fine to medium SAND with frequent rootlets. Gravel consists of brick, quartzite and flint. MADE GROUND | | 0.20 | | | | | | |
| Medium dense orange brown gravelly very clayey fine to medium SAND with roots up to 20mm in diameter. Gravel consists of brick, pottery, sub-rounded to rounded quartzite, flint and crushed concrete. MADE GROUND | | | | | | 0.50 | | ES |
| Medium dense orange brown silty very clayey fine SAND with frequent rootlets. KEMPTON PARK GRAVEL FORMATION | | 0.60 | | | | | | |
| TRIAL PIT TERMINATED AT 0.65m | | 0.65 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.50m x 0.50m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP411**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| PAVING SLAB. | | 0.04 | | | | | | |
| MADE GROUND | | | | | | | | |
| Loose orange and red brown SAND and GRAVEL. Gravel consists of igneous rock. | | 0.25 | | | | | | |
| MADE GROUND | | | | | | 0.30 | | ES |
| Medium dense orange brown gravelly very clayey medium SAND. Gravel consists of sub-angular to angular flint, brick and quartzite. | | | | | | | | |
| MADE GROUND | | 0.50 | | | | | | |
| Light grey rounded GRAVEL of quartzite. | | 0.55 | | | | | | |
| MADE GROUND (PEA GRAVEL) | | | | | | | | |
| TRIAL PIT TERMINATED AT 0.55m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion. Trial pit terminated due to potential presence of buried service indicated by pea gravel.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.25m x 0.25m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP412**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose medium dense brown gravelly very clayey fine to medium SAND with frequent rootlets. Gravel consists of brick, sub-rounded to rounded quartzite and chalk.<br>MADE GROUND | | | | | | 0.30 | | ES |
| TRIAL PIT TERMINATED AT 0.50m | | 0.50 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion. Trial pit terminated due to concrete obstruction in base likely associated with adjacent soak away chamber.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP413**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Black BITUMINOUS BOUND MATERIAL. | | | | | | | | |
| MADE GROUND | | 0.05 | | | | | | |
| Medium dense light cream SAND and GRAVEL. Sand is coarse. Gravel consists of sandstone and igneous rock. | | | | | | | | |
| MADE GROUND | | 0.25 | | | | | | |
| Very soft very low strength dark brown slightly gravelly very silty CLAY. Gravel consists of sub-rounded to rounded flint. | | | | PP 0.40 | 13 | 0.40 | | ES |
| KEMPTON PARK GRAVEL FORMATION | | 0.50 | | | | | | |
| Very soft very low strength orange brown slightly gravelly very silty CLAY. Gravel consists of sub-angular flint. | | | | PP 0.55 | 13 | | | |
| KEMPTON PARK GRAVEL FORMATION | | 0.60 | | | | | | |
| TRIAL PIT TERMINATED AT 0.60m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
Yes

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP414**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Gravel surfacing onto very soft very dark brown gravelly very sandy CLAY with gravel sized pockets of ash. Gravel consists of sub-rounded to rounded quartzite and occasional brick. MADE GROUND | | | | | | 0.25 | | ES |
| | | 0.30 | | | | | | |
| Medium dense orange brown gravelly very clayey medium to coarse SAND. Gravel consists of sub-rounded to rounded quartzite. MADE GROUND | | | | | | | | |
| | | 0.45 | | | | | | |
| Very soft dark orange brown gravelly very sandy CLAY. Gravel consists of sub-rounded to sub-angular flint. KEMPTON PARK GRAVEL FORMATION | | | | | | | | |
| | | 0.60 | | | | | | |
| TRIAL PIT TERMINATED AT 0.60m | | | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
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**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP415**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose to medium dense light brown slightly gravelly very clayey SAND with occasional rootlets. Gravel consists of brick and sub-rounded to rounded quartzite and flint. MADE GROUND | | | | | | 0.30 | | ES |
| Very soft light orange brown gravelly very sandy CLAY. Gravel consists of sub-rounded to rounded quartzite and brick. MADE GROUND | | 0.45 | | | | | | |
| TRIAL PIT TERMINATED AT 0.60m | | 0.60 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.25m x 0.25m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
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**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP416**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose to medium dense light brown slightly gravelly very clayey SAND with occasional rootlets. Gravel consists of brick and sub-rounded to rounded quartzite and flint.<br>MADE GROUND | | 0.30 | | | | | | |
| Medium dense clayey very gravelly medium SAND. Gravel consists of igneous rock, ash, slag, flint, quartzite and brick.<br>MADE GROUND | | | | | | 0.45 | | ES |
| TRIAL PIT TERMINATED AT 0.65m | | 0.65 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.30m x 0.30m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP417**

soiltechnics
environmental and geotechnical consultants

| DESCRIPTION | LEGEND | DEPTH (m) | WATER STRIKE | TEST RESULTS | | SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| | | | | TYPE/ DEPTH (m) | RESULT | FROM (m) | TO (m) | TYPE |
| Grass onto loose to medium dense light brown slightly gravelly very clayey SAND with occasional rootlets. Gravel consists of brick and sub-rounded to rounded quartzite and flint. MADE GROUND | | | | | | 0.20 | | ES |
| | | 0.25 | | | | | | |
| Very soft light orange brown gravelly very sandy CLAY. Gravel consists of sub-rounded to rounded quartzite, sandstone and brick. MADE GROUND | | | | | | 0.50 | | ES |
| TRIAL PIT TERMINATED AT 0.60m | | 0.60 | | | | | | |

**Notes:** Trial pit sides remained upright and stable upon completion.

**Ground level (mAOD)**

**Co-ordinates**

**Title**
Trial pit record

**Surface breaking**
No

**Groundwater observations**
No groundwater encountered.

**Dimensions (W x L)**
0.40m x 0.40m

**Date of excavation (range if applicable)**
22/12/2015

**Appendix**
-

**Method of excavation**
Hand tools

**Location plan on drawing number**
02

**TP418**

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

# Final Report

| | |
|---|---|
| **Report No.:** | 15-30143-1 |
| **Initial Date of Issue:** | 08-Jan-2016 |
| **Client** | Soiltechnics Limited |
| **Client Address:** | Cedar Barn<br>White Lodge<br>Walgrave<br>Northampton<br>Northamptonshire<br>NN6 9PY |
| **Contact(s):** | Rachel Brown<br>Sara Bertholdson |
| **Project** | STM3361D - Richmond Upon Thames, Richmond, London |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 23-Dec-2015 |
| **Order No.:** | 20628 | **Date Instructed:** | 23-Dec-2015 |
| **No. of Samples:** | 20 | **Target Date:** | 08-Jan-2016 |
| **Turnaround (Wkdays):** | 11 | **Results Due:** | 08-Jan-2016 |
| **Date Approved:** | 08-Jan-2016 | | |

**Approved By:**

**Details:** Keith Jones, Technical Manager

Chemtest
The right chemistry to deliver results

# Results - Leachate

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| Client: Soiltechnics Limited | | | | | Chemtest Job No.: | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quotation No.: | | | | | Chemtest Sample ID.: | 236798 | 236799 | 236800 | 236801 | 236802 | 236803 | 236804 | 236805 | 236806 |
| Order No.: 20628 | | | | | Client Sample Ref.: | TP401 | TP402 | TP403 | TP404 | TP405 | TP406 | TP406 | TP407 | TP408 |
| | | | | | Client Sample ID.: | 5-001 | 5-002 | 5-003 | 5-004 | 5-005 | 5-006 | 5-007 | 5-008 | 5-009 |
| | | | | | Sample Type: | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | | | Top Depth (m): | 0.50 | 0.60 | 0.50 | 0.60 | 0.50 | 0.30 | 0.50 | 0.40 | 0.50 |
| | | | | | Date Sampled: | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | | | | | | | | |
| pH | U | 1010 | | N/A | | 9.6 | 6.3 | 7.9 | 7.4 | 7.6 | 8.9 | 7.6 | 7.0 | 8.6 |
| Nitrate | U | 1220 | mg/l | 0.50 | | 0.90 | 6.1 | 9.6 | 1.8 | 5.6 | < 0.50 | < 0.50 | 1.1 | < 0.50 |
| Sulphate | U | 1220 | mg/l | 1.0 | | 12 | 10 | 81 | 18 | < 1.0 | 2.8 | 44 | 8.0 | 6.4 |
| Cyanide (Total) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Cyanide (Free) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Cyanide (Complex) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Sulphide | U | 1325 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Arsenic (Dissolved) | U | 1450 | µg/l | 1.0 | | 15 | 6.9 | 3.1 | 6.2 | 4.4 | 5.2 | 9.6 | 6.6 | 8.8 |
| Boron (Dissolved) | U | 1450 | µg/l | 20 | | < 20 | 50 | 80 | 48 | 85 | < 20 | 120 | 41 | 37 |
| Beryllium (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Cadmium (Dissolved) | U | 1450 | µg/l | 0.080 | | < 0.080 | 0.15 | < 0.080 | 0.085 | 0.080 | < 0.080 | < 0.080 | 0.11 | < 0.080 |
| Chromium (Dissolved) | U | 1450 | µg/l | 1.0 | | 7.4 | 3.0 | < 1.0 | 3.3 | 2.2 | 7.2 | 1.1 | 1.3 | 2.7 |
| Copper (Dissolved) | U | 1450 | µg/l | 1.0 | | 3.2 | 28 | < 1.0 | 17 | 19 | 3.9 | 2.9 | 45 | 5.7 |
| Mercury (Dissolved) | U | 1450 | µg/l | 0.50 | | 0.85 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Nickel (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | 3.0 | 1.7 | 4.8 | 3.5 | < 1.0 | 1.7 | 7.1 | < 1.0 |
| Lead (Dissolved) | U | 1450 | µg/l | 1.0 | | 11 | 69 | 1.5 | 55 | 30 | 210 | 26 | 63 | 8.1 |
| Selenium (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 1.2 |
| Vanadium (Dissolved) | U | 1450 | µg/l | 1.0 | | 38 | 9.0 | 2.0 | 8.2 | 6.3 | 2.3 | 4.8 | 7.7 | 12 |
| Zinc (Dissolved) | U | 1450 | µg/l | 1.0 | | 2.3 | 960 | 12 | 27 | 38 | 10 | 4.4 | 59 | 8.7 |
| Naphthalene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Acenaphthylene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Acenaphthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 1700 | µg/l | 0.10 | | < 0.10 | 15 | < 0.10 | < 0.10 | < 0.10 | 4.6 | < 0.10 | < 0.10 | < 0.10 |
| Anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | 7.3 | < 0.10 | < 0.10 | < 0.10 | 1.5 | < 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 1700 | µg/l | 0.10 | | 0.74 | 9.5 | < 0.10 | < 0.10 | < 0.10 | 10 | < 0.10 | < 0.10 | < 0.10 |
| Pyrene | U | 1700 | µg/l | 0.10 | | 0.85 | 7.6 | < 0.10 | < 0.10 | < 0.10 | 10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[a]anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Chrysene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[b]fluoranthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[k]fluoranthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[a]pyrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Indeno(1,2,3-c,d)Pyrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Dibenz(a,h)Anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[g,h,i]perylene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Total Of 16 PAH's | U | 1700 | µg/l | 2.0 | | < 2.0 | 39 | < 2.0 | < 2.0 | < 2.0 | 26 | < 2.0 | < 2.0 | < 2.0 |

Chemtest
The right chemistry to deliver results

# Results - Leachate

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| Client: Soiltechnics Limited | | | | | Chemtest Job No.: | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quotation No.: | | | | | Chemtest Sample ID.: | 236807 | 236808 | 236809 | 236810 | 236811 | 236812 | 236813 | 236814 | 236815 |
| Order No.: 20628 | | | | | Client Sample Ref.: | TP409 | TP410 | TP411 | TP412 | TP413 | TP414 | TP415 | TP416 | TP417 |
| | | | | | Client Sample ID.: | 5-010 | 5-011 | 5-012 | 5-013 | 5-014 | 5-015 | 5-016 | 5-017 | 5-018 |
| | | | | | Sample Type: | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | | | Top Depth (m): | 0.20 | 0.50 | 0.50 | 0.30 | 0.30 | 0.40 | 0.50 | 0.30 | 0.45 |
| | | | | | Date Sampled: | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | | | | | | | | |
| pH | U | 1010 | | N/A | | 8.2 | 7.9 | 8.7 | 8.5 | 8.2 | 8.0 | 8.2 | 7.8 | 8.0 |
| Nitrate | U | 1220 | mg/l | 0.50 | | 1.8 | 2.0 | 1.6 | 0.63 | 5.6 | < 0.50 | 1.6 | 0.68 | 0.58 |
| Sulphate | U | 1220 | mg/l | 1.0 | | < 1.0 | 2.5 | < 1.0 | 7.0 | 10 | 14 | < 1.0 | 3.0 | 23 |
| Cyanide (Total) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Cyanide (Free) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Cyanide (Complex) | U | 1300 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Sulphide | U | 1325 | mg/l | 0.050 | | < 0.050 | < 0.050 | < 0.050 | < 0.050 | 0.051 | < 0.050 | < 0.050 | < 0.050 | < 0.050 |
| Arsenic (Dissolved) | U | 1450 | µg/l | 1.0 | | 9.7 | 2.1 | 15 | 6.8 | 6.7 | 9.0 | 6.5 | 1.1 | 4.1 |
| Boron (Dissolved) | U | 1450 | µg/l | 20 | | 20 | 37 | 52 | < 20 | 46 | 34 | < 20 | < 20 | 58 |
| Beryllium (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Cadmium (Dissolved) | U | 1450 | µg/l | 0.080 | | < 0.080 | < 0.080 | < 0.080 | < 0.080 | < 0.080 | < 0.080 | 0.11 | < 0.080 | < 0.080 |
| Chromium (Dissolved) | U | 1450 | µg/l | 1.0 | | 1.6 | 1.2 | 3.3 | < 1.0 | < 1.0 | < 1.0 | 1.5 | < 1.0 | < 1.0 |
| Copper (Dissolved) | U | 1450 | µg/l | 1.0 | | 8.7 | 14 | 12 | 3.1 | 4.7 | 21 | 7.3 | 6.7 | 4.6 |
| Mercury (Dissolved) | U | 1450 | µg/l | 0.50 | | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Nickel (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | < 1.0 | 1.9 | < 1.0 | < 1.0 | 1.5 | < 1.0 | < 1.0 | < 1.0 |
| Lead (Dissolved) | U | 1450 | µg/l | 1.0 | | 15 | 22 | 34 | 7.3 | 2.6 | 51 | 13 | 9.8 | 1.7 |
| Selenium (Dissolved) | U | 1450 | µg/l | 1.0 | | < 1.0 | < 1.0 | 1.1 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Vanadium (Dissolved) | U | 1450 | µg/l | 1.0 | | 10 | 2.3 | 18 | 5.7 | 30 | 10 | 11 | 2.1 | < 1.0 |
| Zinc (Dissolved) | U | 1450 | µg/l | 1.0 | | 15 | 17 | 23 | 3.4 | 4.0 | 6.1 | 18 | 6.1 | 1.2 |
| Naphthalene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Acenaphthylene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Acenaphthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | 2.8 |
| Pyrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | 2.8 |
| Benzo[a]anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Chrysene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[b]fluoranthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[k]fluoranthene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[a]pyrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Indeno(1,2,3-c,d)Pyrene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Dibenz(a,h)Anthracene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Benzo[g,h,i]perylene | U | 1700 | µg/l | 0.10 | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Total Of 16 PAH's | U | 1700 | µg/l | 2.0 | | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | 5.6 |

Chemtest
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# Results - Leachate

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| **Client: Soiltechnics Limited** | | **Chemtest Job No.:** | | | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|
| Quotation No.: | | **Chemtest Sample ID.:** | | | 236816 | 236817 |
| Order No.: 20628 | | Client Sample Ref.: | | | TP418 | TP418 |
| | | Client Sample ID.: | | | 5-019 | 5-020 |
| | | Sample Type: | | | SOIL | SOIL |
| | | Top Depth (m): | | | 0.20 | 0.50 |
| | | Date Sampled: | | | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| pH | U | 1010 | | N/A | 7.5 | 7.9 |
| Nitrate | U | 1220 | mg/l | 0.50 | 0.92 | < 0.50 |
| Sulphate | U | 1220 | mg/l | 1.0 | < 1.0 | < 1.0 |
| Cyanide (Total) | U | 1300 | mg/l | 0.050 | < 0.050 | < 0.050 |
| Cyanide (Free) | U | 1300 | mg/l | 0.050 | < 0.050 | < 0.050 |
| Cyanide (Complex) | U | 1300 | mg/l | 0.050 | < 0.050 | < 0.050 |
| Sulphide | U | 1325 | mg/l | 0.050 | < 0.050 | < 0.050 |
| Arsenic (Dissolved) | U | 1450 | µg/l | 1.0 | 3.4 | 1.9 |
| Boron (Dissolved) | U | 1450 | µg/l | 20 | 25 | 20 |
| Beryllium (Dissolved) | U | 1450 | µg/l | 1.0 | < 1.0 | < 1.0 |
| Cadmium (Dissolved) | U | 1450 | µg/l | 0.080 | < 0.080 | < 0.080 |
| Chromium (Dissolved) | U | 1450 | µg/l | 1.0 | 1.4 | < 1.0 |
| Copper (Dissolved) | U | 1450 | µg/l | 1.0 | 37 | 5.1 |
| Mercury (Dissolved) | U | 1450 | µg/l | 0.50 | < 0.50 | < 0.50 |
| Nickel (Dissolved) | U | 1450 | µg/l | 1.0 | 3.0 | < 1.0 |
| Lead (Dissolved) | U | 1450 | µg/l | 1.0 | 24 | 2.6 |
| Selenium (Dissolved) | U | 1450 | µg/l | 1.0 | < 1.0 | < 1.0 |
| Vanadium (Dissolved) | U | 1450 | µg/l | 1.0 | 4.3 | 2.1 |
| Zinc (Dissolved) | U | 1450 | µg/l | 1.0 | 18 | 1.2 |
| Naphthalene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Acenaphthylene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Acenaphthene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Anthracene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Pyrene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Benzo[a]anthracene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Chrysene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Benzo[b]fluoranthene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Benzo[k]fluoranthene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Benzo[a]pyrene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Indeno(1,2,3-c,d)Pyrene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Dibenz(a,h)Anthracene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Benzo[g,h,i]perylene | U | 1700 | µg/l | 0.10 | < 0.10 | < 0.10 |
| Total Of 16 PAH's | U | 1700 | µg/l | 2.0 | < 2.0 | < 2.0 |

Chemtest
The right chemistry to deliver results

# Results - Soil

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| **Client: Soiltechnics Limited** | | | | | **Chemtest Job No.:** | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quotation No.: | | | | | **Chemtest Sample ID.:** | 236798 | 236799 | 236800 | 236801 | 236802 | 236803 | 236804 | 236805 | 236806 |
| Order No.: 20628 | | | | | Client Sample Ref.: | TP401 | TP402 | TP403 | TP404 | TP405 | TP406 | TP406 | TP407 | TP408 |
| | | | | | Client Sample ID.: | 5-001 | 5-002 | 5-003 | 5-004 | 5-005 | 5-006 | 5-007 | 5-008 | 5-009 |
| | | | | | Sample Type: | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | | | Top Depth (m): | 0.50 | 0.60 | 0.50 | 0.60 | 0.50 | 0.30 | 0.50 | 0.40 | 0.50 |
| | | | | | Date Sampled: | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | | | | | | | | |
| Moisture | N | 2030 | % | 0.020 | | 16 | 18 | 17 | 9.5 | 19 | 16 | 21 | 15 | 12 |
| Naphthalene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 0.19 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | 0.19 | < 0.10 |
| Acenaphthylene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 0.28 | < 0.10 | 0.20 | 0.15 | < 0.10 | 0.25 | < 0.10 |
| Acenaphthene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 0.22 | < 0.10 | 0.11 | 0.40 | < 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 0.28 | < 0.10 | 0.16 | 0.36 | < 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 2.7 | < 0.10 | 2.0 | 11 | < 0.10 | 0.49 | < 0.10 |
| Anthracene | U | 2700 | mg/kg | 0.10 | | < 0.10 | < 0.10 | 0.52 | < 0.10 | 0.34 | 1.4 | < 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 2700 | mg/kg | 0.10 | | 1.2 | 1.1 | 4.2 | 1.5 | 3.7 | 17 | 0.75 | 1.4 | 2.5 |
| Pyrene | U | 2700 | mg/kg | 0.10 | | 1.1 | 1.1 | 3.3 | 1.4 | 3.4 | 12 | 0.55 | 1.2 | 1.6 |
| Benzo[a]anthracene | U | 2700 | mg/kg | 0.10 | | 0.48 | 0.64 | 1.5 | 0.72 | 1.6 | 5.7 | < 0.10 | 0.78 | 1.2 |
| Chrysene | U | 2700 | mg/kg | 0.10 | | 0.63 | 0.86 | 1.9 | 0.84 | 1.7 | 5.8 | < 0.10 | 0.93 | 1.6 |
| Benzo[b]fluoranthene | U | 2700 | mg/kg | 0.10 | | 0.76 | 1.3 | 3.3 | 1.3 | 2.3 | 7.4 | < 0.10 | 1.6 | 2.2 |
| Benzo[k]fluoranthene | U | 2700 | mg/kg | 0.10 | | 0.21 | 0.51 | 1.4 | 0.61 | 0.97 | 3.0 | < 0.10 | 0.65 | 0.84 |
| Benzo[a]pyrene | U | 2700 | mg/kg | 0.10 | | 0.60 | 0.85 | 2.3 | 0.96 | 1.7 | 5.0 | < 0.10 | 0.99 | 1.5 |
| Indeno(1,2,3-c,d)Pyrene | U | 2700 | mg/kg | 0.10 | | < 0.10 | 0.74 | 2.2 | 1.1 | 1.1 | 3.7 | < 0.10 | 0.93 | 1.6 |
| Dibenz(a,h)Anthracene | U | 2700 | mg/kg | 0.10 | | < 0.10 | 0.14 | 0.67 | 0.42 | 0.30 | 0.93 | < 0.10 | 0.23 | 0.59 |
| Benzo[g,h,i]perylene | U | 2700 | mg/kg | 0.10 | | < 0.10 | 0.70 | 2.1 | 0.63 | 1.3 | 3.0 | < 0.10 | 0.91 | 1.3 |
| Total Of 16 PAH's | U | 2700 | mg/kg | 2.0 | | 5.0 | 7.9 | 27 | 9.5 | 21 | 77 | < 2.0 | 11 | 15 |

Chemtest
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# Results - Soil

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| **Client: Soiltechnics Limited** | | | **Chemtest Job No.:** | | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quotation No.: | | | **Chemtest Sample ID.:** | | 236807 | 236808 | 236809 | 236810 | 236811 | 236812 | 236813 | 236814 | 236815 |
| Order No.: 20628 | | | Client Sample Ref.: | | TP409 | TP410 | TP411 | TP412 | TP413 | TP414 | TP415 | TP416 | TP417 |
| | | | Client Sample ID.: | | 5-010 | 5-011 | 5-012 | 5-013 | 5-014 | 5-015 | 5-016 | 5-017 | 5-018 |
| | | | Sample Type: | | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | Top Depth (m): | | 0.20 | 0.50 | 0.50 | 0.30 | 0.30 | 0.40 | 0.50 | 0.30 | 0.45 |
| | | | Date Sampled: | | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | | | | | | | |
| Moisture | N | 2030 | % | 0.020 | 17 | 16 | 13 | 7.9 | 16 | 19 | 15 | 14 | 14 |
| Naphthalene | U | 2700 | mg/kg | 0.10 | 0.17 | 0.12 | 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | 0.23 |
| Acenaphthylene | U | 2700 | mg/kg | 0.10 | 0.30 | 0.95 | 0.38 | 0.23 | 0.31 | < 0.10 | < 0.10 | < 0.10 | 0.22 |
| Acenaphthene | U | 2700 | mg/kg | 0.10 | < 0.10 | 0.23 | < 0.10 | 0.10 | 0.30 | < 0.10 | < 0.10 | < 0.10 | 0.55 |
| Fluorene | U | 2700 | mg/kg | 0.10 | 0.19 | 0.37 | 0.13 | 0.11 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | 0.50 |
| Phenanthrene | U | 2700 | mg/kg | 0.10 | 3.4 | 1.1 | 1.1 | 0.65 | 0.65 | < 0.10 | < 0.10 | 0.24 | 14 |
| Anthracene | U | 2700 | mg/kg | 0.10 | 0.30 | < 0.10 | 0.19 | 0.11 | 0.16 | < 0.10 | < 0.10 | < 0.10 | 2.9 |
| Fluoranthene | U | 2700 | mg/kg | 0.10 | 5.2 | 0.80 | 2.1 | 1.2 | 1.7 | 0.81 | 0.69 | 0.19 | 47 |
| Pyrene | U | 2700 | mg/kg | 0.10 | 4.2 | 0.67 | 2.0 | 1.1 | 1.7 | 0.77 | 0.72 | 0.17 | 50 |
| Benzo[a]anthracene | U | 2700 | mg/kg | 0.10 | 2.3 | 0.28 | 0.80 | 0.71 | 1.1 | < 0.10 | 0.38 | < 0.10 | 18 |
| Chrysene | U | 2700 | mg/kg | 0.10 | 2.7 | 0.37 | 0.87 | 0.86 | 1.3 | < 0.10 | 0.42 | < 0.10 | 20 |
| Benzo[b]fluoranthene | U | 2700 | mg/kg | 0.10 | 4.3 | 0.31 | 1.0 | 1.4 | 1.7 | < 0.10 | 0.48 | < 0.10 | 20 |
| Benzo[k]fluoranthene | U | 2700 | mg/kg | 0.10 | 1.6 | 0.17 | 0.44 | 0.50 | 0.70 | < 0.10 | 0.23 | < 0.10 | 7.5 |
| Benzo[a]pyrene | U | 2700 | mg/kg | 0.10 | 2.8 | 0.26 | 0.87 | 0.88 | 1.3 | < 0.10 | 0.35 | < 0.10 | 13 |
| Indeno(1,2,3-c,d)Pyrene | U | 2700 | mg/kg | 0.10 | 2.4 | < 0.10 | 0.55 | 0.65 | 0.81 | < 0.10 | < 0.10 | < 0.10 | 9.2 |
| Dibenz(a,h)Anthracene | U | 2700 | mg/kg | 0.10 | 0.63 | < 0.10 | 0.14 | 0.24 | 0.27 | < 0.10 | < 0.10 | < 0.10 | 2.4 |
| Benzo[g,h,i]perylene | U | 2700 | mg/kg | 0.10 | 2.2 | < 0.10 | 0.57 | 0.59 | 0.73 | < 0.10 | < 0.10 | < 0.10 | 8.0 |
| Total Of 16 PAH's | U | 2700 | mg/kg | 2.0 | 33 | 5.6 | 11 | 9.3 | 13 | < 2.0 | 3.3 | < 2.0 | 210 |

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# Results - Soil

**Project: STM3361D - Richmond Upon Thames, Richmond, London**

| **Client: Soiltechnics Limited** | | | **Chemtest Job No.:** | | 15-30143 | 15-30143 |
|---|---|---|---|---|---|---|
| Quotation No.: | | | **Chemtest Sample ID.:** | | 236816 | 236817 |
| Order No.: 20628 | | | Client Sample Ref.: | | TP418 | TP418 |
| | | | Client Sample ID.: | | 5-019 | 5-020 |
| | | | Sample Type: | | SOIL | SOIL |
| | | | Top Depth (m): | | 0.20 | 0.50 |
| | | | Date Sampled: | | 22-Dec-2015 | 22-Dec-2015 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| Moisture | N | 2030 | % | 0.020 | 17 | 15 |
| Naphthalene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Acenaphthylene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Acenaphthene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 2700 | mg/kg | 0.10 | 0.32 | 0.42 |
| Anthracene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 2700 | mg/kg | 0.10 | 0.85 | 0.60 |
| Pyrene | U | 2700 | mg/kg | 0.10 | 0.67 | 0.57 |
| Benzo[a]anthracene | U | 2700 | mg/kg | 0.10 | 0.44 | 0.23 |
| Chrysene | U | 2700 | mg/kg | 0.10 | 0.62 | 0.25 |
| Benzo[b]fluoranthene | U | 2700 | mg/kg | 0.10 | 0.81 | 0.51 |
| Benzo[k]fluoranthene | U | 2700 | mg/kg | 0.10 | 0.38 | 0.27 |
| Benzo[a]pyrene | U | 2700 | mg/kg | 0.10 | 0.61 | 0.33 |
| Indeno(1,2,3-c,d)Pyrene | U | 2700 | mg/kg | 0.10 | 0.46 | 0.13 |
| Dibenz(a,h)Anthracene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[g,h,i]perylene | U | 2700 | mg/kg | 0.10 | 0.59 | 0.21 |
| Total Of 16 PAH's | U | 2700 | mg/kg | 2.0 | 5.8 | 3.5 |

## Report Information

### Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### Sample Deviation Codes

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

### Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

soiltechnics
environmental and geotechnical consultants

# Summary of leachate test results within the proposed school area of the site (blue)

| | | |
|---|---|---|
| **Receptor** | **Groundwater** | |
| **Water type** | **Freshwater** | |
| **Fish type** | **Cyprinid** | |
| **Water hardness** | **>250** | **mg/l** |

| Contaminant | Guideline value (µg/l) | Guideline source | Location | DTS115 | TP401 | TP402 | TP403 | TP404 | TP405 | TP406 | Average (mean) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.3 | |
| **Inorganics (µg/l)** | | | | | | | | | | | |
| Arsenic | 50 | EQS (f) | | 2 | 15 | 7 | 3 | 6 | 4 | 5 | 6 |
| Boron | 2000 | EQS (f) | | < 20 | < 20 | 50 | 80 | 48 | 85 | < 20 | 66 |
| Cadmium | 5 | EQS (f) | | < 0.080 | < 0.080 | 0 | < 0.080 | 0 | 0 | < 0.080 | 0 |
| Chromium | 250 | EQS (f) | | < 1.0 | 7 | 3 | < 1.0 | 3 | 2 | 7 | 5 |
| Copper | 28 | EQS (f) | | 3 | 3 | 28 | < 1.0 | 17 | 19 | 4 | 12 |
| Lead | 250 | EQS (f) | | 10 | 11 | 69 | 2 | 55 | 30 | 210 | 55 |
| Mercury | 1 | EQS (f) | | < 0.50 | 1 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | 1 |
| Nickel | 200 | EQS (f) | | < 1.0 | < 1.0 | 3 | 2 | 5 | 4 | < 1.0 | 3 |
| Selenium[1] | 10 | UKDWS | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 0.1 |
| Vanadium[2] | 60 | EQS (f) | | 3 | 38 | 9 | 2 | 8 | 6 | 2 | 10 |
| Zinc | 500 | EQS (f) | | 8 | 2 | 960 | 12 | 27 | 38 | 10 | 151 |
| Free Cyanide[1] | 50 | UKDWS | | <50 | <50 | <50 | <50 | <50 | <50 | <50 | < 50 |
| Nitrate as N | 50000 | UKDWS | | <500 | 900 | 6100 | 9600 | 1800 | 5600 | <500 | 4800 |
| Sulphate as SO4 | 400000 | EQS(f) | | | 12000 | 10000 | 81000 | 18000 | <10000 | 2800 | 24760 |
| **PAH (µg/l)** | | | | | | | | | | | |
| Benzo(a)pyrene[1,4] | 0.01 | UKDWS | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Naphthalene[2] | 10 | EQS (f) | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Sum of 4 PAH[1] | 0.1 | UKDWS | | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | < 0.10 |

Notes

1 EQS values not available
2 UKDWS not available
3 Lower detectable limit above UKDWS. Concentrations below detectable limits are not considered further.
* Taken as lower detection limit
# Taken as lower detection limit of a single compound
$ Hardness data presented by the Environment Agency

UKDWS UK Drinking Water Standard Guideline taken from "The Water Supply (Water Quality) Regulations 2000"
EQS (f) Environmental Quality Standard for freshwater published by the Environment Agency
EQS (s) Environmental Quality Standard for saltwater published by the Environment Agency

Title
Comparison of measured concentrations with guideline values for water receptors.

Table number
101

soiltechnics
environmental and geotechnical consultants

# Summary of lechate test results within the proposed combined residential area (pink and orange)

| | | |
|---|---|---|
| **Receptor** | **Groundwater** | |
| **Water type** | **Freshwater** | |
| **Fish type** | **Cyprinid** | |
| **Water hardness** | **>250** | **mg/l** |

| Contaminant | Guideline value (µg/l) | Guideline source | Location | TP407 | TP414 | TP416 | TP104 | TP105 | TP408 | TP409 | TP410 | TP411 | TP412 | TP413 | TP415 | TP417 | TP418 | DTS115 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 0.4 | 0.4 | 0.3 | 0.2 | 0.2 | 0.5 | 0.2 | 0.5 | 0.5 | 0.3 | 0.3 | 0.5 | 0.45 | 0.2 | 0.5 |
| **Inorganics (µg/l)** | | | | | | | | | | | | | | | | | | |
| Arsenic | 50 | EQS (f) | | 7 | 9 | 1 | 7 | | 9 | 10 | 2 | 15 | 7 | 7 | 7 | 4 | 3 | 2 |
| Boron | 2000 | EQS (f) | | 41 | 34 | < 20 | < 20 | | 37 | 20 | 37 | 52 | < 20 | 46 | < 20 | 58 | 25 | < 20 |
| Cadmium | 5 | EQS (f) | | 0 | < 0.080 | < 0.080 | 0 | | < 0.080 | < 0.080 | < 0.080 | < 0.080 | < 0.080 | < 0.080 | 0 | < 0.080 | < 0.080 | < 0.080 |
| Chromium | 250 | EQS (f) | | 1 | < 1.0 | < 1.0 | < 1.0 | | 3 | 2 | 1 | 3 | < 1.0 | < 1.0 | 2 | < 1.0 | 1 | < 1.0 |
| Copper | 28 | EQS (f) | | 45 | 21 | 7 | 33 | | 6 | 9 | 14 | 12 | 3 | 5 | 7 | 5 | 37 | 3 |
| Lead | 250 | EQS (f) | | 63 | 51 | 10 | 40 | | 8 | 15 | 22 | 34 | 7 | 3 | 13 | 2 | 24 | 10 |
| Mercury | 1 | EQS (f) | | < 0.50 | < 0.50 | < 0.50 | < 0.50 | | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Nickel | 200 | EQS (f) | | 7 | 2 | < 1.0 | 3 | | < 1.0 | < 1.0 | < 1.0 | 2 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 3 | < 1.0 |
| Selenium[1] | 10 | UKDWS | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | 1 | < 1.0 | < 1.0 | 1 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Vanadium[2] | 60 | EQS (f) | | 8 | 10 | 2 | 7 | | 12 | 10 | 2 | 18 | 6 | 30 | 11 | < 1.0 | 4 | 3 |
| Zinc | 500 | EQS (f) | | 59 | 6 | 6 | 36 | | 9 | 15 | 17 | 23 | 3 | 4 | 18 | 1 | 18 | 8 |
| Free Cyanide[1] | 50 | UKDWS | | <50 | <50 | <50 | <50 | | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Nitrate as N | 50000 | UKDWS | | 1100 | <500 | 680 | 730 | | <500 | 1800 | 2000 | 1600 | 630 | 5600 | 1600 | 580 | 920 | <500 |
| Sulphate as SO4 | 400000 | EQS(f) | | 8000 | 14000 | 3000 | | | 6400 | <10000 | 2500 | <10000 | 7000 | 10000 | <10000 | 23000 | <10000 | |
| **PAH (µg/l)** | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene[1,4] | 0.01 | UKDWS | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Naphthalene[2] | 10 | EQS (f) | | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Sum of 4 PAH[1] | 0.1 | UKDWS | | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* | <0.1* |
| **TPH (µg/l)** | | | | | | | | | | | | | | | | | | |
| Hydrocarbons[1] | 10 | UKDWS | | | | | | 2 | | | | | | | | | | 2 |
| Benzene | 30 | EQS (f) | | | | | | < 1.0 | | | | | | | | | | < 1.0 |
| Toluene[2] | 50 | EQS (f) | | | No testing undertaken | | | < 1.0 | | No testing undertaken | | | | | | | | < 1.0 |
| Ethyl benzene[3] | 300 | WHO | | | | | | < 1.0 | | | | | | | | | | < 1.0 |
| Xylene[2] | 30 | EQS (f) | | | | | | < 1.0 | | | | | | | | | | < 1.0 |

Notes

1 EQS values not available
2 UKDWS not available
3 Lower detectable limit above UKDWS. Concentrations below detectable limits are not considered further.
* Taken as lower detection limit
# Taken as lower detection limit of a single compound
$ Hardness data presented by the Environment Agency

UKDWS UK Drinking Water Standard Guideline taken from "The Water Supply (Water Quality) Regulations 2000"
EQS (f) Environmental Quality Standard for freshwater published by the Environment Agency
EQS (s) Environmental Quality Standard for saltwater published by the Environment Agency

Title
Comparison of measured concentrations with guideline values for water receptors.

Table number
102

soiltechnics
environmental and geotechnical consultants

# Analysis of test data in relation to concentrations of organic chemical contaminants within the school area (blue)

**Adopted model:** Residential without
**Receptor:** Current and proposed site user

| Test procedure | | | Summary of test data | | | | | Initial Screening | Oulier test | | | | Normality test | | | UCL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contaminant | Guideline source | Guideline value mg/kg | No. of tests | Min. mg/kg | Max. mg/kg | Mean mg/kg | No. of tests above guideline value | Initial screening | Pass outlier test? | Number of outliers | Location of outlier | Depth / Concentration mg/kg | Shapiro-Wilk Normality test | Probability plot test | Data normally distributed? | 95% UCL of mean mg/kg | Contaminant |
| **Acenaphthene** | S4UL | 6000 | 27 | 0.1 | 45.0 | 1.8 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 9.1 | **Acenaphthene** |
| **Acenaphthylene** | S4UL | 6000 | 27 | 0.1 | 1.8 | 0.2 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 0.5 | **Acenaphthylene** |
| **Anthracene** | S4UL | 37000 | 27 | 0.1 | 110.0 | 4.4 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 22.1 | **Anthracene** |
| **Benzo(a)anthracene** | S4UL | 15 | 7 | 0.1 | 5.7 | 1.5 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 4.7 | **Benzo(a)anthracene** |
| **Benzo(a)pyrene** | S4UL | 3.2 | 7 | 0.1 | 5.0 | 1.6 | 5 | Mean value below guideline | n | 0 | | | normal | normal | y | 2.9 | **Benzo(a)pyrene** |
| **Benzo(b)fluoranthene** | CLEA | 13.5 | 7 | 0.1 | 7.4 | 2.4 | 1 | Mean value below guideline | n | 0 | | | normal | normal | y | 4.2 | **Benzo(b)fluoranthene** |
| **Benzo(g,h,i)perylene** | S4UL | 360 | 7 | 0.1 | 3.0 | 1.1 | 0 | Mean value below guideline | y | 0 | | | normal | normal | y | 1.9 | **Benzo(g,h,i)perylene** |
| **Benzo(k)fluoranthene** | S4UL | 110 | 7 | 0.1 | 3.0 | 1.0 | 0 | Mean value below guideline | n | 0 | | | normal | normal | y | 1.7 | **Benzo(k)fluoranthene** |
| **Chrysene** | S4UL | 32 | 27 | 0.1 | 110.0 | 5.2 | 2 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 22.8 | **Chrysene** |
| **Dibenzo(a,h)anthracene** | CLEA | 1.09 | 7 | 0.1 | 0.9 | 0.4 | 1 | Mean value below guideline | y | 0 | | | normal | not normal | n | 0.9 | **Dibenzo(a,h)anthracene** |
| **Fluoranthene** | S4UL | 1600 | 27 | 0.1 | 290.0 | 13.2 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 59.7 | **Fluoranthene** |
| **Fluorene** | S4UL | 4500 | 27 | 0.1 | 45.0 | 1.8 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 9.1 | **Fluorene** |
| **Indeno(1,2,3-cd)pyrene** | S4UL | 46 | 7 | 0.1 | 3.7 | 1.3 | 1 | Mean value below guideline | y | 0 | | | normal | normal | y | 2.2 | **Indeno(1,2,3-cd)pyrene** |
| **Naphthalene** | S4UL | 13 | 27 | 0.1 | 6.1 | 0.4 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 1.3 | **Naphthalene** |
| **Phenanthrene** | S4UL | 1500 | 27 | 0.1 | 270.0 | 11.6 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 54.9 | **Phenanthrene** |
| **Phenols** | S4UL | 3800 | 7 | 0.1 | 0.1 | 0.1 | 0 | Mean value below guideline | y | 0 | | | not normal | not normal | n | 0.1 | **Phenols** |
| **Pyrene** | CLEA | 10500 | 27 | 0.1 | 240.0 | 10.9 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 49.4 | **Pyrene** |

**Notes**

| | |
|---|---|
| SGV | Soil Guideline Value as published by the Environment Agency |
| GAC | Generic Assessment Criterion as published by LQM and CIEH |
| SSV | Soil Screening Value as derived by Soiltechnics |
| NGV | No Guideline Value |
| S4UL | Suitable for Use Level dervied by LQM (6% SOM) |

Title
Analysis of test data in relation to concentrations of organic chemical contaminants.

Table number
103

soiltechnics
environmental and geotechnical consultants

# Analysis of test data in relation to concentrations of organic chemical contaminants within public open space (pink)

**Adopted model:** Public Open Space
**Receptor:** Current and proposed site user

| Test procedure | | | Summary of test data | | | | | Initial Screening | Oulier test | | | | Normality test | | | UCL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contaminant | Guideline source | Guideline value mg/kg | No. of tests | Min. mg/kg | Max. mg/kg | Mean mg/kg | No. of tests above guideline value | Initial screening | Pass outlier test? | Number of outliers | Location of outlier | Depth | Concentration mg/kg | Shapiro-Wilk Normality test | Probability plot test | Data normally distributed? | 95% UCL of mean mg/kg | Contaminant |
| **Acenaphthene** | S4UL | 15000 | 5 | 0.1 | 0.1 | 0.1 | 0 | Mean value below guideline | y | 0 | | | | not normal | not normal | n | 0.1 | **Acenaphthene** |
| **Acenaphthylene** | S4UL | 15000 | 5 | 0.1 | 0.8 | 0.3 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 0.8 | **Acenaphthylene** |
| **Anthracene** | S4UL | 74000 | 5 | 0.1 | 0.6 | 0.2 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 0.6 | **Anthracene** |
| **Benzo(a)anthracene** | S4UL | 29 | 5 | 0.1 | 3.5 | 1.0 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 3.8 | **Benzo(a)anthracene** |
| **Benzo(a)pyrene** | S4UL | 5.7 | 5 | 0.1 | 5.0 | 1.4 | 1 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 5.4 | **Benzo(a)pyrene** |
| **Benzo(b)fluoranthene** | S4UL | 7.2 | 5 | 0.1 | 5.4 | 1.6 | 1 | Mean value below guideline | n | 0 | | | | normal | normal | y | 3.7 | **Benzo(b)fluoranthene** |
| **Benzo(g,h,i)perylene** | S4UL | 640 | 5 | 0.1 | 3.3 | 1.0 | 0 | Mean value below guideline | n | 0 | | | | normal | normal | y | 2.3 | **Benzo(g,h,i)perylene** |
| **Benzo(k)fluoranthene** | S4UL | 190 | 5 | 0.1 | 2.5 | 0.7 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 2.7 | **Benzo(k)fluoranthene** |
| **Chrysene** | S4UL | 57 | 5 | 0.1 | 4.5 | 1.3 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 4.9 | **Chrysene** |
| **Dibenzo(a,h)anthracene** | S4UL | 0.58 | 5 | 0.1 | 0.3 | 0.2 | 1 | Mean value below guideline | y | 0 | | | | normal | normal | y | 0.3 | **Dibenzo(a,h)anthracene** |
| **Fluoranthene** | S4UL | 3100 | 5 | 0.2 | 8.3 | 2.5 | 0 | Mean value below guideline | n | 0 | | | | not normal | not normal | n | 8.9 | **Fluoranthene** |
| **Fluorene** | S4UL | 9900 | 5 | 0.1 | 0.1 | 0.1 | 0 | Mean value below guideline | y | 0 | | | | not normal | not normal | n | 0.1 | **Fluorene** |
| **Indeno(1,2,3-cd)pyrene** | S4UL | 82 | 5 | 0.1 | 3.2 | 1.0 | 0 | Mean value below guideline | n | 0 | | | | normal | normal | y | 2.2 | **Indeno(1,2,3-cd)pyrene** |
| **Naphthalene** | S4UL | 4900 | 5 | 0.1 | 0.4 | 0.2 | 0 | Mean value below guideline | y | 0 | | | | normal | normal | y | 0.3 | **Naphthalene** |
| **Phenanthrene** | S4UL | 3100 | 5 | 0.1 | 3.0 | 1.0 | 0 | Mean value below guideline | n | 0 | | | | normal | normal | y | 2.1 | **Phenanthrene** |
| **Phenols** | SGV | 3800 | 1 | 0.3 | 0.3 | 0.3 | 0 | Mean value below guideline | n | 0 | | | | normal | normal | y | 0.1 | **Phenols** |
| **Pyrene** | S4UL | 7400 | 5 | 0.2 | 7.5 | 2.3 | 0 | Mean value below guideline | n | 0 | | | | not normal | normal | y | 5.1 | **Pyrene** |

**Notes**

| | |
|---|---|
| SGV | Soil Guideline Value as published by the Environment Agency |
| GAC | Generic Assessment Criterion as published by LQM and CIEH |
| SSV | Soil Screening Value as derived by Soiltechnics |
| NGV | No Guideline Value |
| S4UL | Suitable for use level derived by LQM (6% SOM) |

Title
Analysis of test data in relation to concentrations of organic chemical contaminants.

Table number
104

soiltechnics
environmental and geotechnical consultants

# Analysis of test data in relation to concentrations of organic chemical contaminants wihin garden areas (orange)

**Adopted model:** Residential
**Receptor:** Proposed site user

| Test procedure | | | Summary of test data | | | | | Initial Screening | Oulier test | | | | Normality test | | | UCL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contaminant | Guideline source | Guideline value mg/kg | No. of tests | Min. mg/kg | Max. mg/kg | Mean mg/kg | No. of tests above guideline value | Initial screening | Pass outlier test? | Number of outliers | Location of outlier | Depth / Concentration mg/kg | Shapiro-Wilk Normality test | Probability plot test | Data normally distributed? | 95% UCL of mean mg/kg | Contaminant |
| **Acenaphthene** | S4UL | 1100 | 11 | 0.1 | 0.6 | 0.2 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 0.4 | **Acenaphthene** |
| **Acenaphthylene** | S4UL | 920 | 11 | 0.1 | 1.0 | 0.3 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 0.6 | **Acenaphthylene** |
| **Anthracene** | S4UL | 11000 | 11 | 0.1 | 2.9 | 0.4 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 1.5 | **Anthracene** |
| **Benzo(a)anthracene** | S4UL | 13 | 11 | 0.1 | 18.0 | 2.3 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 9.2 | **Benzo(a)anthracene** |
| **Benzo(a)pyrene** | S4UL | 3 | 11 | 0.1 | 13.0 | 2.0 | 2 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 6.9 | **Benzo(a)pyrene** |
| **Benzo(b)fluoranthene** | S4UL | 3.7 | 11 | 0.1 | 20.0 | 3.0 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 10.6 | **Benzo(b)fluoranthene** |
| **Benzo(g,h,i)perylene** | S4UL | 350 | 11 | 0.1 | 8.0 | 1.3 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 4.3 | **Benzo(g,h,i)perylene** |
| **Benzo(k)fluoranthene** | S4UL | 100 | 11 | 0.1 | 7.5 | 1.2 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 4.0 | **Benzo(k)fluoranthene** |
| **Chrysene** | S4UL | 27 | 11 | 0.1 | 20.0 | 2.6 | 1 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 10.3 | **Chrysene** |
| **Dibenzo(a,h)anthracene** | S4UL | 0.3 | 11 | 0.1 | 2.4 | 0.4 | 3 | Mean value above guideline | | 0 | | | | not normal | n | 1.3 | **Dibenzo(a,h)anthracene** |
| **Fluoranthene** | S4UL | 890 | 11 | 0.2 | 47.0 | 5.7 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 23.8 | **Fluoranthene** |
| **Fluorene** | S4UL | 860 | 11 | 0.1 | 0.5 | 0.2 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 0.4 | **Fluorene** |
| **Indeno(1,2,3-cd)pyrene** | S4UL | 41 | 11 | 0.1 | 9.2 | 1.5 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 5.0 | **Indeno(1,2,3-cd)pyrene** |
| **Naphthalene** | S4UL | 13 | 11 | 0.1 | 0.2 | 0.1 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 0.2 | **Naphthalene** |
| **Phenanthrene** | S4UL | 440 | 11 | 0.1 | 14.0 | 2.0 | 0 | Mean value below guideline | n | 0 | | | not normal | not normal | n | 7.4 | **Phenanthrene** |
| **Phenols** | SGV | 2000 | 11 | 0.3 | 0.3 | 0.3 | 0 | Mean value below guideline | y | 0 | | | not normal | not normal | n | 0.3 | **Phenols** |
| **Pyrene** | S4UL | 1.1 | 11 | 0.2 | 50.0 | 5.8 | 6 | Mean value above guideline | | 0 | | | | not normal | n | 25.1 | **Pyrene** |

**Notes**

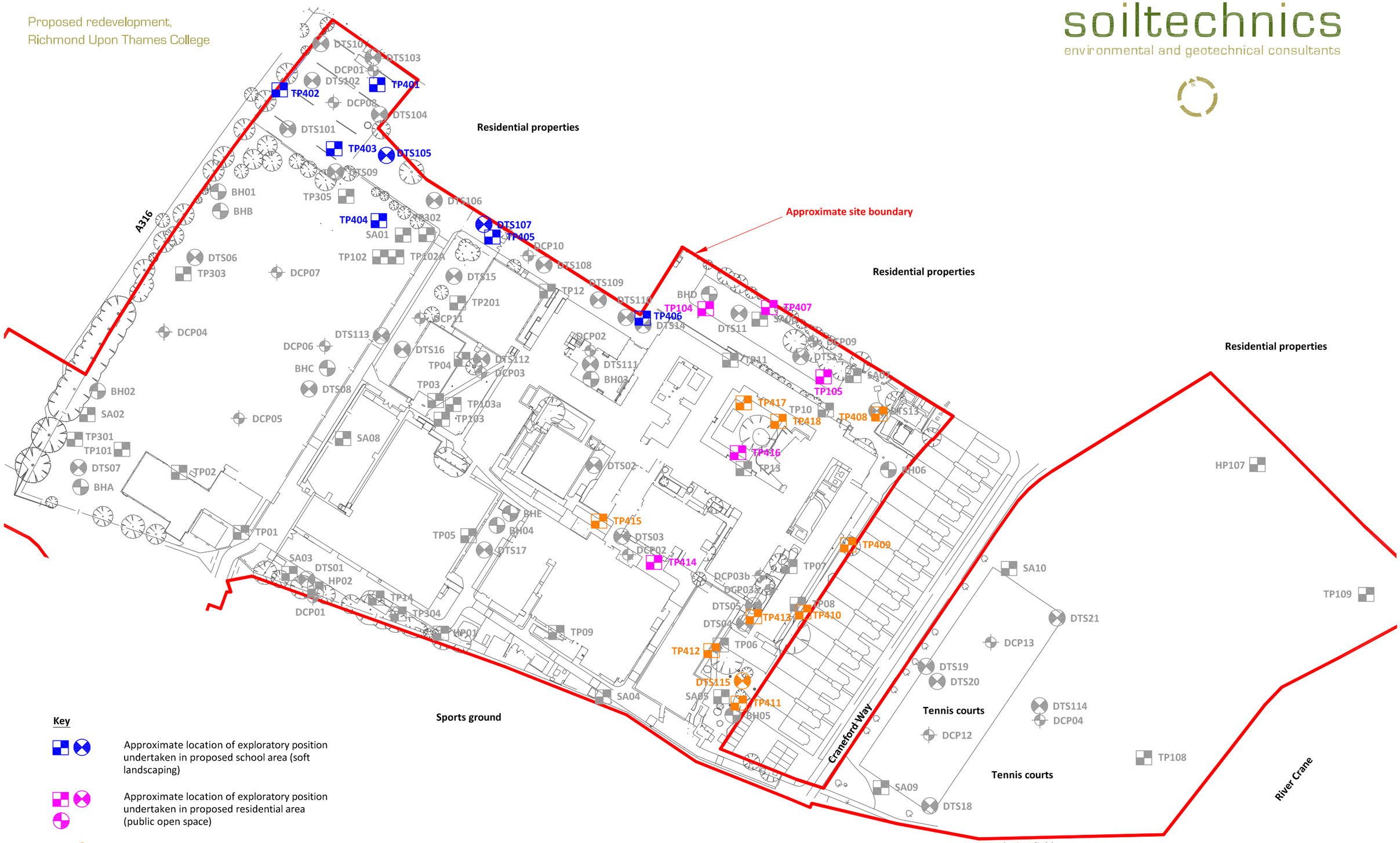
| | |
|---|---|
| SGV | Soil Guideline Value as published by the Environment Agency |
| GAC | Generic Assessment Criterion as published by LQM and CIEH |
| SSV | Soil Screening Value as derived by Soiltechnics |
| NGV | No Guideline Value |
| S4UL | Suitable for Use Level derived by LQM (6% SOM) |

Title
Analysis of test data in relation to concentrations of organic chemical contaminants.

Table number
105

Proposed redevelopment,
Richmond Upon Thames College

soiltechnics
environmental and geotechnical consultants




**Key**

- Approximate location of exploratory position undertaken in proposed school area (soft landscaping)
- Approximate location of exploratory position undertaken in proposed residential area (public open space)
- Approximate location of exploratory position undertaken in proposed residential area (garden areas)
- Not used in chemical contamination analysis

| Title | Scale | Drawing number |
|---|---|---|
| Plan showing existing site features and location of exploratory points | 1:1500 at A3 | 01 |

Report Ref: STM3361D-L003
Revision: 0

January 2016

Proposed redevelopment,
Richmond Upon Thames College

soiltechnics
environmental and geotechnical consultants


**Key**

- Approximate location of exploratory position undertaken in proposed school area (soft landscaping)
- Approximate location of exploratory position undertaken in proposed residential area (public open space)
- Approximate location of exploratory position undertaken in proposed residential area (garden areas)
- Not used in chemical contamination analysis

| Title | Scale | Drawing number |
|---|---|---|
| Plan showing existing site features and location of exploratory points | 1:1500 at A3 | 02 |