From:	Humphris, Brian
To:	DeskBasedUtilities
Subject:	FW: 1921744 Richmond upon Thames College, Egerton Road, Twickenham TW2 7SJ
Date:	06 September 2022 11:12:17
Attachments:	image001.png image002.png PE Egerton Road 06 09 2022.pdf
Importance:	High

Official

Dear Monique

Please find attached a plan indicating Richmond's assets within your indicated area.

Lamp columns and illuminated signs, indicated in yellow, and lamps attached to adjacent buildings, indicated in green, are connected to LV electricity cables. I regret that we do not have precise records of the connections. Non-illuminated signs are indicated in red.

Road gullies, indicated in blue, are connected to the Thames Water sewer network, or to a nearby watercourse.

Yours sincerely

Brian Humphris
Highway Asset Co-ordinator
Serving Richmond and Wandsworth Councils

brian.humphris@richmondandwandsworth.gov.uk
www.richmond.gov.uk / www.wandsworth.gov.uk

Please note that I am currently working from home and work only on Tuesday, Wednesday and Thursday.

From: Halpin, Nick <Nick.Halpin@richmondandwandsworth.gov.uk>
Sent: 05 September 2022 11:38
To: Humphris, Brian <Brian.Humphris@richmondandwandsworth.gov.uk>
Subject: 1921744 Richmond upon Thames College, Egerton Road, Twickenham TW2 7SJ
Importance: High

Official

Morning Brian

Can you advise the below on our assets in the affected area ?

Kind Regards

Nick Halpin
Network Coordinator
Serving Richmond and Wandsworth Councils

Network Management

Tel: 020 8487 5172
Mobile: 07947 154520
Email: Nick.Halpin@richmondandwandsworth.gov.uk

From: DeskBasedUtilities <DeskBasedUtilities@rsk.co.uk>
Sent: 01 September 2022 17:21
Subject: 1921744 Richmond upon Thames College, Egerton Road, Twickenham TW2 7SJ
Importance: High

Good Afternoon,

Our company is due to undertake a site investigation within the area detailed below, this includes intrusive works including borehole, window sampling and machine dug trial pitting. These intrusive works follow HSG47 guidelines and will be undertaken under a Permit to Dig safe system of work including a site walkover with the service plans, service detection, CAT & Genny sweeps, and hand dug pits to 1.2m depth where appropriate.

Our reference: 1921744
Location of works: Richmond upon Thames College, Egerton Road, Twickenham
O.S. Grid Ref.: 515421, 173718
Address/Nearest Postcode: TW2 7SJ
Expected Start Date:
Expected Completion Date:

A plan of the site has been enclosed, please cover the entire area shown within the boundary on the attached map.

In order that all reasonable precautions may be taken to avoid the risk to health and safety through contacts with any of your existing apparatus during execution of the proposed works, please indicate the position and depth of all main statutory services and wayleaves on site and in the adjoining roads where applicable. In addition, please highlight any likely special problems that could arise in connection with your apparatus as a result of the proposed works.

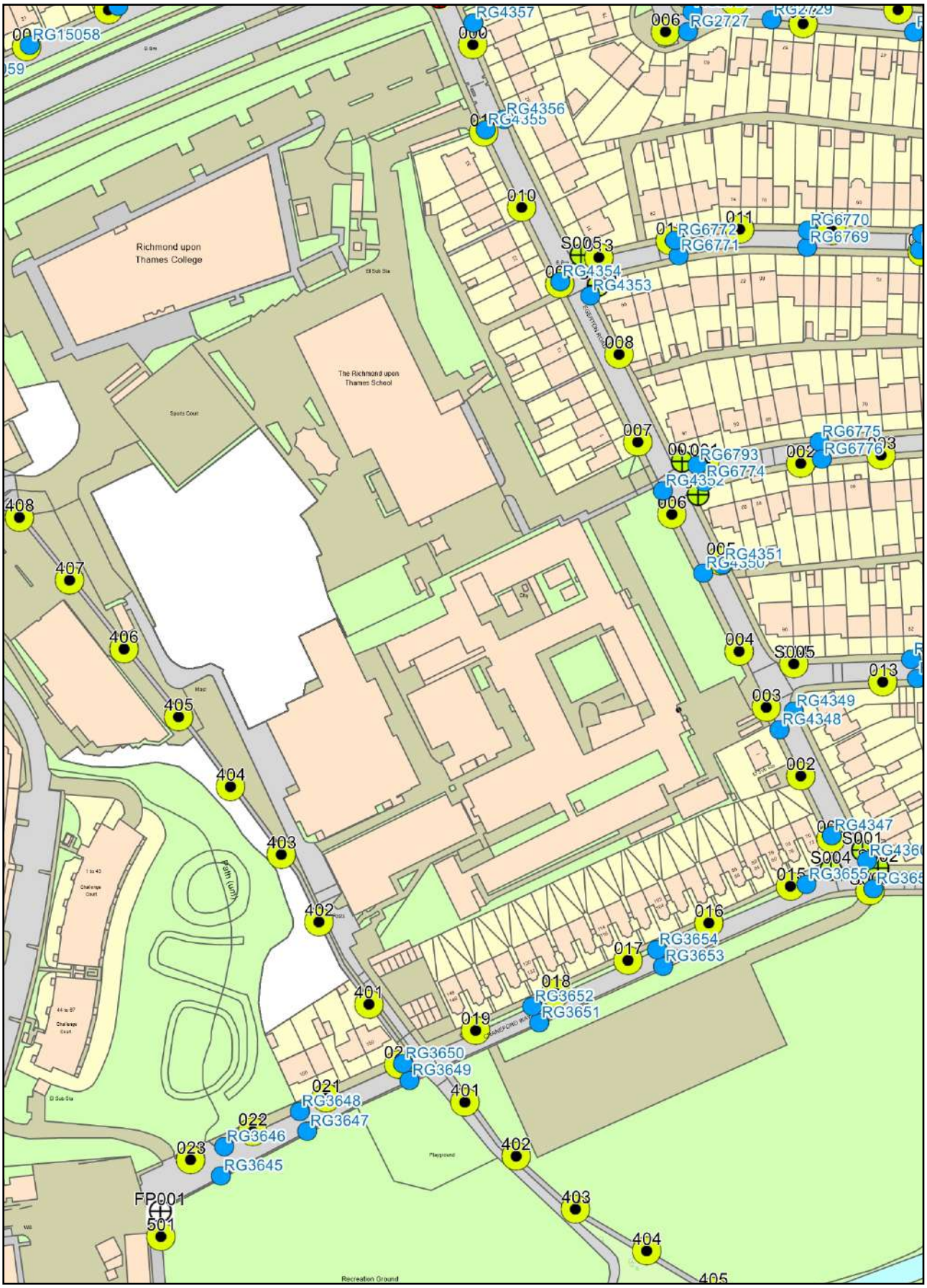
We therefore request that you supply us with relevant plan information or written confirmation to declare that no apparatus is affected at your earliest convenience.

Should you encounter any problems or require any further information, please contact me on the above address or by telephoning 01442 416626, any costs will be accepted with approval first.

Many Thanks,

Monique Elsom
Utility Report Co-ordinator
Please note, my normal working hours are Tuesday-Thursday.

18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK
Mobile: 07393 464647 · email: melsom@rsk.co.uk
http://www.rsk.co.uk | RSK Geophysics Download Geophysics Guide Follow @RSK_Geophysics



Scale 1:2000 Printed on: 06 September 2022

London Borough of Richmond upon Thames, Civic Centre, 44 York Street, Twickenham, TW1 3BZ Telephone 020 8891 1411 www.richmond.gov.uk

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LONDON BOROUGH OF RICHMOND UPON THAMES

General Conditions to be observed for the Protection of Apparatus and the Prevention of Disruption to Gas Supplies

General conditions affecting the design, construction or maintenance of services and/or structures or other works in the vicinity of Indigo Pipelines' plant, pipelines and associated installations:

These general conditions apply only to the gas apparatus and pipes operated by Indigo Pipelines. It is possible that there may be other gas transporters with apparatus in the vicinity, therefore you should ensure that you have made enquiries of them and have complied with their requirements.

1.GRAPHIC REPRESENTATION OF GAS MAINS

Any plans supplied or marked up by Indigo will indicate the **APPROXIMATE** location of its apparatus. This information is provided as a general guide only; its accuracy cannot be guaranteed and is given without obligation or warranty. Service pipes are not shown but their presence should be anticipated. No liability whatsoever is accepted by Indigo Pipelines, its agents or servants for any error, omission, discrepancy or deviation. Plans on site should be current, i.e. no older than 28 days from the date of issue. Gas pipes owned by other Gas Transporters, or otherwise privately owned, may be present in this area; information with regard to such pipes should be obtained from the relevant owners.

Should you require assistance on site locating Indigo Pipelines' apparatus, please contact our Gas Asset Management team on 0345 072 1919**.**

2.METHODS OF WORKING

The following methods of work shall not normally be permitted within the limits of distance indicated (relative to the established pipe position). Any variances must have consent from Indigo Pipelines before works commence on site:

Mechanical Excavation	**3m** (**1m** for low pressure mains)	Hydraulic Testing	**8 m**
Piling / Pile removing / Boring	**15m**	Welding or other hot works*	**15m**
Directional Drill Operations	**15m**	Explosives	**250m**

* NOTE: Welding or other hot works involving naked flames shall be carried out at a safe distance to the satisfaction of an Indigo Pipelines Engineer. A check should be made prior to the commencement of works, to ensure a gas free atmosphere exists. It is also necessary to monitor the atmosphere at regular intervals for the duration of the works. In no case shall such activities take place in any Indigo Pipelines Utilities Easement without the written consent and in the presence of an Indigo representative.

Indigo Pipelines must be consulted prior to carrying out any excavation work within **10m** of any above or below ground gas installations or pipeline

In addition to the above methods of working, Indigo Pipelines must be contacted prior to any External Wall Installation (EWI) schemes, proposed solar farms and wind turbine installations.

No work shall be undertaken near, nor heavy plant or equipment moved over, any gas pipeline or apparatus until all of the conditions specified by Indigo Pipelines have been complied with.

Where Indigo Pipelines have apparatus in the vicinity of your work, any damage to it could have serious consequences. In view of this and in the interests of safety, a meeting should be arranged before the commencement of work on site between Indigo Pipeline representatives, representatives of the promoting authority, the contractors and any other interested parties. At this meeting the suggested programme of site works and plant safety should be discussed. It is essential that this meeting is convened well in advance of commencement on site. Access to Indigo plant and facilities for inspection by Indigo Pipelines staff must not be affected. Where formal consent has been given, **A MINIMUM OF SEVEN DAYS NOTICE IS REQUIRED** before carrying out work in Indigo Pipelines easements, or the appropriate notice under the New Roads & Street Works Act (NRSWA) where existing plant is situated within the public highway.

Further guidance can also be sought from the document **HS(G)47 – Avoiding Danger from Underground Services** from the HSE website**.**

3.PROXIMITY OF OTHER PLANT

A minimum clearance of **600 millimetres (mm)** should be allowed between all plant being installed and an existing gas main operating above 2 bar medium pressure (MP), whether the adjacent plant is parallel to or crossing the gas pipe. For mains operating at MP or below, this distance can be reduced to 300mm. **NO APPARATUS SHOULD BE LAID OVER AND ALONG THE LINE OF A GAS PIPE, IRRESPECTIVE OF CLEARANCE**.

No manhole or chamber shall be built over or around a gas pipe and no work should be carried out which results in a reduction of

cover or protection over a pipe without consultation with and the agreement of Indigo Pipelines staff.

4.PROTECTION
Where any works cross or run in close proximity to Indigo Pipelines apparatus, periodic visits must be made by an Indigo Pipelines engineer. Their requests for protection or support to the apparatus shall be immediately observed.

Suitably designed crossing points are to be constructed to the satisfaction of an Indigo Pipelines Engineer. These crossing points shall be clearly indicated by the erection of bunting and crossings at other places should be prevented.

Backfill material adjacent to Indigo Pipelines apparatus shall be soft fill or sand, containing no stones, bricks, or lumps of concrete etc., placed to a minimum 150mm around the mains and is to be well compacted by hand. No power consolidation shall take place above the main until 300mm of soft fill has been compacted by hand.

5.DAMAGE TO COATINGS
Where a gas pipe is coated with special wrapping and this is damaged, even to a minor extent, Indigo Pipelines must be notified so that repairs can be made to prevent future corrosion and subsequent leakage. **WHERE MINOR DAMAGE TO COATING IS REPORTED TO INDIGO PIPELINES PRIOR TO BACKFILL, THE NECESSARY REPAIR WILL BE MADE FREE OF CHARGE**.

6.CATHODIC PROTECTION
Where Indigo Pipelines apparatus is cathodically protected either by sacrificial anode or impressed current systems and where new apparatus is to be laid and is to be similarly protected, Indigo Pipelines will require to carry out interaction tests to determine whether its own system is adversely affected. The cost of any mutually agreed remedial action will be recharged to the authority installing the new apparatus. If any bond wires, test leads etc., used in connection with cathodic protection systems are damaged or found to be in poor condition, broken or disconnected, Indigo must be notified prior to backfilling so that a repair can be made.

7.HOT WORKS
Even when a gas free atmosphere exists care must be taken when carrying out hot works in close proximity to gas plant in order to ensure that no damage occurs. Particular care must be taken to avoid damage by heat or naked flames to plastic gas pipes or to the protective coatings on other pipes.

8.DEMOLITION
Live gas services must be disconnected **PRIOR** to demolishing any property, arrangements must be made for Indigo to check for the presence of any live gas services.

9.TREE PLANTING
Indigo must be contacted prior to all tree-planting works above or near our apparatus. Further information can then be made available.

10.DEEP EXCAVATIONS
Any work involving deep excavations (1.5m or more) will be subject to the "Model Consultative Procedure for Pipeline Construction involving Deep Excavations". This may require the diversion of Indigo Pipelines apparatus prior to the commencement of your works.
Detailed plans and cross sections will be required in order to determine the effect of these works on Indigo Pipelines apparatus.

11.RENEWABLE ENERGY INSTALLATIONS
Wind Turbines – Indigo Pipelines must be advised of any planned development of wind turbines in the vicinity of an above 2 bar gas pipelines to ensure the development does not impact on the future safe operation of the pipeline. Industry guidance states that any wind turbine must be sited no closer than 1.5 times the proposed height of the turbine mast away from the nearest edge of the pipeline.

Solar Farms – Indigo Pipelines must be contacted regarding planned solar farms being considered in the vicinity of Indigo gas pipelines.

EWI – Indigo must be contacted regarding any EWI scheme to ensure the scheme does not impact upon Indigo's apparatus.

12.LEAKAGE FROM GAS MAINS OR SERVICES
If damage or leakage is caused or an escape of gas is smelt or suspected the following action should be taken at once:

- Remove all personnel from the immediate vicinity of the escape.
- Inform the 24hr Gas Emergency Service on **0800 111 999**
- Prevent any approach by the public, prohibit smoking, and extinguish all naked flames or other sources of ignition for at least 15 metres from the leakage. Do not operate any electrical switches in the vicinity of the escape.
- Assist gas personnel, Police and/or Fire Services as requested.

IN THE EVENT OF A LEAK, OBSERVE THE ABOVE BUT DO NOT ATTEMPT TO SEAL THE LEAK

REMEMBER – IF IN DOUBT; CONTACT 24HR GAS EMERGENCY LINE 0800 111 999

13.BUILDING PROXIMITIES

There are minimum proximity distances for buildings from Indigo Pipelines mains depending on both the operating pressure and the material of the main. Advice should be sought from Indigo prior to building works taking place to confirm these distances. For High Pressure pipelines you must seek further guidance from the HSE and Local Authority Planning team regarding their PADHI distances regarding building proximities as these may be in addition to Indigo Pipelines proximity distances for a pipeline.

Temporary buildings should not be placed above any gas pipe or within 3.0 metres of mains operating above 75mbar (medium, intermediate and high-pressure mains) during construction activities and in no circumstances should permanent structures be built over any pipe transporting gas.

14.SITE RESPONSIBILITIES

All costs incurred by Indigo for the repair of direct or consequential damage to gas plant will be rechargeable (with the exception of paragraph 5). Indigo reserves the right to divert any affected apparatus or alternatively specify suitable protection of its apparatus. If proved necessary during the course of site works, the cost of which will be chargeable.

The above requirements do not relieve you of the responsibility of taking all precautions necessary to safeguard the Company's plant and to avoid risk to persons and property. The persons for whom the works are being undertaken, their servants, agents and contractors shall indemnify Indigo's servants, agents and contractors against any loss, damage, expenses, claims and actions incurred or brought against Indigo Pipelines, its servants, agents and contractors in consequence of the provision of these works and activities associated therewith or ancillary thereto.

KEY TO MAPS

LP	Low Pressure	**PE**	Polyethylene
MP	Medium Pressure	**ST**	Steel
IP	Intermediate Pressure		

Asset location search

Thames Water Property Searches

RSK Environment LTD
18 Frogmore Road
HEMEL HEMPSTEAD
HP3 9RT

Search address supplied Richmond-Upon-Thames College
Egerton Road
Twickenham
TW2 7SJ

Your reference 1921744

Our reference ALS/ALS Standard/2022_4712143

Search date 1 September 2022

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: Richmond-Upon-Thames College, Egerton Road, Twickenham, TW2 7SJ

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and

pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

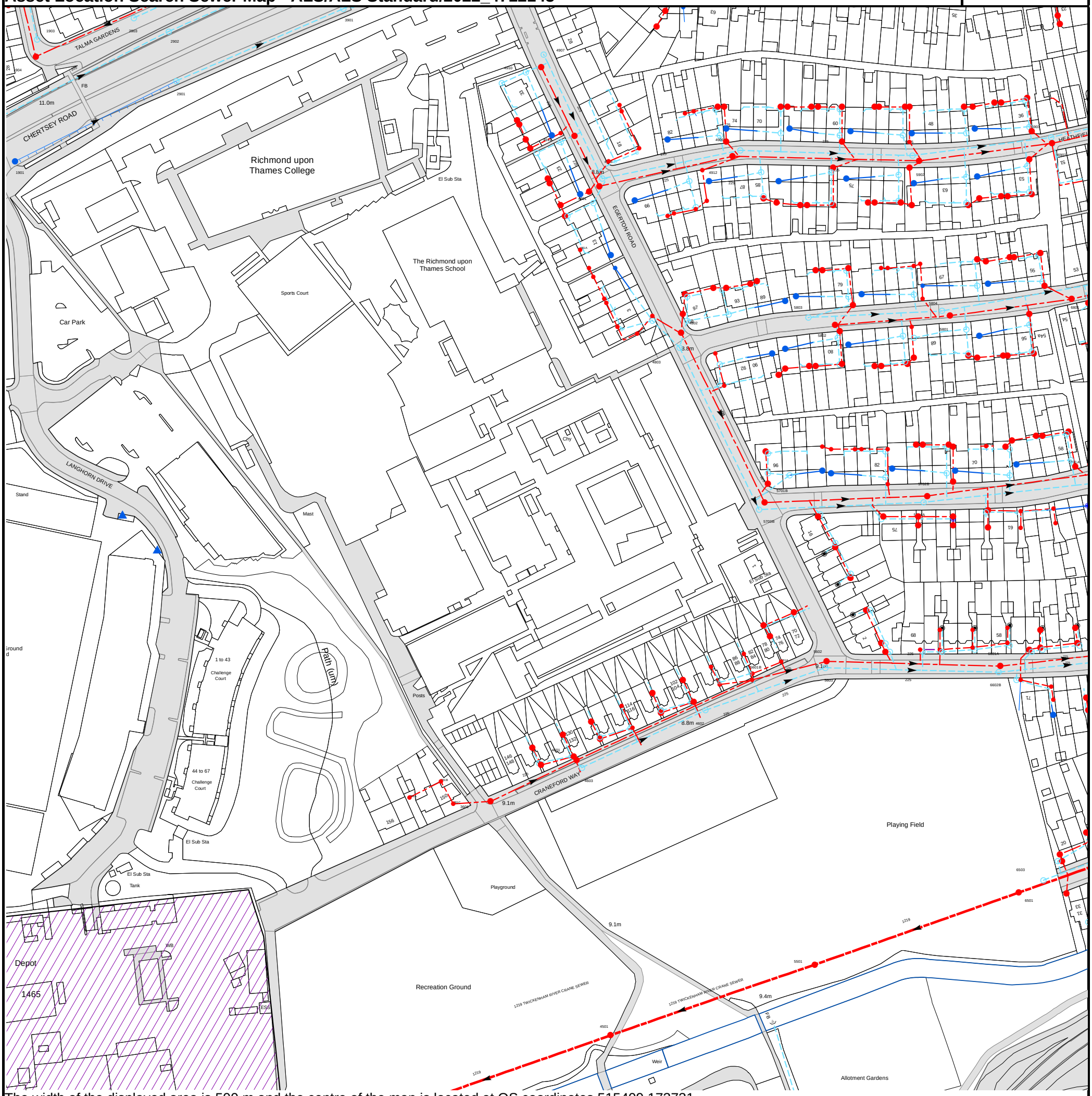
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4712143



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 515409,173731

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6801	n/a	n/a
68WS	n/a	n/a
66ST	n/a	n/a
66VZ	n/a	n/a
66VY	n/a	n/a
65ZS	n/a	n/a
65YY	n/a	n/a
66YR	n/a	n/a
66YZ	n/a	n/a
66ZP	n/a	n/a
6701A	n/a	n/a
67YS	n/a	n/a
67VY	n/a	n/a
67WW	n/a	n/a
68WP	n/a	n/a
68VS	n/a	n/a
68VR	n/a	n/a
68VQ	n/a	n/a
68VP	n/a	n/a
68VW	n/a	n/a
69XR	n/a	n/a
69XV	n/a	n/a
69XT	n/a	n/a
69WZ	n/a	n/a
6902	n/a	n/a
6903	n/a	n/a
69VQ	n/a	n/a
69VS	n/a	n/a
69WP	n/a	n/a
69WS	n/a	n/a
59XZ	n/a	n/a
59YS	n/a	n/a
69VX	n/a	n/a
69VV	n/a	n/a
69VW	n/a	n/a
69WT	n/a	n/a
69VT	n/a	n/a
69TZ	n/a	n/a
69TY	n/a	n/a
65ZV	n/a	n/a
6501	8.55	.24
6503	n/a	n/a
65YW	n/a	n/a
65ZP	n/a	n/a
65YX	n/a	n/a
66TP	n/a	n/a
66TT	n/a	n/a
66TS	n/a	n/a
66SX	n/a	n/a
66TR	n/a	n/a
6602B	n/a	n/a
6601A	n/a	n/a
66YP	n/a	n/a
56YY	n/a	n/a
66YX	n/a	n/a
66YQ	n/a	n/a
56ZR	n/a	n/a
66ZQ	n/a	n/a
66ZW	n/a	n/a
66YY	n/a	n/a
66ZS	n/a	n/a
66ZX	n/a	n/a
66YT	n/a	n/a
66ZV	n/a	n/a
56YZ	n/a	n/a
66ZY	n/a	n/a
67TQ	n/a	n/a
67TR	n/a	n/a
57SS	n/a	n/a
67TX	n/a	n/a
57SR	n/a	n/a
67VR	n/a	n/a
67TV	n/a	n/a
67TT	n/a	n/a
67TW	n/a	n/a
5702B	n/a	n/a
57ZV	n/a	n/a
67XX	n/a	n/a
57YX	n/a	n/a
57ZY	n/a	n/a
67ZQ	n/a	n/a
67ZT	n/a	n/a
67XY	n/a	n/a
67YY	n/a	n/a
57YY	n/a	n/a
57ZW	n/a	n/a
671A	n/a	n/a
57ZX	n/a	n/a
67YX	n/a	n/a
67YV	n/a	n/a
67YW	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
67ZV	n/a	n/a
67YT	n/a	n/a
58RW	n/a	n/a
58RQ	n/a	n/a
5804	n/a	n/a
5801	n/a	n/a
68RY	n/a	n/a
68VT	n/a	n/a
68QX	n/a	n/a
68SV	n/a	n/a
68TZ	n/a	n/a
68TY	n/a	n/a
68QW	n/a	n/a
68SW	n/a	n/a
68RP	n/a	n/a
68RZ	n/a	n/a
68SZ	n/a	n/a
68QV	n/a	n/a
68QT	n/a	n/a
68ST	n/a	n/a
68SS	n/a	n/a
68QR	n/a	n/a
68RS	n/a	n/a
68RT	n/a	n/a
68QS	n/a	n/a
68TS	n/a	n/a
68SR	n/a	n/a
68TR	n/a	n/a
68SQ	n/a	n/a
58TW	n/a	n/a
58TV	n/a	n/a
58WY	n/a	n/a
5802	n/a	n/a
58QS	n/a	n/a
58PR	n/a	n/a
58VS	n/a	n/a
58AS	n/a	n/a
58TT	n/a	n/a
58VR	n/a	n/a
58TS	n/a	n/a
58ST	n/a	n/a
58XW	n/a	n/a
58SP	n/a	n/a
58RZ	n/a	n/a
58XT	n/a	n/a
58UW	n/a	n/a
58OX	n/a	n/a
58AB	n/a	n/a
58XS	n/a	n/a
58SX	n/a	n/a
58AD	n/a	n/a
58AC	n/a	n/a
58SW	n/a	n/a
58AF	n/a	n/a
58RY	n/a	n/a
58RX	n/a	n/a
59TW	n/a	n/a
59TV	n/a	n/a
58ZR	n/a	n/a
59ZW	n/a	n/a
59YV	n/a	n/a
59VT	n/a	n/a
59VV	n/a	n/a
59TS	n/a	n/a
59TT	n/a	n/a
59ZQ	n/a	n/a
59WX	n/a	n/a
59WT	n/a	n/a
58XV	n/a	n/a
59WS	n/a	n/a
59ZS	n/a	n/a
58YV	n/a	n/a
59XP	n/a	n/a
59XQ	n/a	n/a
59WR	n/a	n/a
59WP	n/a	n/a
59WQ	n/a	n/a
59YX	n/a	n/a
59XX	n/a	n/a
5905	n/a	n/a
58XY	n/a	n/a
5902	n/a	n/a
56ZX	n/a	n/a
56ZT	n/a	n/a
56ZQ	n/a	n/a
56ZY	n/a	n/a
56ZV	n/a	n/a
56YQ	n/a	n/a
56YR	n/a	n/a
56YP	n/a	n/a
57RW	n/a	n/a
57RT	n/a	n/a
57SZ	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
57TQ	n/a	n/a
57VQ	n/a	n/a
57TW	n/a	n/a
57VP	n/a	n/a
57TV	n/a	n/a
57RX	n/a	n/a
57SW	n/a	n/a
57TZ	n/a	n/a
57SQ	n/a	n/a
57SP	n/a	n/a
57TT	n/a	n/a
5703B	n/a	n/a
5701B	n/a	n/a
5704A	n/a	n/a
57VS	n/a	n/a
57WW	n/a	n/a
57XX	n/a	n/a
57VZ	n/a	n/a
57XT	n/a	n/a
57WP	n/a	n/a
57VX	n/a	n/a
57YV	n/a	n/a
57WQ	n/a	n/a
57XY	n/a	n/a
57VT	n/a	n/a
57WZ	n/a	n/a
57WY	n/a	n/a
57WX	n/a	n/a
57XP	n/a	n/a
57XQ	n/a	n/a
57ZR	n/a	n/a
57ZS	n/a	n/a
48RY	n/a	n/a
48RT	n/a	n/a
58PX	n/a	n/a
58PW	n/a	n/a
58BP	n/a	n/a
58AA	n/a	n/a
58PV	n/a	n/a
58PT	n/a	n/a
48RZ	n/a	n/a
58QT	n/a	n/a
58PS	n/a	n/a
48TR	n/a	n/a
48VZ	n/a	n/a
48WP	n/a	n/a
48TY	n/a	n/a
49WV	n/a	n/a
48TX	n/a	n/a
48VR	n/a	n/a
48SW	n/a	n/a
48RS	n/a	n/a
48TV	n/a	n/a
48SX	n/a	n/a
48TT	n/a	n/a
4912	n/a	n/a
58WQ	n/a	n/a
58WR	n/a	n/a
59ZY	n/a	n/a
58XR	n/a	n/a
58ZX	n/a	n/a
58WP	n/a	n/a
58XQ	n/a	n/a
58ZQ	n/a	n/a
58WV	n/a	n/a
58QQ	n/a	n/a
58VP	n/a	n/a
58XP	n/a	n/a
58WZ	n/a	n/a
5803	n/a	n/a
4803	n/a	n/a
481B	n/a	n/a
4802	n/a	n/a
48ZV	n/a	n/a
48YX	n/a	n/a
48ZT	n/a	n/a
48YW	n/a	n/a
48SQ	n/a	n/a
48YY	n/a	n/a
48YZ	n/a	n/a
48SZ	n/a	n/a
48SV	n/a	n/a
48ZP	n/a	n/a
48ZQ	n/a	n/a
48YT	n/a	n/a
48XV	n/a	n/a
481A	n/a	n/a
48VP	n/a	n/a
48TZ	n/a	n/a
48XX	n/a	n/a
48VY	n/a	n/a
48WZ	n/a	n/a
48WW	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4801	n/a	n/a
4908	n/a	n/a
49YT	n/a	n/a
49ZT	n/a	n/a
49ZV	n/a	n/a
4909	n/a	n/a
49YV	n/a	n/a
49TW	n/a	n/a
49VT	n/a	n/a
4911	n/a	n/a
49VW	n/a	n/a
59SZ	n/a	n/a
49WQ	n/a	n/a
59VQ	n/a	n/a
49VP	n/a	n/a
49YW	n/a	n/a
49TZ	n/a	n/a
49VX	n/a	n/a
59TP	n/a	n/a
59TX	n/a	n/a
59TY	n/a	n/a
49TX	n/a	n/a
49TY	n/a	n/a
49YX	n/a	n/a
49SS	n/a	n/a
49SY	n/a	n/a
491B	n/a	n/a
46WX	n/a	n/a
4601	9.19	7.58
4603	8.95	8.14
46XY	n/a	n/a
46YR	n/a	n/a
46XX	n/a	n/a
46XT	n/a	n/a
46YQ	n/a	n/a
46XW	n/a	n/a
46YX	n/a	n/a
46YW	n/a	n/a
46ZQ	n/a	n/a
46WT	n/a	n/a
46ZP	n/a	n/a
46YV	n/a	n/a
4602	8.9	7.94
46ZV	n/a	n/a
46ZT	n/a	n/a
46ZX	n/a	n/a
46ZS	n/a	n/a
56XZ	n/a	n/a
5601B	n/a	n/a
56XX	n/a	n/a
561A	n/a	n/a
5603	n/a	n/a
5602	n/a	n/a
56YX	n/a	n/a
39ZR	n/a	n/a
39ZQ	n/a	n/a
39ZT	n/a	n/a
39ZP	n/a	n/a
49XQ	n/a	n/a
49YQ	n/a	n/a
4910	n/a	n/a
4907	n/a	n/a
49WY	n/a	n/a
48WY	n/a	n/a
49XT	n/a	n/a
48WX	n/a	n/a
49YP	n/a	n/a
49XP	n/a	n/a
48WT	n/a	n/a
48XY	n/a	n/a
191D	n/a	n/a
1901	10.99	9.35
1904	n/a	n/a
1903	n/a	n/a
2903	n/a	n/a
2902	n/a	n/a
2901	n/a	n/a
3901	n/a	n/a
391A	n/a	n/a
39ZV	n/a	n/a
4501	8.59	.14
5501	8.5	.2
361C	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2022_4712143

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 515409, 173731.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

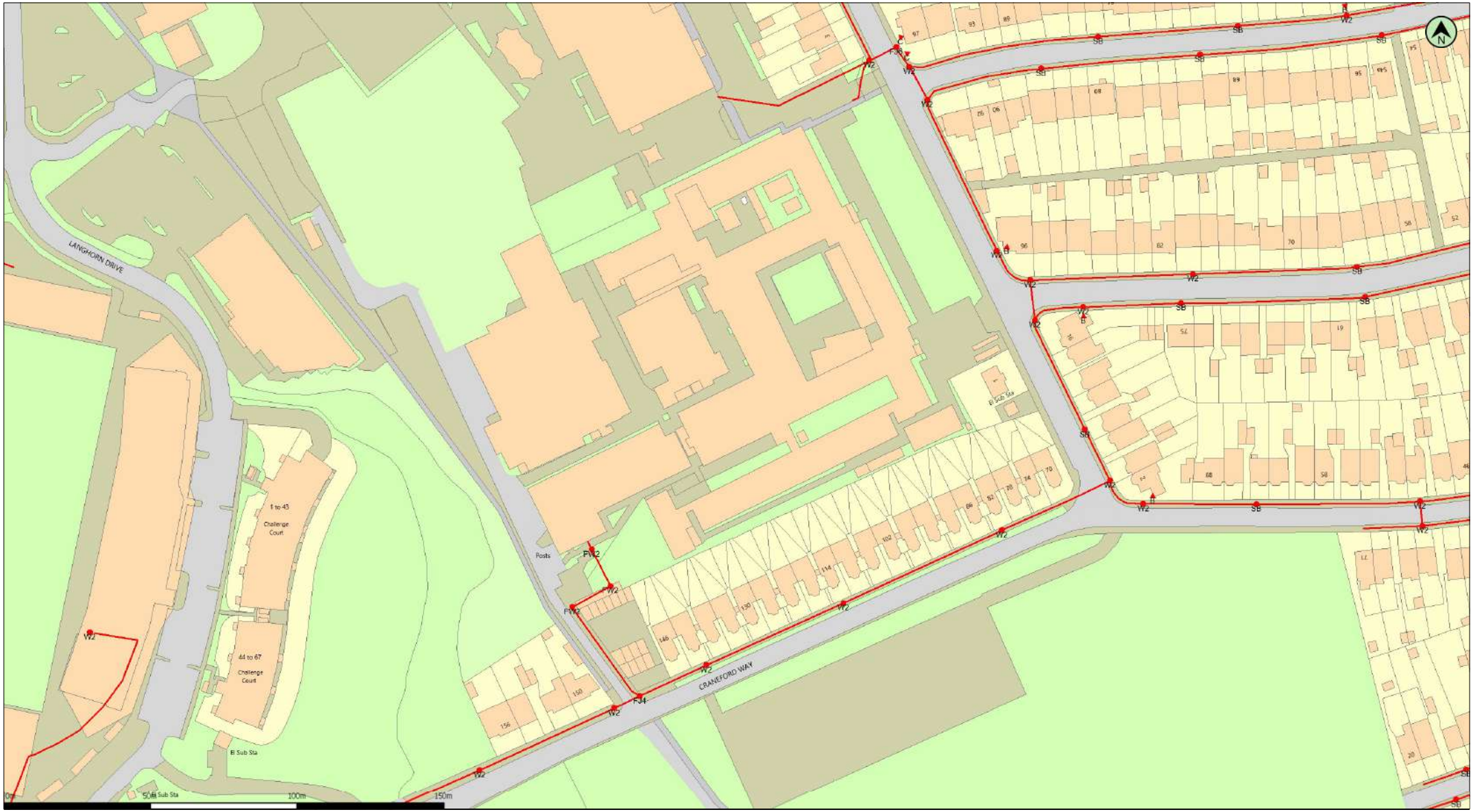
If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



 Date: 01/09/22 Scale: 1:1250 Map Centre: 515415,173714 Data updated: 31/07/22 Our Ref: 940440 - 1 Telecoms Plan A3

Duct, Trench

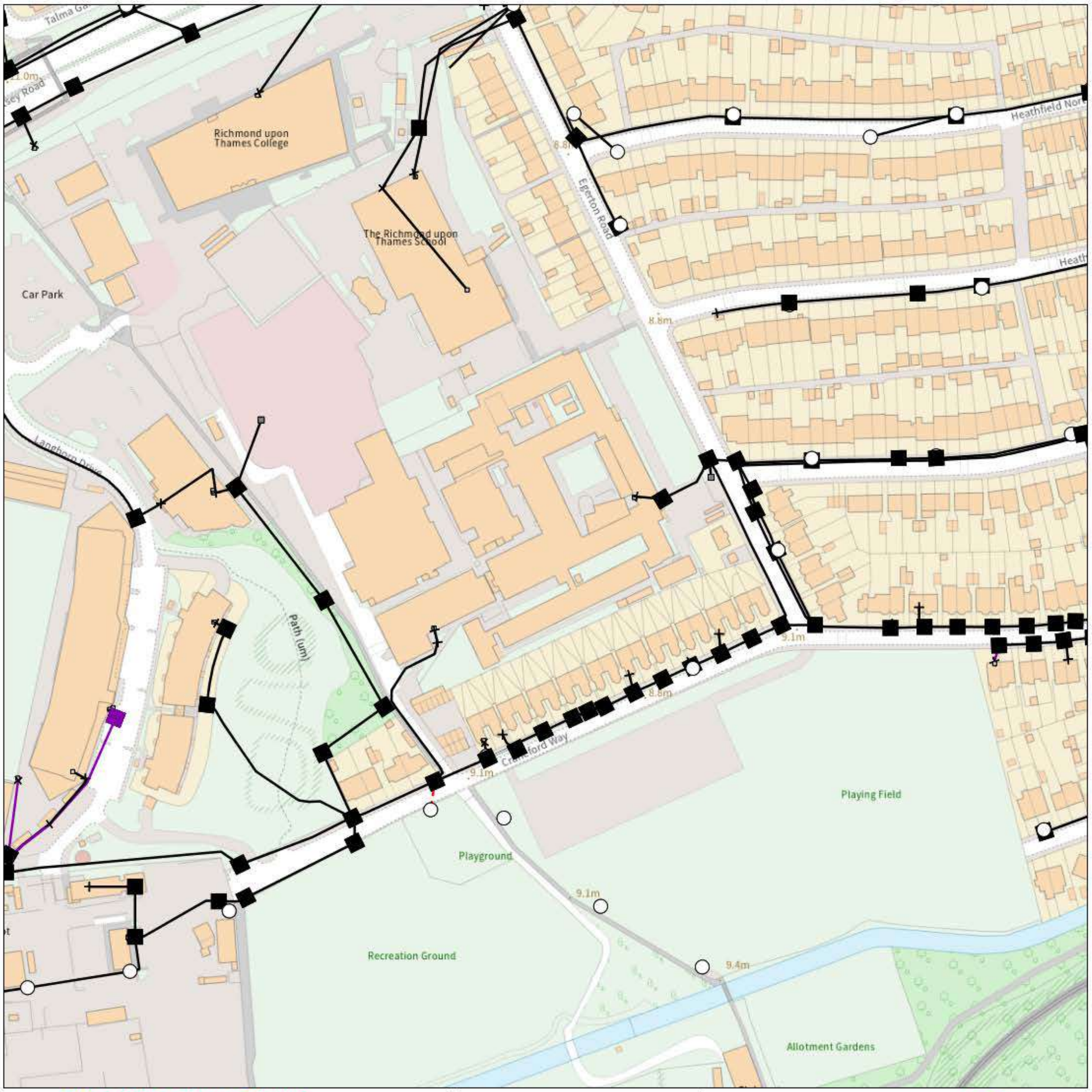
Chamber / Pole

Cabinet

melsom@rsk.co.uk

1921744

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

openreach

CLICK BEFORE YOU DIG

FOR PROFESSIONAL FREE ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS INCLUDING LOCATE AND MARKING SERVICE

email cbyd@openreach.co.uk

ADVANCE NOTICE REQUIRED
(Office hours: Monday - Friday 08.00 to 17.00)
www.openreach.co.uk/cbyd

Accidents happen

If you do damage any Openreach equipment please let us know by calling 0800 023 2023 (opt 1 + opt 1) and we can get it fixed ASAP

KEY TO BT SYMBOLS

	Planned	*Live*
PCP		
Pole		
Box		
Manhole		
Cabinet		

Change Of State	+	Hatchings	
Split Coupling	×	Built	
Duct Tee	▲	Planned	
Building		Inferred	
Kiosk	K	Duct	

Other proposed plant is shown using dashed lines.
BT Symbols not listed above may be disregarded.
Existing BT Plant may not be recorded.
Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.

	Pending Add	*In Place*	*Pending Remove*	*Not In Use*
Power Cable				
Power Duct				N/A

BT Ref : WXQ05154G
Map Reference : (centre) TQ1542173718
Easting/Northing : (centre) 515421,173718
Issued : 01/09/2022 17:15:26

WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk

APPENDIX G
SITE RECONNAISSANCE PHOTOGRAPHS

PHOTOGRAPHIC LOG		
Photo no. **1**	**Date:** 24/8/22	
Description: Access gates for the active school section of the site.		

Photo No. **2**	**Date:** 24/8/22	
Description: Entrance to the active school section of the site that joins the schools southern access road.		

Photo No.	Date:	
3	24/8/22	
Description: Continuing South East along the schools southern access road.		

Photo No.	Date:	
4	24/8/22	
Description: Facing back towards the access gates for the site (North West)		

Photo No.	Date:	
5	24/8/22	
Description: Looking East towards the rear of the active school site, and the location of WS3 and WS4		

Photo No.	Date:	
6	24/8/22	
Description: Looking East towards the rear of the active school site, and the location of WS4		

Photo No.	Date:
7	27/09/22

Description:

The facing South East looking at the location of BH1 with the protective cover.

Photo No.	Date:
8	

Description:

BH2

Photo No. 7	Date:	
Description: BH3		

Photo No. 8	Date:	
Description: WS1		

Photo No. 7	Date:	
Description: WS2		

Photo No. 8	Date:	
WS3		
Description:		

Photo No. 7	Date:	
Description: WS4		

Photo No. 8	Date:	
Description: WS5		

APPENDIX H
TECHNICAL BACKGROUND

H1 Desk Study

Aquifer designation and Source protection zones

Principal aquifer: layers of rock or drift deposit that have high intergranular and/or fracture permeability (usually providing a high level of water storage). They may support water supply and/or river base flow on a strategic scale.

Secondary A aquifer: 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.

Secondary B aquifer: predominantly lower permeability layers that may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

Secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both a minor and non-aquifer in different locations owing to the variable characteristics.

Unproductive' strata: low permeability with negligible significance for water supply or river base flow.

The EA generally adopts a three-fold classification of source protection zones (SPZ) surround abstractions for public water supply. The Site is situated in an area defined as follows:

- Zone 1 or the 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- Zone 2 or the 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants
- Zone 3 or the 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Preliminary risk assessment methodology

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) contaminant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the

likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)
- medium: chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required
- high: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term
- moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term
- low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild
- very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

H2 Site Investigation Methodology

Ground gas monitoring

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

Low flow groundwater sampling

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology.

The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

Reuse of suitable materials

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the

re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on-sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.

APPENDIX I
EXPLORATORY HOLE RECORDS

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Asphalt hardstanding.	0.20	
0.50	B1	B				MADE GROUND: Grey brown sandy angular to subangular fine to coarse GRAVEL of brick, sandstone, flint. Sand is fine to coarse.	0.50	
0.50		PID	0.0ppm				1.00	
1.00	B2	B				MADE GROUND: Grey brown sandy slightly clayey GRAVEL with medium cobble content. Gravel is angular to subangular fine to coarse brick, flint and concrete. Cobbles are of brick up to 80mm across. Sand is fine to coarse.	1.20	
1.10	D1	D					1.70	
1.20-1.65	1	SPT(c)	N=35				2.00	
1.50		PID	0.0ppm				2.50	
1.70	B3	B						
1.90	D2	D				MADE GROUND: Brown sandy clayey angular to subangular fine to coarse GRAVEL of flint, brick. Sand is fine to coarse.	(1.50)	
2.00-2.38	2	SPT(c)	9,12/15,21,29 for 75mm					
2.50	B4	B				MADE GROUND: Brown sandy clayey GRAVEL with medium cobble content. Gravel is angular to subangular fine to coarse flint, brick. Cobbles are of flint and brick up to 100mm across. Sand is fine to coarse.	4.00	
2.70	D3	D						
3.00-3.45	3	SPT(c)	N=52				(2.20)	
3.50	B5	B						
3.70	D4	D				Brown white and black sandy angular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	6.20	
4.00-4.45	4	SPT(c)	N=30					
4.50	B6	B						
4.70	D5	D				Very dense brown white and black sandy angular to rounded fine to coarse GRAVEL of flint. With low cobble content of flint up to 65mm. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	7.00	
5.00-5.45	5	SPT(c)	N=31					
5.50	B7	B						
6.00	D6	D						
6.20	D7	D				Low cobble content of flint up to 65mm		
6.50	U1	U	50 blows					
7.00	D8	D						
7.50	D9	D				Very dense brown white and black sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(2.50)	
8.50	B8	B						
						Medium dense grey brown sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER).	9.50	
9.50-9.65	6	SPT	NP				10.00	
						Very sandy at 5m bgl and becoming dense.		
						Firm grey silty CLAY (LONDON CLAY FORMATION)		
11.00	B9	B						
11.00	U2	U	60 blows			Very stiff grey silty CLAY with occasional selenite crystals. (LONDON CLAY FORMATION)		
11.50	D10	D						
12.00	D11	D				claystone band recorded.		
12.50-12.95	7	SPT	N=32					
13.00	B10	B				Very stiff grey silty CLAY with frequent selenite crystals and veins. (LONDON CLAY FORMATION)		
13.50	D12	D						
14.00	U3	U	65 blows			Very stiff grey silty CLAY with occasional selenite crystals and veins. (LONDON CLAY FORMATION)		
14.50	D13	D					(9.50)	
15.00	D14	D						
15.50-15.95	8	SPT	N=48					
16.00	B11	B						
16.50	D15	D						
17.00	U4	U	70 blows					
17.50	D16	D						
18.00	D17	D						
18.50-18.95	9	SPT	N=42					
19.00	B12	B					19.50	
						Description on next sheet		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	0.50	01:00
0.50	1.20	01:00
8.00	11.00	01:00
24.30	25.80	01:00

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No visual or olfactory evidence of contamination.
4. 50mm diameter gas/groundwater monitoring well complete with Flush protective cover installed to

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	AGS

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
20.00	U5	U	85 blows			Very stiff grey silty CLAY with frequent selenite crystals and veins (LONDON CLAY FORMATION) *(stratum copied from 19.50m from previous sheet)*	(6.30)	
20.50	D18	D						
21.00	D19	D						
21.50-21.95	10	SPT	N=44					
22.00	B13	B						
22.50	D20	D						
23.00	U6	U	85 blows					
23.50	D21	D						
24.00	D22	D				claystone band recorded.	25.80	
25.80	B14	B				Very stiff grey silty CLAY with frequent selenite crystals and veins (LONDON CLAY FORMATION)	(4.20)	
25.90	D23	D						
26.00-26.45	11	SPT	N=46					
26.50	B15	B						
27.00	D24	D						
27.50	U7	U	95 blows					
28.00	D25	D						
28.30	D26	D						
28.50-28.95	12	SPT	N=55					
29.00	B16	B						
29.30	D27	D						
29.50	U8	U	100 blows				30.00	
30.00	D28	D				Borehole terminated at 30m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

8m depth on completion. Response zone 3m to 8m depth.

5. Groundwater struck at 4.5m, rising to 3.8m after 20 minutes

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**21.09.22** End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.50	B1	B				MADE GROUND: Brown sandy angular to subangular fine to coarse GRAVEL of flint, brick, concrete, sandstone, glass and ceramic with medium cobble content of brick up to 110mm across. Sand is fine to coarse.	0.50	
0.50		PID	0.0ppm				1.20	
1.00	B2	B				MADE GROUND: Orangish brown sandy slightly clayey angular to rounded fine to coarse GRAVEL of flint and brick. Sand is fine to coarse.	2.00	
1.10	D1	D						
1.20-1.65	1	SPT(c)	N=36					
1.50		PID	0.0ppm					
1.70	B3	B				Dense brown, white and black sandy angular to subangular fine to medium GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.50)	
1.90	D2	D					3.50	
2.00-2.38	2	SPT(c)	9,10/15,21,28 for 75mm	1				
2.50	B4	B				Very dense brown, white and black sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.50)	
2.70	D3	D					5.00	
3.00-3.45	3	SPT(c)	N=46					
3.50	B5	B				Dense black, white and brown slightly sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)		
3.70	D4	D						
4.00-4.45	4	SPT(c)	N=33					
4.50	B6	B				Medium dense greyish brown sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(2.00)	
4.70	D5	D					7.00	
5.00-5.45	5	SPT(c)	N=21					
5.50	B7	B				Very stiff grey silty CLAY with rare concretions. (LONDON CLAY FORMATION)		
6.00	D6	D						
6.50-6.95	6	SPT(c)	N=18					
7.00	B8	B						
7.50	D7	D						
8.00	U1	U	55 blows					
8.50	D8	D						
9.00	D9	D				Claystone band noted.	(5.40)	
							12.40	
12.40	B9	B				Very stiff dark grey silty CLAY with frequent selenite crystals and rare concretions. (LONDON CLAY FORMATION)	(1.10)	
12.50-12.95	7	SPT	N=28					
13.00	B10	B					13.50	
13.50	D10	D				Very stiff dark grey silty CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)		
14.00	U2	U	65 blows					
14.50	D11	D						
15.00	D12	D						
15.50-15.95	8	SPT	N=31				(5.00)	
16.00	B11	B						
16.50	D13	D						
17.00	U3	U	70 blows					
17.50	D14	D						
18.00	D15	D						
							18.50	
18.50-18.95	9	SPT	N=39			Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION)		
19.00	B12	B						
19.50	D16	D					(3.00)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	0.20	01:00
0.20	1.20	01:00
9.10	12.40	01:00

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. Groundwater struck at 3.7m depth, rising to 3.5m depth after 20 minutes.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**21.09.22** End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
20.00	U4	U	75 blows			Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION) *(stratum copied from 18.50m from previous sheet)*	21.50	
20.50	D17	D						
21.00	D18	D						
21.50-21.95	10	SPT	N=52			Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)	(6.00)	
22.00	B13	B						
22.50	D19	D						
23.00	U5	U	85 blows					
23.50	D20	D						
24.00	D21	D						
24.50-24.95	11	SPT	N=45					
25.00	B14	B						
25.50	D22	D						
26.00	U6	U	90 blows					
26.50	D23	D						
27.00	D24	D					27.50	
27.50-27.95	12	SPT	N=55			Claystone band noted. Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)	(2.50)	
28.00	B15	B						
28.50	D25	D						
29.00	D26	D						
29.50	U7	U	95 blows					
30.00	D27	D				Borehole terminated at 30m bgl.	30.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

5. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 8m depth on completion. Response zone 3m to 8m depth.

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	AGS

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.50	1	ES	1xT+1xJ+1xV			MADE GROUND: Brown sandy angular to subangular fine to coarse GRAVEL of flint, brick, concrete, sandstone, glass and ceramic with low cobble content of subrounded concrete up to 80mm across. Sand is fine to coarse.	(1.20)	
0.50	B1	B					1.20	
0.50		PID	0.0ppm					
1.00	B2	B				MADE GROUND: Brown sandy slightly clayey angular to rounded fine to coarse GRAVEL of flint, brick and wood. Sand is fine to coarse.	1.70	
1.10	D1	D					(1.30)	
1.20-1.65	1	SPT(c)	N=9			Very dense brown white and yellow sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	3.00	
1.50	2	ES	1xT+1xJ+1xV					
1.50		PID	0.0ppm					
1.70	B3	B					3.50	
1.80	D2	D				Very dense brown yellow and white very sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.50)	
2.00-2.45	2	SPT(c)	N=56					
2.50	B4	B					5.00	
2.70	D3	D				Very dense black brown and white sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER) . . . Slight organic odour		
3.00-3.38	3	SPT(c)	9,11/20,20,23 for 75mm					
3.50	B5	B					6.00	
3.80	D4	D				Medium dense greyish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of flint. (KEMPTON PARK GRAVEL MEMBER)	7.00	
4.00	3	ES	1xT+1xJ+1xV					
4.00-4.38	4	SPT(c)	4,8/10,14,21 for 75mm					
4.00		PID	0.0ppm					
4.50	B6	B				Medium dense greyish brown very sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)		
4.80	D5	D						
5.00-5.45	5	SPT(c)	N=28					
5.50	B7	B						
6.00	D6	D				Very stiff dark grey silty CLAY with rare concretions. (LONDON CLAY FORMATION)	(4.00)	
6.50-6.95	6	SPT(c)	N=15					
7.00	B8	B						
7.50	D7	D				Claystone band noted.		
8.00	U1	U	50 blows					
8.50	D8	D						
9.00	D9	D					11.00	
11.00-11.45	7	SPT	N=36			Stiff dark grey silty CLAY with rare concretions and common selenite crystals. (LONDON CLAY FORMATION)	12.00	
11.50	B9	B						
12.00	D10	D				Very stiff dark grey silty fissured CLAY with common selenite crystals and common concretions up to 15mm across. (LONDON CLAY FORMATION)	(1.50)	
12.50	U2	U	55 blows					
13.00	D11	D					13.50	
13.50	D12	D				Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)		
14.00-14.45	8	SPT	N=37					
14.50	B10	B						
15.00	D13	D						
15.50	U3	U	55 blows				(4.50)	
16.00	D14	D						
16.50	D15	D						
17.00-17.45	9	SPT	N=51					
17.50	B11	B					18.00	
18.00	D16	D				Very stiff dark grey silty laminated CLAY with common selenite crystals. (LONDON CLAY FORMATION)		
18.50	U4	U	65 blows					
19.00	D17	D						
19.50	D18	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	1.20	01:00
9.00	11.00	00:30

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No visual or olfactory evidence of contamination.
4. Groundwater struck at 3.7m depth, rising to 3.5m depth after 20 minutes.

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
20.00-20.45	10	SPT	N=58			Very stiff dark grey silty laminated CLAY with common selenite crystals. (LONDON CLAY FORMATION) *(stratum copied from 18.00m from previous sheet)*	(5.00)	
20.50	B12	B						
21.00	D19	D						
21.50	U5	U	65 blows					
22.00	D20	D						
22.50	D21	D					23.00	
23.00-23.45	11	SPT	N=61			Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION) Claystone band noted.	(2.50)	
23.50	B13	B						
24.00	D22	D						
							25.50	
25.50	B14	B				Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare concretions up to 5mm across. (LONDON CLAY FORMATION)	(2.00)	
25.50	U6	U	85 blows					
26.00	D23	D						
26.50	D24	D						
27.00-27.45	12	SPT	N=82				27.50	
27.50	B15	B				Very stiff grey silty fissured CLAY with common selenite crystals and rare shell fragments. Very stiff grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION) . . . Band of fine Sand.	(2.50)	
28.00	D25	D						
28.50	U7	U	70 blows					
29.00	D26	D						
29.30	D27	D						
29.50-29.95	13	SPT	N=68				30.00	
30.00	B16	B				Borehole terminated at 30m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

5. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 8m depth on completion. Response zone 3m to 8m depth.

All dimensions in metres | Scale: **1:111**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	AGS

RSK GEOSCIENCES

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**1** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Tarmac	0.20	
						MADE GROUND: Grey brown sandy angular to subangular fine to coarse GRAVEL of brick, sandstone, flint. Sand is fine to coarse.	0.50	
0.50	B1	B				MADE GROUND: Grey brown sandy slightly clayey angular to subangular fine to coarse GRAVEL of brick flint concrete. Medium, cobble content of brick up to 80mm across. Sand is fine to coarse.	(0.50)	
0.50		PID	0.0ppm				1.00	
1.00	B2	B				MADE GROUND: Brown sandy clayey angular to subangular fine to coarse GRAVEL of flint, brick. Sand is fine to coarse.	1.20	
1.10	D1	D						
1.20-1.65	1	SPT(c)	N=35				(0.50)	
1.50		PID	0.0ppm			MADE GROUND: Brown sandy clayey angular to subangular fine to coarse GRAVEL of flint, brick. Medium cobble content of flint and brick up to 100mm across. Sand is fine to coarse.	1.70	
1.70	B3	B						
1.90	D2	D				Dense brown white and black sandy angular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	2.00	
2.00-2.38	2	SPT(c)	9,12/15,21,29 for 75mm				(0.50)	
							2.50	
2.50	B4	B				Dense brown white and black sandy angular to rounded fine to coarse GRAVEL of flint. With low cobble content of flint up to 65mm. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)		
2.70	D3	D						
3.00-3.45	3	SPT(c)	N=52			Low cobble content of flint up to 65mm		
						Dense brown white and black sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(2.00)	
3.50	B5	B						
3.70	D4	D						
4.00-4.45	4	SPT(c)	N=30				4.50	
4.50	B6	B				Dense grey brown sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER).		
4.70	D5	D					(1.00)	
5.00-5.45	5	SPT(c)	N=31			Very sandy at 5m bgl		
							5.50	
5.50	B7	B				Dense grey brown sandy slightly clayey angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER).	(0.50)	
							6.00	
6.00	D6	D				Firm grey silty CLAY (LONDON CLAY FORMATION)		
6.20	D7	D					(1.00)	
6.50	U1	U	50 blows					
							7.00	
7.00	D8	D				Very stiff grey silty CLAY with occasional selenite crystals. (LONDON CLAY FORMATION)		
7.50	D9	D					(1.50)	
							8.50	
8.50	B8	B				Strong grey thinly bedded CLAYSTONE with occasional selenite veins (LONDON CLAY FORMATION)	(1.00)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	0.50	01:00
0.50	1.20	01:00
8.00	11.00	01:00
24.30	25.80	01:00

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No visual or olfactory evidence of contamination.
4. 50mm diameter gas/groundwater monitoring well complete with Flush protective cover installed to

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	AGS

RSK GEOSCIENCES

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**2** of **4**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
						Strong grey thinly bedded CLAYSTONE with occasional selenite veins (LONDON CLAY FORMATION) *(stratum copied from 8.50m from previous sheet)*	9.50	
9.50-9.65	6	SPT	NP			Very stiff grey silty CLAY with frequent selenite crystals and veins. (LONDON CLAY FORMATION)	(0.50) 10.00	
						Very stiff grey silty CLAY with occasional selenite crystals and veins. (LONDON CLAY FORMATION)	(9.50)	
11.00	B9	B						
11.00	U2	U	60 blows					
11.50	D10	D						
12.00	D11	D						
12.50-12.95	7	SPT	N=32					
13.00	B10	B						
13.50	D12	D						
14.00	U3	U	65 blows					
14.50	D13	D						
15.00	D14	D						
15.50-15.95	8	SPT	N=48					
16.00	B11	B						
16.50	D15	D						
17.00	U4	U	70 blows					
17.50	D16	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

8m depth on completion. Response zone 3m to 8m depth.

5. Groundwater struck at 4.5m, rising to 3.8m after 20 minutes

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	

RSK GEOSCIENCES

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**3** of **4**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
18.00	D17	D				Very stiff grey silty CLAY with occasional selenite crystals and veins. (LONDON CLAY FORMATION) *(stratum copied from 10.00m from previous sheet)*		
18.50-18.95	9	SPT	N=42					
19.00	B12	B					19.50	
20.00	U5	U	85 blows			Very stiff grey silty CLAY with frequent selenite crystals and veins (LONDON CLAY FORMATION)		
20.50	D18	D						
21.00	D19	D						
21.50-21.95	10	SPT	N=44				(4.80)	
22.00	B13	B						
22.50	D20	D						
23.00	U6	U	85 blows					
23.50	D21	D						
24.00	D22	D					24.30	
						Strong grey thinly bedded CLAYSTONE with frequent selenite veins. (LONDON CLAY FORMATION)	(1.50)	
25.80	B14	B					25.80	
25.90	D23	D				Very stiff grey silty CLAY with frequent selenite crystals and veins (LONDON CLAY FORMATION)		
26.00-26.45	11	SPT	N=46					
26.50	B15	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**26.09.22** End: **27.09.22**	**9.47**	**E:515371.2 N:173742.6**	**4** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
27.00	D24	D				Very stiff grey silty CLAY with frequent selenite crystals and veins (LONDON CLAY FORMATION) *(stratum copied from 25.80m from previous sheet)*	(4.20)	
27.50	U7	U	95 blows					
28.00	D25	D						
28.30	D26	D						
28.50-28.95	12	SPT	N=55					
29.00	B16	B						
29.30	D27	D						
29.50	U8	U	100 blows				30.00	
30.00	D28	D				Borehole terminated at 30m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**MJackaman**	

AGS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**1** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Brown sandy angular to subangular fine to coarse GRAVEL of flint, brick, concrete, sandstone, glass and ceramic with medium cobble content of brick up to 110mm across. Sand is fine to coarse.	(0.50)	
0.50	B1	B					0.50	
0.50		PID	0.0ppm			MADE GROUND: Orangish brown sandy slightly clayey angular to rounded fine to coarse GRAVEL of flint and brick. Sand is fine to coarse.	(0.70)	
1.00	B2	B					1.20	
1.10	D1	D						
1.20-1.65	1	SPT(c)	N=36			Dense brown, white and black sandy angular to subangular fine to medium GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(0.80)	
1.50		PID	0.0ppm				2.00	
1.70	B3	B						
1.90	D2	D						
2.00-2.38	2	SPT(c)	9,10/15,21,28 for 75mm			Dense brown, white and black sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.50)	
2.50	B4	B						
2.70	D3	D						
3.00-3.45	3	SPT(c)	N=46				3.50	
3.50	B5	B				Dense black, white and brown slightly sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.50)	
3.70	D4	D						
4.00-4.45	4	SPT(c)	N=33				5.00	
4.50	B6	B						
4.70	D5	D						
5.00-5.45	5	SPT(c)	N=21			Dense greyish brown sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(2.00)	
5.50	B7	B						
6.00	D6	D					7.00	
6.50-6.95	6	SPT(c)	N=18					
7.00	B8	B				Very stiff grey silty CLAY with rare concretions. (LONDON CLAY FORMATION)	(2.10)	
7.50	D7	D						
8.00	U1	U	55 blows					
8.50	D8	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	0.20	01:00
0.20	1.20	01:00
9.10	12.40	01:00

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. Groundwater struck at 3.7m depth, rising to 3.5m depth after 20 minutes.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**21.09.22** End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**2** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	D9	D				Strong grey thinly bedded CLAYSTONE with common selenite mineral veins. (LONDON CLAY FORMATION)	9.10	
							(3.30)	
12.40	B9	B					12.40	
12.50-12.95	7	SPT	N=28			Very stiff dark grey silty CLAY with frequent selenite crystals and rare concretions. (LONDON CLAY FORMATION)	(1.10)	
13.00	B10	B					13.50	
13.50	D10	D				Very stiff dark grey silty CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)		
14.00	U2	U	65 blows					
14.50	D11	D						
15.00	D12	D						
15.50-15.95	8	SPT	N=31					
16.00	B11	B					(5.00)	
16.50	D13	D						
17.00	U3	U	70 blows					
17.50	D14	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

5. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 8m depth on completion. Response zone 3m to 8m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**21.09.22** End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**3** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00	D15	D				Very stiff dark grey silty CLAY with frequent selenite crystals. (LONDON CLAY FORMATION) *(stratum copied from 13.50m from previous sheet)*	18.50	
18.50-18.95	9	SPT	N=39			Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION)	(3.00)	
19.00	B12	B						
19.50	D16	D						
20.00	U4	U	75 blows					
20.50	D17	D						
21.00	D18	D						
21.50-21.95	10	SPT	N=52			Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)	21.50	
22.00	B13	B					(5.50)	
22.50	D19	D						
23.00	U5	U	85 blows					
23.50	D20	D						
24.00	D21	D						
24.50-24.95	11	SPT	N=45					
25.00	B14	B						
25.50	D22	D						
26.00	U6	U	90 blows					
26.50	D23	D					27.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	End: **23.09.22**	**9.29**	**E:515315.0 N:173729.5**	**4** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
27.00	D24	D				Strong grey thinly bedded CLAYSTONE with common selenite mineral veins. (LONDON CLAY FORMATION)	(0.50)	
							27.50	
27.50-27.95	12	SPT	N=55			Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)		
28.00	B15	B						
28.50	D25	D					(2.50)	
29.00	D26	D						
29.50	U7	U	95 blows					
							30.00	
30.00	D27	D				Borehole terminated at 30m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**1** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.50	1	ES	1xT+1xJ+1xV			MADE GROUND: Brown sandy angular to subangular fine to coarse GRAVEL of flint, brick, concrete, sandstone, glass and ceramic with low cobble content of subrounded concrete up to 80mm across. Sand is fine to coarse.	(1.20)	
0.50	B1	B						
0.50		PID	0.0ppm					
1.00	B2	B					1.20	
1.10	D1	D				MADE GROUND: Brown sandy slightly clayey angular to rounded fine to coarse GRAVEL of flint, brick and wood. Sand is fine to coarse.	(0.50)	
1.20-1.65	1	SPT(c)	N=9					
1.50	2	ES	1xT+1xJ+1xV				1.70	
1.50		PID	0.0ppm			Dense brown white and yellow sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.30)	
1.70	B3	B						
1.80	D2	D						
2.00-2.45	2	SPT(c)	N=56					
2.50	B4	B					3.00	
2.70	D3	D						
3.00-3.38	3	SPT(c)	9,11/20,20,23 for 75mm			Dense brown yellow and white very sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(0.50)	
3.50	B5	B					3.50	
3.80	D4	D				Dense black brown and white sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER) . . . Slight organic odour	(1.50)	
4.00	3	ES	1xT+1xJ+1xV					
4.00-4.38	4	SPT(c)	4,8/10,14,21 for 75mm					
4.00		PID	0.0ppm				5.00	
4.50	B6	B						
4.80	D5	D						
5.00-5.45	5	SPT(c)	N=28			Greyish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of flint. (KEMPTON PARK GRAVEL MEMBER)	(1.00)	
5.50	B7	B						
6.00	D6	D					6.00	
6.50-6.95	6	SPT(c)	N=15			Dense greyish brown very sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL MEMBER)	(1.00)	
7.00	B8	B					7.00	
7.50	D7	D				Very stiff dark grey silty CLAY with rare concretions. (LONDON CLAY FORMATION)	(2.00)	
8.00	U1	U	50 blows					
8.50	D8	D					9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	1.20	01:00
9.00	11.00	00:30

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No visual or olfactory evidence of contamination.
4. Groundwater struck at 3.7m depth, rising to 3.5m depth after 20 minutes.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**2** of **4**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	D9	D				Medium weak to strong dark grey thinly bedded CLAYSTONE with common selenite mineral veins. (LONDON CLAY FORMATION)	(2.00)	
							11.00	
11.00-11.45	7	SPT	N=36			Stiff dark grey silty CLAY with rare concretions and common selenite crystals. (LONDON CLAY FORMATION)	(1.00)	
11.50	B9	B					12.00	
12.00	D10	D				Very stiff dark grey silty fissured CLAY with common selenite crystals and common concretions up to 15mm across. (LONDON CLAY FORMATION)	(1.50)	
12.50	U2	U	55 blows				13.50	
13.00	D11	D						
13.50	D12	D				Very stiff dark grey silty fissured CLAY with frequent selenite crystals. (LONDON CLAY FORMATION)	(4.50)	
14.00-14.45	8	SPT	N=37					
14.50	B10	B						
15.00	D13	D						
15.50	U3	U	55 blows					
16.00	D14	D						
16.50	D15	D						
17.00-17.45	9	SPT	N=51					
17.50	B11	B					18.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

5. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 8m depth on completion. Response zone 3m to 8m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

AGS

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**3** of **4**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00	D16	D				Very stiff dark grey silty laminated CLAY with common selenite crystals. (LONDON CLAY FORMATION)		
18.50	U4	U	65 blows					
19.00	D17	D						
19.50	D18	D						
20.00-20.45	10	SPT	N=58					
20.50	B12	B					(5.00)	
21.00	D19	D						
21.50	U5	U	65 blows					
22.00	D20	D						
22.50	D21	D						
							23.00	
23.00-23.45	11	SPT	N=61			Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION)		
23.50	B13	B					(1.20)	
24.00	D22	D						
							24.20	
						Strong dark grey CLAYSTONE with common selenite mineral veins. (LONDON CLAY FORMATION)		
							(1.30)	
							25.50	
25.50	B14	B				Very stiff dark grey silty fissured CLAY with frequent selenite crystals and rare concretions up to 5mm across. (LONDON CLAY FORMATION)		
25.50	U6	U	85 blows					
26.00	D23	D						
26.50	D24	D					(2.00)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	

RSK GEOSCIENCES

RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Richmond College	**Clarion Housing Group Ltd**	**BH03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**20.09.22** End: **21.09.22**	**9.52**	**E:515322.9 N:173764.0**	**4** of **4**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
27.00-27.45	12	SPT	N=82				27.50	
27.50	B15	B				Very stiff grey silty fissured CLAY with common selenite crystals and rare shell fragments. Very stiff grey silty fissured CLAY with frequent selenite crystals and rare shell fragments. (LONDON CLAY FORMATION)	(2.50)	
28.00	D25	D						
28.50	U7	U	70 blows					
29.00	D26	D				. . . Band of fine Sand.		
29.30	D27	D						
29.50-29.95	13	SPT	N=68				30.00	
30.00	B16	B				Borehole terminated at 30m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Cable percussion	**Dando 2500**	**Dave Hutson**	**CVickers**	AGS

RAW FIELD DATA

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Richmond College	**Clarion Housing Group Ltd**	**WS01-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**23.09.22** End: **23.09.22**	**9.26**	**E:515329.8 N:173698.5**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20	1	ES	1xT+1xJ+1xV			MADE GROUND: Concrete with reinforcement	0.10	
							MADE GROUND: Brown grey sandy angular to subangular fine to coarse GRAVEL of brick, metal, asphalt and concrete. Sand is fine to coarse.	(0.40) 0.50	
	0.80	2	ES	1xT+1xJ+1xV			MADE GROUND: Dark brown sandy clayey angular to subangular fine to coarse GRAVEL of brick and asphalt. Sand is fine to coarse.	(0.50) 1.00	
	1.40	3	ES	1xT+1xJ+1xV			Firm light brown gravelly slightly silty CLAY. Gravel is angular to subrounded fine to medium.	(0.40) 1.40	
							Brown orange slightly sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL)	1.50	
							Borehole terminated at 1.5m depth due to refusal.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No groundwater encountered.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Premier 110**	**Darren Ypey**	**MJackaman**	

RAW FIELD DATA

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Richmond College	**Clarion Housing Group Ltd**	**WS02-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**23.09.22** End: **23.09.22**	**9.20**	**E:515343.4 N:173680.3**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							MADE GROUND: Concrete	0.20	
	0.30	1	ES	1xT+1xJ+1xV			MADE GROUND: Brown grey slightly sandy angular to subangular fine to coarse GRAVEL with brick and cobbles. Sand is fine to coarse.	0.40	
	0.80	2	ES	1xT+1xJ+1xV			MADE GROUND: Firm mottled light and dark brown slightly gravelly CLAY with clinker and a low cobble content of brick. Gravel is angular to subangular fine to coarse of brick.	(0.60) 1.00	
	1.20	3	ES	1xT+1xJ+1xV			Mottled light brown orange and grey gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subrounded of flint.	(0.40) 1.40	
	1.60	4	ES	1xT+1xJ+1xV			Orange brown mottled sandy angular to subangular fine to coarse GRAVEL of flints with occasional cobbles. Sand is fine to coarse.	(0.60) 2.00	
							Borehole terminated at 2m depth due to refusal.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No groundwater encountered.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Premier 110**	**Darren Ypey**	**MJackaman**	

RAW FIELD DATA

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Richmond College	**Clarion Housing Group Ltd**	**WS03-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**23.09.22** End: **23.09.22**	**9.20**	**E:515343.4 N:173680.3**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30 0.30	1	ES PID	1xT+1xJ+1xV 0.0ppm			Grass over: Brown gravelly SILT. Gravel is angular to rounded fine to coarse flint. (TOPSOIL)	0.10	
							MADE GROUND: Red and brown sandy angular to subangular fine to coarse GRAVEL of brick. Sand is fine to coarse.	(0.70)	
	0.80 0.80	2	ES PID	1xT+1xJ+1xV 0.0ppm				0.80	
	1.00 1.00	3	ES PID	1xT+1xJ+1xV 0.0ppm			Firm mottled brown and orange slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of flint.	(0.30)	
								1.10	
	1.50	4	ES	1xT+1xJ+1xV			Dense brown sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL)	(0.90)	
								2.00	
							Borehole terminated at 2m due to refusal.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No groundwater encountered.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Premier 110**	**Darren Ypey**	**MJackaman**	

RAW FIELD DATA

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Richmond College	**Clarion Housing Group Ltd**	**WS04-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**23.09.22** End: **23.09.22**	**9.34**	**E:515343.4 N:173664.5**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES	1xT+1xJ+1xV			MADE GROUND: Brown slightly sandy angular to subangular fine to coarse GRAVEL with rootlets and brick. Sand is fine to coarse.	(0.50) 0.50	
	0.70	2	ES	1xT+1xJ+1xV			Light brown sandy clayey angular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse.	(0.30) 0.80	
	1.50	3	ES	1xT+1xJ+1xV			Light brown slightly sandy slightly clayey angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse.	(1.00) 1.80	
							Brown sandy slightly clayey angular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.	(1.20) 3.00	
	3.00	4	ES	1xT+1xJ+1xV			Brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.	(0.60) 3.60	
							Borehole terminated at 3.6m depth due to refusal.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No groundwater encountered.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Premier 110**	**Darren Ypey**	**MJackaman**	

RAW FIELD DATA

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Richmond College	**Clarion Housing Group Ltd**	**WS05-22**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921744	**23.09.22** End: **23.09.22**	**9.10**	**E:515373.2 N:173674.2**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20 0.20	1	ES PID	1xT+1xJ+1xV 0.0ppm			MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with low cobble content of concrete. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick and concrete.	(1.10) 1.10	
	0.80 0.80	1	ES PID	1xT+1xJ+1xV 0.0ppm			Firm mottled brown and orange slightly gravelly CLAY. Gravel is angular to subangular fine to medium of flint.	1.30	
	1.30 1.30	1	ES PID	1xT+1xJ+1xV 0.0ppm			Dense brown sandy angular to subangular fine to coarse GRAVEL of flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL)	(0.50) 1.80	
							Borehole terminated at 1.8m due to refusal.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position checked with Ground Penetrating Radar, CAT and Genny prior to excavation.
2. Inspection pit hand dug to 1.2m depth.
3. No groundwater encountered.
4. No visual or olfactory evidence of contamination.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Premier 110**	**Darren Ypey**	**CVickers**	

APPENDIX J
GROUND GAS MONITORING DATA AND SITE CONDITIONS

GAS MONITORING FIELD SHEET

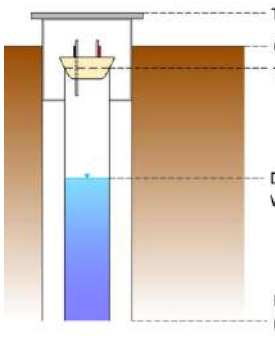
Monitoring Date:	03/10/2022	Measurement datum: TOC / GL / TOP / Other	TOP	Offset to GL (m):		-0.13	
Pre-Testing Remarks:		Air Temperature: °C	17C	Device:		GA2000	
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:		✓	
		Wind: NONE / LIGHT / MEDIUM / STRONG		None			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS02-22	Monitoring Round Number:	1	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:59	11:00	1023	0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:00	11:07				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0.1	20.9	0	0		0.5
5	0	15	0	0.1	18.6	0	0		
10	0	30	0	0.1	16.9	0	0		
15	0	60	0	0.1	16.6	0	0		
20	0	90	0	0.1	16.5	0	0		
25	0	120	0	0.1	16.5	0	0		
30	0	180	0	0.1	16.5	0	0		
40		240	0	0.1	16.5	0	0		
50		300	0	0.1	16.6	0	0		
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.47	Time:	11:07	LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	1.52	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	B.H
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

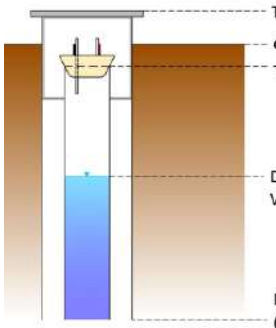
Monitoring Date:	03/10/2022	Measurement datum: TOC / GL / TOP / Other	TOP	Offset to GL (m):		-0.1	
Pre-Testing Remarks:		Air Temperature: °C	17C	Device:		GA2000	
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:		✓	
		Wind: NONE / LIGHT / MEDIUM / STRONG		None			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS04-22	Monitoring Round Number:	1	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:13	11:14	1023	-0.12	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:14	11:21				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0	0.1	20.9	0	0		0.2
5	0	15	0	1	20.5	0	0		
10	0	30	0.1	1.1	20.2	0	0		
15	0	60	0.1	1.1	20.2	0	0		
20	0	90	0.3	1.1	20.2	0	0		
25	0	120	0.3	1.1	20.2	0	0		
30	0	180	0.3	1.1	20.2	0	0		
40		240	0.2	1.1	20.2	0	0		
50		300	0.2	1.1	20.2	0	0		
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.16	Time:	11:21	LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	2.26	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	B.H
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

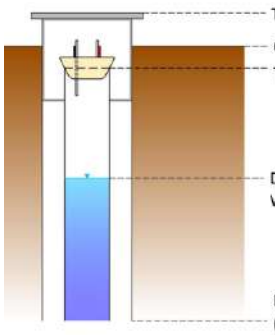
GAS MONITORING FIELD SHEET

Monitoring Date:	13/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		-0.13	
Pre-Testing Remarks:		Air Temperature: °C	13C	Device:		GFM	
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Wet	Daily Check:		✓	
		Wind: NONE / LIGHT / MEDIUM / STRONG		None			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS02-22	Monitoring Round Number:	2	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		
Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single	
Time Start (hh:mm)	10:30	10:34	1014		Observations (e.g. on-site activities):		
Time End (hh:mm)	10:33	10:40					

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	21	0	0		0.1
5	0	15	0	0	14.9	0	0		
10	0	30	0	0	14.1	0	0		
15	0	60	0	0	13.9	0	0		
20	0	90	0	0	13.7	0	0		
25	0	120	0	0	13.6	0	0		
30	0	180	0	0	13.2	0	0		
40	0	240	0	0.1	12.7	0	0		
50	0	300	0	0.2	12.1	0	0		
60	0	360	0	0.2	12	0	0		
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION	Depth (from datum) to water (DTW): (m)	1.34	Time:		LNAPL Top (from datum) (m):	-	
	Depth (from datum) to well base (DTB): (m)	1.67	Purge Start:	-	DNAPL Top (from datum) (m):	-	
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:		
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-			



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J10:30
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

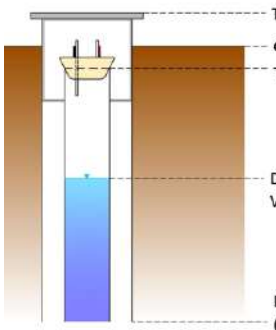
Monitoring Date:	13/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	14C	Device:		GFM
		Weather:	Overcast	Serial Number:		
		Ground Conditions:	Wet	Daily Check:		✓
		Wind: NONE / LIGHT / MEDIUM / STRONG		None		
		Tidal State: (if applicable) High / Low / Rising / Falling		-		
Exploratory Position ID:	WS04-22	Monitoring Round Number:	2	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:52	10:56	1014		Observations (e.g. on-site activities):	
Time End (hh:mm)	10:55	11:01				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	21.4	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.5	0	0		0
5	0	15	0	0.6	20.3	0	0		
10	0	30	0	0.6	20.2	0	0		
15	0	60	0	0.6	20.2	0	0		
20	0	90	0	0.6	20.2	0	0		
25	0	120	0	0.6	20.2	0	0		
30	0	180	0	0.6	20.2	0	0		
40	0	240	0	0.6	20.2	0	0		
50	0	300	0	0.6	20.2	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.17	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	2.35	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

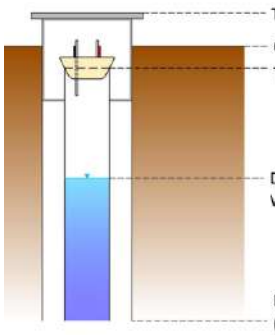
GAS MONITORING FIELD SHEET

Monitoring Date:	19/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		-0.13
Pre-Testing Remarks:		Air Temperature: °C	15C	Device:		GFM
		Weather:	Overcast	Serial Number:		
		Ground Conditions:	Dry	Daily Check:		✓
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		-		
Exploratory Position ID:	WS02-22	Monitoring Round Number:	3	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50
Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:45	10:49	1020		Observations (e.g. on-site activities):	
Time End (hh:mm)	10:48	10:54				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0	0	21.5	0	0		0.2
5	0	15	0	0	16.4	0	0		
10	0	30	0	0	15.7	0	0		
15	0	60	0	0	15.5	0	0		
20	0	90	0	0	15.5	0	0		
25	0	120	0	0	15.4	0	0		
30	0	180	0	0	15.3	0	0		
40	0	240	0	0	15.3	0	0		
50	0	300	0	0	15.3	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION	Depth (from datum) to water (DTW): (m)	1.57	Time:		LNAPL Top (from datum) (m):	-	
	Depth (from datum) to well base (DTB): (m)	1.67	Purge Start:	-	DNAPL Top (from datum) (m):	-	
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:		
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-			



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

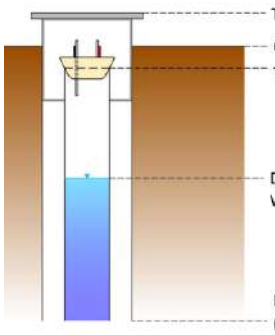
GAS MONITORING FIELD SHEET

Monitoring Date:	19/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			0
Pre-Testing Remarks:		Air Temperature: °C	15C	Device:	GFM		
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:	✓		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS04-22	Monitoring Round Number:	3	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		
Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single	
Time Start (hh:mm)	10:20	10:26	1020		Observations (e.g. on-site activities):		
Time End (hh:mm)	10:23	10:31					

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0	0	21.4	0	0		0
5	0	15	0	0.5	21.1	0	0		
10	0	30	0	0.5	21	0	0		
15	0	60	0	0.5	20.9	0	0		
20	0	90	0	0.5	21	0	0		
25	0	120	0	0.5	20.9	0	0		
30	0	180	0	0.5	20.9	0	0		
40	0	240	0	0.5	20.9	0	0		
50	0	300	0	0.5	20.9	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION	Depth (from datum) to water (DTW): (m)	2.2	Time:		LNAPL Top (from datum) (m):	-	
	Depth (from datum) to well base (DTB): (m)	2.35	Purge Start:	-	DNAPL Top (from datum) (m):	-	
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:		
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-			



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

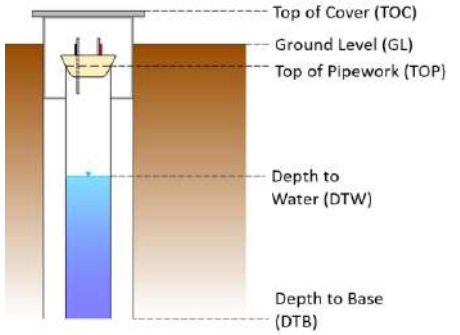
Monitoring Date:	24/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		-0.13	
Pre-Testing Remarks:		Air Temperature: °C	14C	Device:		GA2000	
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:		✓	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS02-22	Monitoring Round Number:	4	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	08:45	08:49	998	-0.3	Observations (e.g. on-site activities):	
Time End (hh:mm)	08:48	08:54				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0	0	20.3	0	0		0
5	0	15	0	0.1	18.8	0	0		
10	0	30	0	0.1	17.7	0	0		
15	0	60	0.1	0.1	18.3	0	0		
20	0	90	0.1	0.1	19.6	0	0		
25	0	120	0.1	0.1	20.2	0	0		
30	0	180	0.1	0.1	20.3	0	0		
40	0	240	0.1	0.1	20.3	0	0		
50	0	300	0.1	0.1	20.3	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION							
	Depth (from datum) to water (DTW): (m)	0.45	Time:		LNAPL Top (from datum) (m):	-	
	Depth (from datum) to well base (DTB): (m)	1.67	Purge Start:	-	DNAPL Top (from datum) (m):	-	
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:		
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-			



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

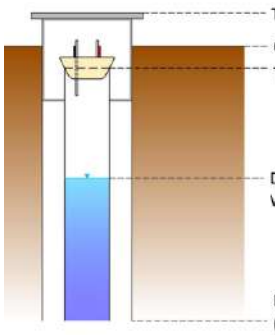
Monitoring Date:	24/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			0
Pre-Testing Remarks:		Air Temperature: °C	15C	Device:	GA2000		
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:	✓		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS04-22	Monitoring Round Number:	4	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	09:10	09:14	999	-0.27	Observations (e.g. on-site activities):	
Time End (hh:mm)	09:13	09:19				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.4	0	0		0
5	0	15	0	0.7	19.8	0	0		
10	0	30	0	0.7	19.2	0	0		
15	0	60	0	0.7	19.2	0	0		
20	0	90	0	0.7	19.2	0	0		
25	0	120	0	0.7	19.2	0	0		
30	0	180	0	0.7	19.2	0	0		
40	0	240	0	0.7	19.2	0	0		
50	0	300	0	0.7	19.2	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.42	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	2.35	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

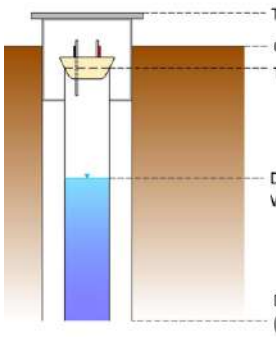
Monitoring Date:	31/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		-0.13	
Pre-Testing Remarks:		Air Temperature: °C	16C	Device:		GFM	
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:		✓	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS02-22	Monitoring Round Number:	5	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)			1014		Observations (e.g. on-site activities):	
Time End (hh:mm)						

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.8	0	0		0.1
5	0	15	0	0	16.2	0	0		
10	0	30	0	0	15.5	0	0		
15	0	60	0	0.1	15.4	0	0		
20	0	90	0	0	15.3	0	0		
25	0	120	0	0.1	15.2	0	0		
30	0	180	0	0	15.1	0	0		
40	0	240	0	0.1	14.9	0	0		
50	0	300	0	0.4	14.6	0	0		
60	0	360	0	0.7	14.1	0	0		
90	0	420	0	0.8	13.9	0	0		
120	0	480	0	0.9	13.7	0	0		
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.23	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	1.6	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

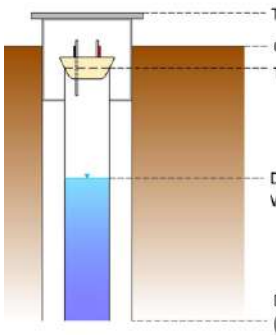
Monitoring Date:	31/10/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			0
Pre-Testing Remarks:		Air Temperature: °C	16C	Device:	GFM		
		Weather:	Overcast	Serial Number:			
		Ground Conditions:	Dry	Daily Check:	✓		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light			
		Tidal State: (if applicable) High / Low / Rising / Falling		-			
Exploratory Position ID:	WS04-22	Monitoring Round Number:	5	Test Number:	1		
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50		

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)			1013		Observations (e.g. on-site activities):	
Time End (hh:mm)						

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.9	0	0		0
5	0	15	0	0.5	20.2	0	0		
10	0	30	0	0.5	20.1	0	0		
15	0	60	0	0.5	20.1	0	0		
20	0	90	0	0.5	20	0	0		
25	0	120	0	0.5	20.1	0	0		
30	0	180	0	0.5	20.1	0	0		
40	0	240	0	0.5	20.1	0	0		
50	0	300	0	0.5	20.1	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.97	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	2.26	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

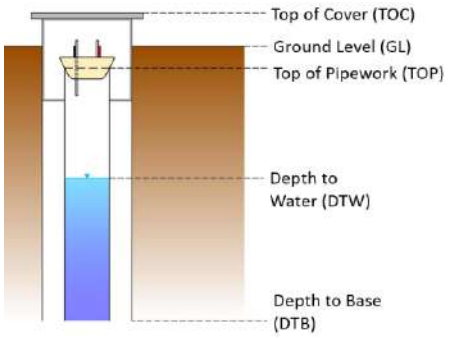
Monitoring Date:	07/11/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		-0.13
Pre-Testing Remarks:		Air Temperature: °C	13C	Device:		GFM
		Weather:	Overcast	Serial Number:		
		Ground Conditions:	Dry	Daily Check:		✓
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		-		
Exploratory Position ID:	WS02-22	Monitoring Round Number:	6	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)			1004		Observations (e.g. on-site activities):	
Time End (hh:mm)						

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.6	0	0		0
5	0	15	0	0.8	18.6	0	0		
10	0	30	0	0.8	18	0	0		
15	0	60	0	0.8	17.9	0	0		
20	0	90	0	0.8	18.3	0	0		
25	0	120	0	0.7	18.7	0	0		
30	0	180	0	0.1	20.1	0	0		
40	0	240							
50	0	300							
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.59	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	1.59	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
Gas analyser begun to take up water at 180 seconds	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

GAS MONITORING FIELD SHEET

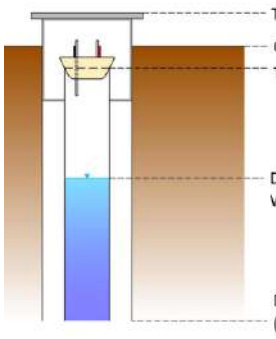
Monitoring Date:	07/11/2022	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	13C	Device:		GFM
		Weather:	Overcast	Serial Number:		
		Ground Conditions:	Dry	Daily Check:		✓
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		-		
Exploratory Position ID:	WS04-22	Monitoring Round Number:	6	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	-	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)			1013		Observations (e.g. on-site activities):	
Time End (hh:mm)						

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	LEL (%)	PID (ppm)
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)							
0	0	0	0	0	20.6	0	0		0
5	0	15	0	0.4	20.1	0	0		
10	0	30	0	0.4	20	0	0		
15	0	60	0	0.4	20	0	0		
20	0	90	0	0.4	20	0	0		
25	0	120	0	0.4	20	0	0		
30	0	180	0	0.4	20	0	0		
40	0	240	0	0.4	20	0	0		
50	0	300	0	0.4	20	0	0		
60	0	360							
90	0	420							
120	0	480							
150	0	540							
180	0	600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.25	Time:		LNAPL Top (from datum) (m):	-
	Depth (from datum) to well base (DTB): (m)	2.26	Purge Start:	-	DNAPL Top (from datum) (m):	-
	Hole Purged: Yes / No	No	Purge End:	-	Water Observations:	
	Purge Volume: (ltrs)	-	Post-Purge (DTW) (m)	-		



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Richmond College	Data Collected By:	R.J
	Project Manager / Engineer:	Danielle Evans	Checked:	
	Contract Ref:	1921744	Page number:	

APPENDIX K
GROUNDWATER SAMPLING RECORDS

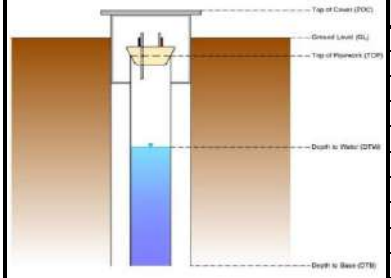
Groundwater Gauging Data Form

Project Information	Project Name:	Richmond College		
	Project Number:	1921744		
	Measurement Date:	03/10/2022	Sampled by:	B.H
	Weather:	17C - Overcast - Dry		
	Well Notes - e.g. Condition, access, safety:			

	Water Level Meter Used (X that applicable):			
	Interface probe	X	Dip Meter	X

Measurement datum:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.

Measurement Datum:	TOP	Offset from **datum** to GL (m):	



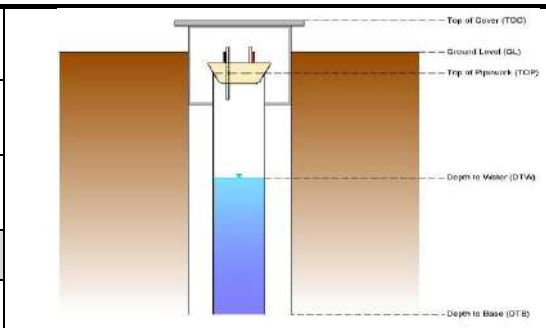
Time	BH ID	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Comments
10:40	BH01-22	-0.21	N			2.20	7.64	
10:45	BH02-22	-0.16	N			2.03	7.65	
10:50	BH03-22	-0.18	N			2.31	7.68	

Groundwater Sampling Data Form

This form is also available for RSK Mobile Data Capture.

Project Information	Project Name:	Richmond College		
	Project Number:			19
	Sampling Date:	13/10/2022	Sampled by:	R.J
	Weather:	Overcast		
	Well Notes - e.g. Condition, access, safety:	Good condition		

Monitoring Information	Water Quality Meter Used:	YSI		
	Water Quality Meter Last Calibrated:			
	Dissolved oxygen probe last calibrated:			
	Water Level Meter Used (X that applicable):			
	Interface probe		Dip Meter	X



Typical Parameter Stabilisation Criteria for Low-Flow Sampling		
	Dissolved Oxygen (D.O.)	0.3 mg/l
	Specific Conductivity (Sp.Cond)	3%
	p.H	0.1 unit
	Oxygen Reduction Potential (ORP)	10mV
	* For REDOX correction, see separate guidance	

BH ID	BH01-22		
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Reco positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.		
Measurement Datum:	GL	Offset from **datum** to GL (m):	0

Start Time:	12:41
Well Diameter (mm)	50
Well Material	
Initial Water Level (m)	2.35
LNAPL Present? (Y/N)	N
Initial LNAPL Level (m)	
Well Headspace Reading (PID/FID)	0
Purge Method (Give details in Notes section)	LowFlow
Sampling Method (Give details in Notes section.)	Peristaltic
Pump Intake Depth (m)	3.5
Depth to Base (m)	7.83
DNAPL Present? (Y/N)	N
Initial DNAPL Level (m)	

Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / (ml/m
								YSI	<Select Pro
12:46	16.5	459.9	1.81	6.92	-5.2	2.35		205.10	
12:49	16.6	497.1	1.31	6.9	-10.6	2.35		199.70	
12:52	16.6	499	1.04	6.86	-14.1	2.35		196.20	
12:55	16.6	502.8	0.95	6.86	-16.5	2.35		193.80	
12:58	16.6	505.6	0.9	6.86	-17.8	2.35		192.50	

Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.	Clear, no odour. 16 seconds to fill a 40ml vile
Sample Containers Obtained	
Sample Collection Time	12:59

BH ID	BH02-22
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Reco positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.
Measurement Datum:	GL — Offset from **datum** to GL (m): 0

Start Time:	11:14
Well Diameter (mm)	50
Well Material	
Initial Water Level (m)	2.11
LNAPL Present? (Y/N)	N
Initial LNAPL Level (m)	
Well Headspace Reading (PID/FID)	0
Purge Method (Give details in Notes section)	LowFlow
Sampling Method (Give details in Notes section.)	Peristaltic
Pump Intake Depth (m)	3.5
Depth to Base (m)	7.81
DNAPL Present? (Y/N)	N
Initial DNAPL Level (m)	

Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / (ml/m
								Aquaread	<Select Pro
11:14	15.7	1139	3.25	6.34	11.1	2.11		224.40	
11:17	15.6	1153	2.77	6.36	1.6	2.11		214.90	
11:20	15.6	1164	2.5	6.37	-3.3	2.11		210.00	
11:23	15.6	1168	2.3	6.38	-6.7	2.11		206.60	
11:26	15.6	1171	2.14	6.38	-9.5	2.11		203.80	

Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.	Clear, no odour. 16 seconds to fill a 40ml vile
Sample Containers Obtained	
Sample Collection Time	11:27

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BH ID	BH03
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Reco positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.
Measurement Datum:	GL — Offset from **datum** to GL (m): 0

Start Time:	11:56
Well Diameter (mm)	50
Well Material	
Initial Water Level (m)	2.42
LNAPL Present? (Y/N)	N
Initial LNAPL Level (m)	
Well Headspace Reading (PID/FID)	0
Purge Method (Give details in Notes section)	LowFlow
Sampling Method (Give details in Notes section.)	Peristaltic
Pump Intake Depth (m)	3.5
Depth to Base (m)	7.84
DNAPL Present? (Y/N)	N
Initial DNAPL Level (m)	

Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / (ml/m
								Aquaread	<Select Pro
11:56	15.7	1106	2.38	6.43	-32.1	2.42		181.20	
11:59	15.6	1106	1.67	6.42	-35.8	2.42		177.50	
12:02	15.6	1106	1.38	6.42	-40.8	2.43		172.50	
12:05	15.6	1106	1.19	6.42	-43.7	2.43		169.60	
12:08	15.6	1106	1.08	6.42	-46.1	2.43		167.20	

Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.	Clear, no odour. 20 seconds to fill a 40ml vile
Sample Containers Obtained	
Sample Collection Time	12:09

TPF209 Issue 6 - June 2021

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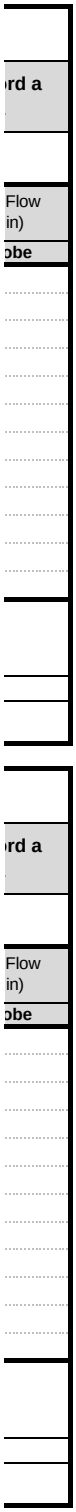
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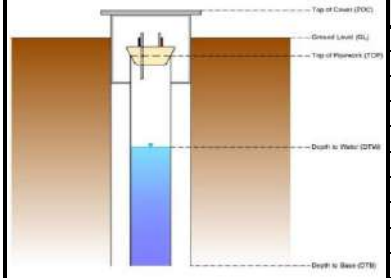
Groundwater Gauging Data Form

Project Information	Project Name:	Richmond College		
	Project Number:	1921744		
	Measurement Date:	19/10/2022	Sampled by:	R.J
	Weather:	15C - Overcast - Dry		
	Well Notes - e.g. Condition, access, safety:			

	Water Level Meter Used (X that applicable):			
	Interface probe	X	Dip Meter	X

Measurement datum:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.

Measurement Datum:	GL	Offset from **datum** to GL (m):	



Time	**BH ID**	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Comments
	BH01-22	0	N			2.38	7.83	
	BH02-22	0	N			2.13	7.84	
	BH03-22	0	N			2.53	7.87	

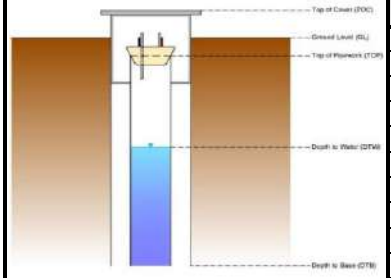
Groundwater Gauging Data Form

Project Information	Project Name:	Richmond College		
	Project Number:	1921744		
	Measurement Date:	24/10/2022	Sampled by:	R.J
	Weather:	14C - Overcast - Dry		
	Well Notes - e.g. Condition, access, safety:			

	Water Level Meter Used (X that applicable):			
	Interface probe	X	Dip Meter	X

Measurement datum:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.

Measurement Datum:	GL	Offset from **datum** to GL (m):	



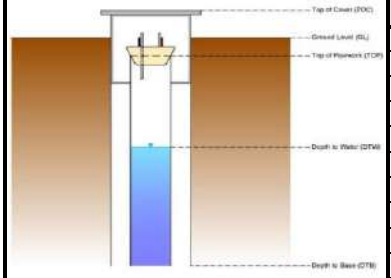
Time	BH ID	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Comments
	BH01-22	0	N			1.79	7.83	
	BH02-22	0	N			1.69	7.84	
	BH03-22	0	N			1.97	7.86	

Groundwater Gauging Data Form

Project Information	Project Name:	Richmond College		
	Project Number:	1921744		
	Measurement Date:	31/10/2022	Sampled by:	R.J
	Weather:	16C		
	Well Notes - e.g. Condition, access, safety:			

	Water Level Meter Used (X that applicable):			
	Interface probe	X	Dip Meter	X

Measurement datum:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.		
Measurement Datum:	GL	Offset from **datum** to GL (m):	



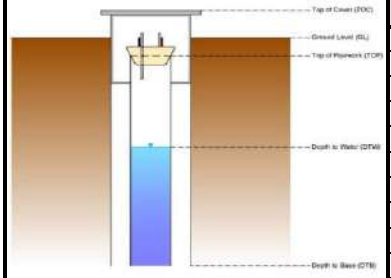
Time	**BH ID**	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Comments
	BH01-22	0	N			2.15	7.74	
	BH02-22	0	N			1.93	7.73	
	BH03-22	0	N			2.25	7.77	

Groundwater Gauging Data Form

Project Information	Project Name:	Richmond College		
	Project Number:	1921744		
	Measurement Date:	07/11/2022	Sampled by:	R.J
	Weather:	13C		
	Well Notes - e.g. Condition, access, safety:			

	Water Level Meter Used (X that applicable):			
	Interface probe	X	Dip Meter	X

Measurement datum:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.		
Measurement Datum:	GL	Offset from **datum** to GL (m):	



Time	**BH ID**	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Comments
	BH01-22	0	N			1.57	7.74	
	BH02-22	0	N			1.44	7.72	
	BH03-22	0	N			1.74	7.75	

APPENDIX L
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

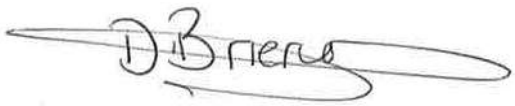
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/09713
Issue Number: 1 **Date:** 18 October, 2022

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Danielle Evans
Project Name: Richmond College
Project Ref: 1921744
Order No: N/A
Date Samples Received: 04/10/22
Date Instructions Received: 04/10/22
Date Analysis Completed: 18/10/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.30	0.80	0.30	1.00	0.30			
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	4A	4A	4AB	5A	4ABE	5A	4A			
% Stones >10mm$_A$	25.8	15.6	44.6	<0.1	18.4	<0.1	24.2	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	11.88	10.67	-	8.76	-	8.49	8.94	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	0.03	0.03	-	0.03	-	0.05	0.05	g/l	0.01	A-T-026s
Sulphate (acid soluble)$_D$$^{M\#}$	3100	1100	-	<200	-	230	1000	mg/kg	200	A-T-028s
Cyanide (total)$_A$$^{M\#}$	<1	-	<1	<1	<1	-	-	mg/kg	1	A-T-042sTCN
Total Organic Carbon$_D$$^{M\#}$	-	9.13	1.50	-	1.49	-	-	% w/w	0.03	A-T-032s
Arsenic$_D$$^{M\#}$	10	8	-	4	-	7	6	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	0.7	0.8	-	0.6	-	0.9	<0.5	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	21	41	-	13	-	15	10	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	24	25	-	27	-	37	20	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	-	<1	<1	-	<1	-	-	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	109	297	-	12	-	19	61	mg/kg	1	A-T-024s
Mercury$_D$	0.68	0.64	-	<0.17	-	<0.17	0.42	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	21	22	-	17	-	25	14	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	50	77	-	31	-	41	49	mg/kg	5	A-T-024s

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.30	0.80	0.30	1.00	0.30			
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	4A	4A	4AB	5A	4ABE	5A	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	Chrysotile	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	Loose Fibres	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	-	-	-	0.004	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.30	0.80	0.30	1.00	0.30			
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	4A	4A	4AB	5A	4ABE	5A	4A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	-	<0.01	-	<0.01	0.02	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.04	0.04	-	<0.02	-	<0.02	0.03	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.14	0.13	-	<0.04	-	<0.04	0.50	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.17	0.16	-	<0.04	-	<0.04	0.76	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.20	0.18	-	<0.05	-	<0.05	1.04	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.11	0.09	-	<0.05	-	<0.05	0.61	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.09	0.08	-	<0.07	-	<0.07	0.37	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	0.18	0.16	-	<0.06	-	<0.06	0.65	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	-	<0.04	-	<0.04	0.20	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	0.30	0.30	-	<0.08	-	<0.08	0.55	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.12	0.09	-	<0.03	-	<0.03	0.70	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	-	<0.03	-	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.15	0.16	-	<0.03	-	<0.03	0.11	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	0.26	0.26	-	<0.07	-	<0.07	0.49	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	1.76	1.65	-	<0.08	-	<0.08	6.03	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.30	0.80	0.30	1.00	0.30			
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22	23-Sep-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	4A	4A	4AB	5A	4ABE	5A	4A			
TPH CWG with Clean Up										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	2	6	-	<1	-	<1	167	mg/kg	1	A-T-055s
Total Aliphatics$_A$	2	7	-	<1	-	<1	167	mg/kg	1	Calc-As Recd
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	14	2	-	<1	-	<1	2	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	<1	<1	-	<1	-	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	<1	-	<1	-	<1	3	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	<1	2	-	<1	-	<1	5	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	2	4	-	<1	-	<1	49	mg/kg	1	A-T-055s
Total Aromatics$_A$	18	8	-	<1	-	<1	61	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	19	15	-	<1	-	<1	228	mg/kg	1	Calc-As Recd
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/8	22/09713/9	22/09713/10					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05	WS05	Waste Arising							
Depth to Top	0..20	1.30								
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	27-Sep-22							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6A	5A	6A							
% Moisture at <40C$_A$	-	-	19.2					% w/w	0.1	A-T-044
% Stones >10mm$_A$	22.0	13.5	<0.1					% w/w	0.1	A-T-044
pH$_D^{M\#}$	8.04	8.35	8.48					pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	0.02	<0.01	-					g/l	0.01	A-T-026s
Sulphate (acid soluble)$_D^{M\#}$	290	<200	-					mg/kg	200	A-T-028s
Total Organic Carbon$_D^{M\#}$	1.01	0.16	-					% w/w	0.03	A-T-032s
Arsenic$_D^{M\#}$	7	13	13					mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	0.6	0.8	1.3					mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	23	9	26					mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	23	26	42					mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	-	<1					mg/kg	1	A-T-040s
Lead$_D^{M\#}$	76	13	14					mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17					mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	19	20	56					mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1					mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	98	27	85					mg/kg	5	A-T-024s

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/8	22/09713/9	22/09713/10					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05	WS05	Waste Arising							
Depth to Top	0..20	1.30								
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	27-Sep-22							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6A	5A	6A							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD							A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-							A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A							A-T-045

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/8	22/09713/9	22/09713/10					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05	WS05	Waste Arising							
Depth to Top	0..20	1.30								
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	27-Sep-22							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6A	5A	6A							
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02					mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.11	<0.04	<0.04					mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.13	<0.04	<0.04					mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.15	<0.05	<0.05					mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.09	<0.05	<0.05					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07					mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	0.13	<0.06	<0.06					mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04					mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	0.22	<0.08	<0.08					mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.09	<0.03	<0.03					mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03					mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.08	<0.03	<0.03					mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	0.20	<0.07	<0.07					mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	1.20	<0.08	<0.08					mg/kg	0.01	A-T-019s
TPH Total with ID + GC Trace										
TPH total (>C6-C40)$_A^{M\#}$	-	-	14					mg/kg	10	A-T-007s
TPH FID Chromatogram$_A$	-	-	Appended							A-T-007s
TPH ID Interpretation$_A$	-	-	C20-C36 hydrocarbons with unknown profile							A-T-007s

Envirolab Job Number: 22/09713

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09713/8	22/09713/9	22/09713/10					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05	WS05	Waste Arising							
Depth to Top	0..20	1.30								
Depth To Bottom										
Date Sampled	23-Sep-22	23-Sep-22	27-Sep-22							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6A	5A	6A							
TPH CWG with Clean Up										
Ali >C5-C6$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<1	<1	-					mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	<1	<1	-					mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	<1	<1	-					mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	2	<1	-					mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	13	<1	-					mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	14	<1	-					mg/kg	1	Calc-As Recd
Aro >C5-C7$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	2	<1	-					mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<1	<1	-					mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	2	<1	-					mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	8	<1	-					mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	21	<1	-					mg/kg	1	A-T-055s
Total Aromatics$_{A}$	32	<1	-					mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_{A}$	46	<1	-					mg/kg	1	Calc-As Recd
BTEX - Benzene$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01	<0.01	-					mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Hemel, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, UK, HP3 9RT

Project: Richmond College

Clients Project No: 1921744

Project No: 22/09713

Date Received: 04/10/2022 (am)

Cool Box Temperatures (°C): 17.6,18.2

Lab Sample ID	22/09713/1
Client Sample No	
Client Sample ID/Depth	WS01 0.20m
Date Sampled	23/09/22
Deviation Code	
B1 (no VPH)	✓
D (no glass)	✓

Key

B1 (no VPH)	*Separate container not supplied for VPH/BTEX analysis*
D (no glass)	*Glass container not provided for extractable organics analysis*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9	22/09713/10
Client Sample No										
Client Sample ID/Depth	WS01 0.20m	WS01 0.80m	WS02 0.30m	WS02 0.80m	WS03 0.30m	WS03 1.00m	WS04 0.30m	WS05 0..20m	WS05 1.30m	Waste Arising
Date Sampled	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22	27/09/22
A-T-007s										11/10/2022
A-T-019s	10/10/2022	10/10/2022		10/10/2022		10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022
A-T-022s	12/10/2022	12/10/2022		12/10/2022		12/10/2022	12/10/2022	12/10/2022	12/10/2022	
A-T-024s	13/10/2022	13/10/2022		13/10/2022		13/10/2022	13/10/2022	13/10/2022	13/10/2022	13/10/2022
A-T-026s	14/10/2022	14/10/2022		14/10/2022		14/10/2022	14/10/2022	14/10/2022	14/10/2022	
A-T-028s	14/10/2022	14/10/2022		14/10/2022		14/10/2022	14/10/2022	14/10/2022	14/10/2022	
A-T-031s	18/10/2022	18/10/2022		18/10/2022		18/10/2022	18/10/2022	18/10/2022	18/10/2022	18/10/2022
A-T-032s		17/10/2022	17/10/2022		17/10/2022			17/10/2022	17/10/2022	
A-T-040s		14/10/2022	14/10/2022		14/10/2022			14/10/2022		14/10/2022
A-T-042sTCN	08/10/2022		08/10/2022	08/10/2022	08/10/2022					
A-T-044	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022
A-T-045	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022
A-T-054				11/10/2022						
A-T-055s	10/10/2022	10/10/2022		10/10/2022		10/10/2022	10/10/2022	10/10/2022	10/10/2022	
Calc-As Recd	12/10/2022	12/10/2022		12/10/2022		12/10/2022	12/10/2022	12/10/2022	12/10/2022	

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX M
LABORATORY CERTIFICATES FOR GEOTECHNICAL ANALYSIS

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i2 Analytical Ltd.
7 Woodshots Meadow,
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Analytical Report Number : 22-11453

Project / Site name:	Richmond College	**Samples received on:**	06/12/2022
Your job number:	1921744	**Samples instructed on/ Analysis started on:**	06/12/2022
Your order number:	PO2131800	**Analysis completed by:**	12/12/2022
Report Issue Number:	1	**Report issued on:**	14/12/2022
Samples Analysed:	9 soil samples		

Izabela Wójcik

Signed:

Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-11453
Project / Site name: Richmond College
Your Order No: PO2131800

Lab Sample Number				2522248	2522249	2522250	2522251	2522252
Sample Reference				BH01	BH01	BH01	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20-1.70	12.00	18.00	2.00-2.15	13.15
Date Sampled				06/12/2022	06/12/2022	06/12/2022	06/12/2022	06/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	37	< 0.1
Moisture Content	%	0.01	NONE	8.7	15	8	3.1	16
Total mass of sample received	kg	0.001	NONE	0.8	1.1	1	1	1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.2	8.8	10.3	8.1	8.5
Total Sulphate as SO4	%	0.005	MCERTS	0.152	0.094	0.159	0.015	0.166
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.57	0.19	0.03	0.88
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	124	571	185	30.3	881
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	25	41	20	3.4	67
Total Sulphur	%	0.005	MCERTS	0.068	0.405	0.061	0.01	0.49
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	120	< 5.0	6.7	200
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	62	< 2.5	3.3	99

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-11453
Project / Site name: Richmond College
Your Order No: PO2131800

Lab Sample Number				2522253	2522254	2522255	2522256
Sample Reference				BH02	BH03	BH03	BH03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				30.00	4.00-4.50	7.50	24.00
Date Sampled				06/12/2022	06/12/2022	06/12/2022	06/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	78	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	2.1	17	16
Total mass of sample received	kg	0.001	NONE	1	1	1	1
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	8.4	7.5	8.4	8.7
Total Sulphate as SO4	%	0.005	MCERTS	0.122	0.047	0.081	0.097
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.57	0.2	0.37	0.45
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	572	198	370	447
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	34	4.5	16	19
Total Sulphur	%	0.005	MCERTS	0.314	0.047	0.307	0.365
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
Heavy Metals / Metalloids							
Magnesium (water soluble)	mg/kg	5	NONE	110	28	43	82
Magnesium (leachate equivalent)	mg/l	2.5	NONE	54	14	21	41

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-11453
Project / Site name: Richmond College

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2522248	BH01	None Supplied	1.20-1.70	Brown clay and sand with gravel.
2522249	BH01	None Supplied	12	Brown clay.
2522250	BH01	None Supplied	18	Brown clay and sand with gravel.
2522251	BH02	None Supplied	2.00-2.15	Brown sand with stones.
2522252	BH02	None Supplied	13.15	Brown clay.
2522253	BH02	None Supplied	30	Brown clay.
2522254	BH03	None Supplied	4.00-4.50	Brown sand with stones.
2522255	BH03	None Supplied	7.5	Brown clay.
2522256	BH03	None Supplied	24	Brown clay.

Analytical Report Number : 22-11453
Project / Site name: Richmond College

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

TERRA TEK
SITE INVESTIGATION & LABORATORY SERVICES

RSK Environment Limited
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

For the attention of Ms. Danielle Evans

Report No: C7825
Issue No 01

LABORATORY TEST REPORT

Project Name	**RICHMOND COLLEGE**		
Project Number	**C7825**	Date samples received	07/10/2022
Your Ref	1921744	Date written instructions received	10/10/2022
Purchase Order	PO2130323	Date testing commenced	14/10/2022

Please find enclosed the results as summarised below

Item No	Test Quantity	Description	ISO 17025 Accredited
2.11	9	Moisture Content	Yes
2.21	6	Four point liquid and plastic limits	Yes
2.23	1	Non-plastic Atterberg limit	Yes
2.61	5	Wet sieve analysis	Yes
7.33	6	Single stage quick undrained triaxial	Yes

Remarks :

Issued by : J Hopkins Date of Issue : 25/10/2022

Approved Signatories : 25/10/2022

J.Hopkins (Laboratory Coordinator), M D Brown (Senior Quality Manager), R Norris (Supervisor)

Key to symbols used in this report
S/C : Testing was sub-contracted

Unless we are notified to the contrary, samples will be disposed after a period of one month from this date.
The results reported relate to samples received in the laboratory only.
All results contained in this report are provisional unless signed by an approved signatory
This report should not be reproduced except in full without the written approval of the laboratory.
Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory.
Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation.
Feedback on the this report may be left via our website terratek.co.uk/feedback

TERRA TEK
Site Investigation & Laboratory Services

Site RICHMOND COLLEGE

Client RSK Environment Ltd

Engineer

Contract No 1921744

Sample Identification				Lab Sample ID	Non Enginering Description	Moisture Content %
Exploratory Hole	Depth m	Sample Ref	Sample Type			
BH01-22		D10	Disturbed	384431	Dark brown CLAY.	25
BH01-22		D18	Disturbed	384432	Dark brown CLAY.	20
BH01-22		U3	U100	384413	Very stiff fisured greyish brown CLAY.	28
BH01-22		U8	U100	384414	Very stiff fissured bornw CLAY.	24
BH02-22		D11	Disturbed	384433	Dark brown CLAY.	23
BH02-22		D22	Disturbed	384434	Dark grey CLAY.	23
BH02-22		D6	Disturbed	384421	Brown slightly gravelly SAND. Gravel is fine to coarse.	8.2
BH02-22		U1	U100	384419	Firm fissured grey CLAY.	27
BH02-22		U6	U100	384420	Stiff fissured grey slightly sandy CLAY.	26
BH0322		D3		384429	Orangey brown fine to coarse GRAVEL.	4.2
BH0322		D6		384428	Brown mottled slightly gravelly SAND. Gravel is fine to medium.	18
BH03-22		D16	Disturbed	384435	Dark grey CLAY.	22
BH03-22		D26	Disturbed	384436	Dark grey CLAY.	27
BH03-22		U2	U100	384425	Stiff fissured grey CLAY.	29

Notes

Originator	Checked & Approved
JAH	J. Hopkins

MOISTURE CONTENT
BS1377:Part 2:1990 Clause 3.2

Unit 2 Springfield Road, Chesham, Bucks, HP51PW
Lab Project No C7825 : 25/10/2022 08:24:03

TERRA TEK
Site Investigation & Laboratory Services

Site: RICHMOND COLLEGE
Client: RSK Environment Ltd
Engineer:

Contract No 1921744

Sample Identification				Lab Sample ID	Non Enginering Description	Moisture Content %
Exploratory Hole	Depth m	Sample Ref	Sample Type			
BH03-22		U5	U100	384426	Stiff fissured grey slightly sandy CLAY.	24

Notes

Originator	Checked & Approved
JAH	J. Hopkins

MOISTURE CONTENT
BS1377:Part 2:1990 Clause 3.2

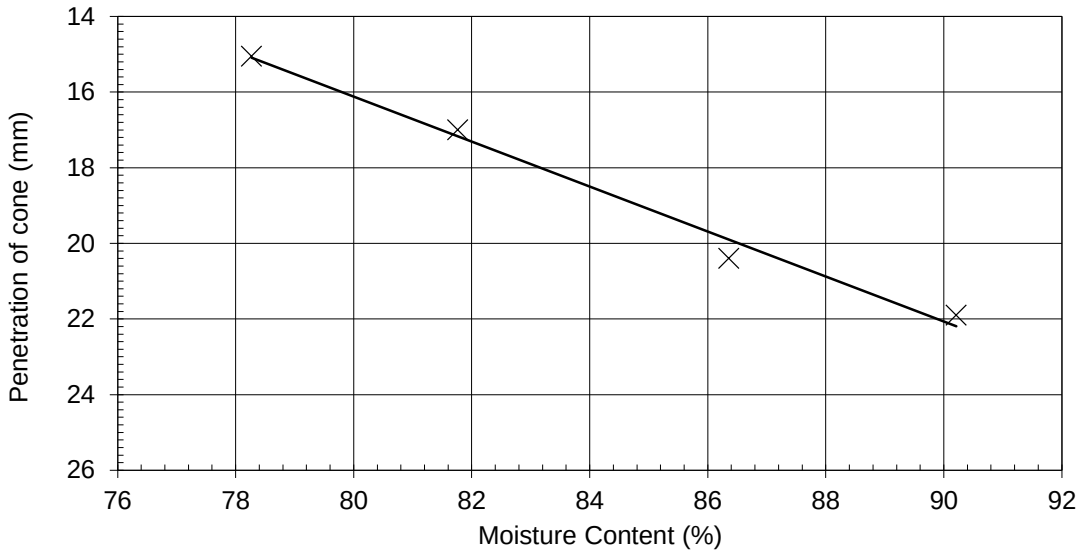
Unit 2 Springfield Road, Chesham, Bucks, HP51PW
Lab Project No C7825 : 25/10/2022 08:24:27

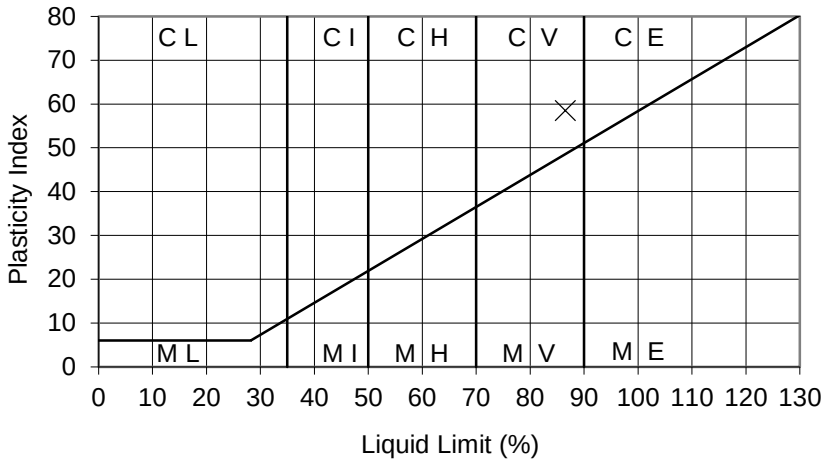
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH01-22
Engineer		Sample Ref	D10
		Sample Type	Disturbed

Non Engineering Description : Dark brown CLAY.

Preparation : Sample as received





Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	25	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	87	%
Plastic Limit :	28	%
Plasticity Index :	59	
Equivalent moisture content of material passing 425µm sieve :	25	%
Liquidity Index :	-0.05	

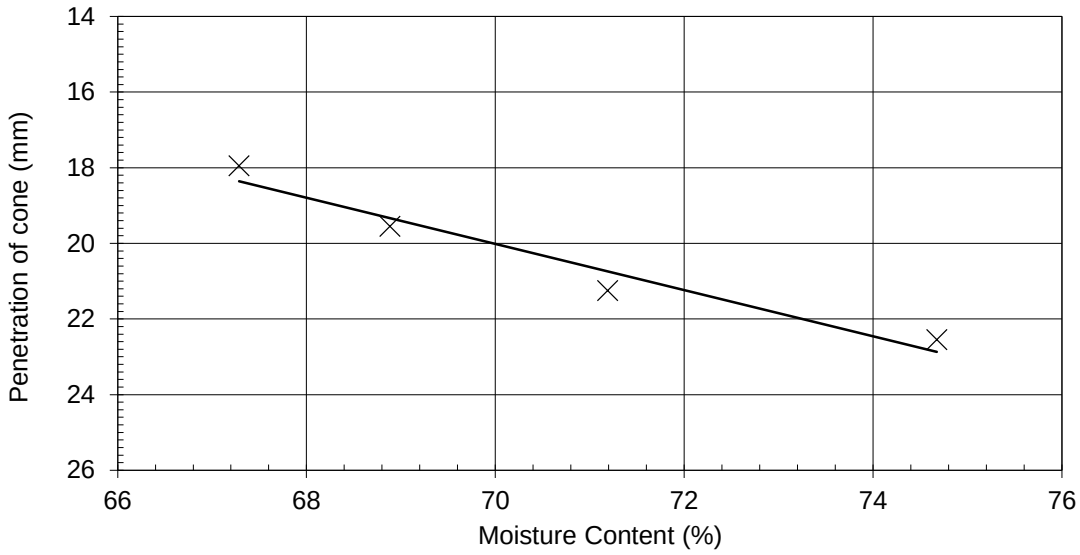
Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index**	
SP	25/10/2022	BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Sheet 1 of 1

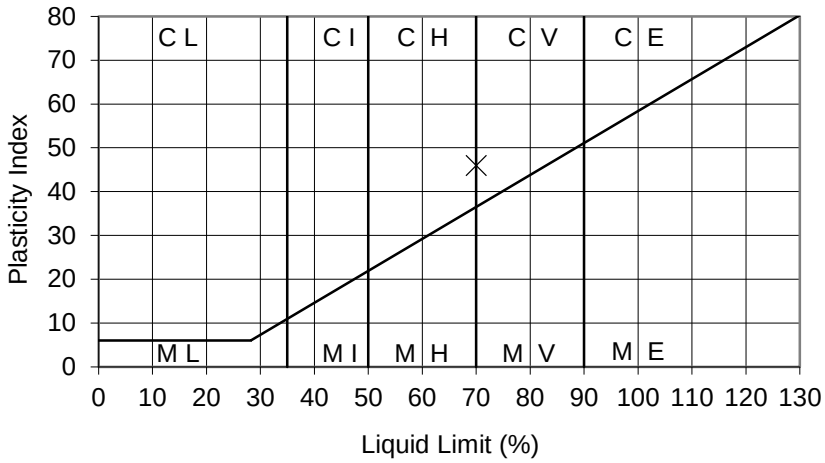
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH01-22
Engineer		Sample Ref	D18
		Sample Type	Disturbed

Non Engineering Description : Dark brown CLAY.

Preparation : Sample as received





Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	20	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	70	%
Plastic Limit :	24	%
Plasticity Index :	46	
Equivalent moisture content of material passing 425µm sieve :	20	%
Liquidity Index :	-0.09	

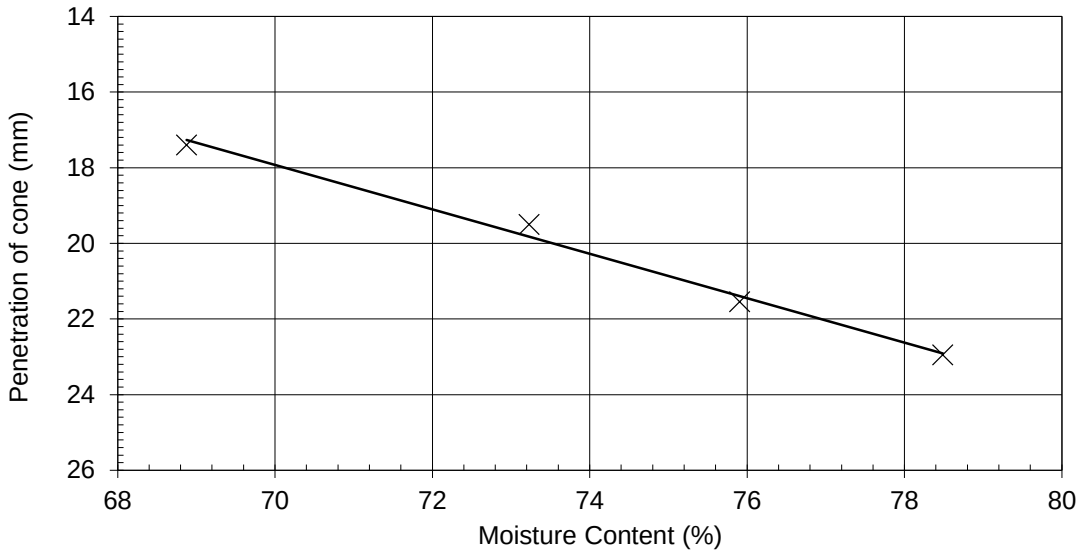
Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index**	
SP	25/10/2022	BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Sheet 1 of 1

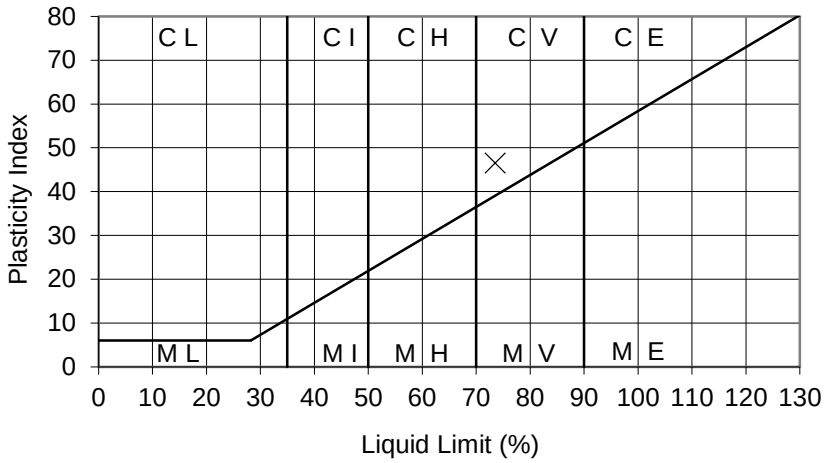
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH02-22
Engineer		Sample Ref	D11
		Sample Type	Disturbed

Non Engineering Description : Dark brown CLAY.

Preparation : Sample as received





Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	23	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	74	%
Plastic Limit :	27	%
Plasticity Index :	47	
Equivalent moisture content of material passing 425µm sieve :	23	%
Liquidity Index :	-0.09	

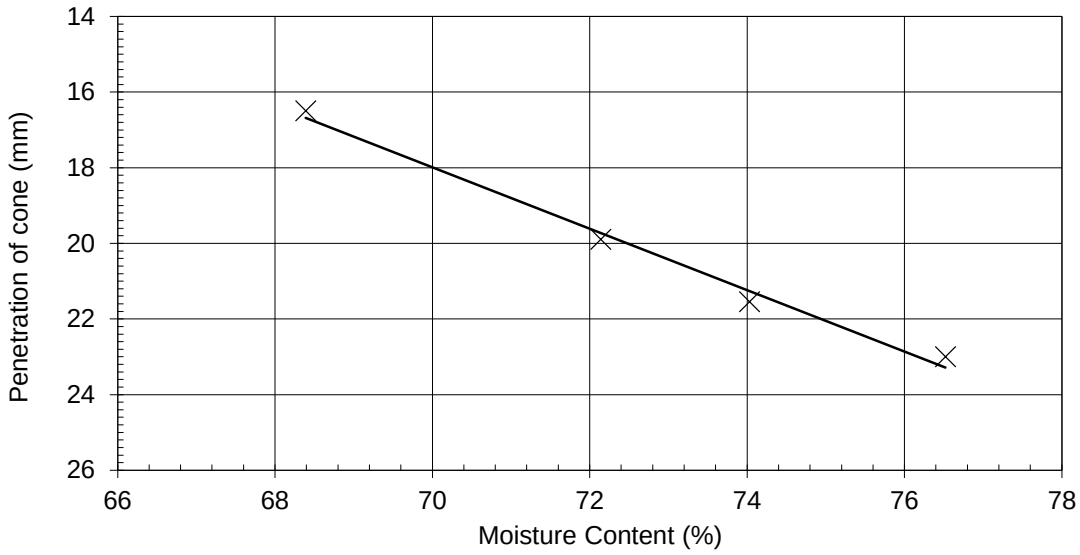
Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index**	
SP	25/10/2022	BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Sheet 1 of 1

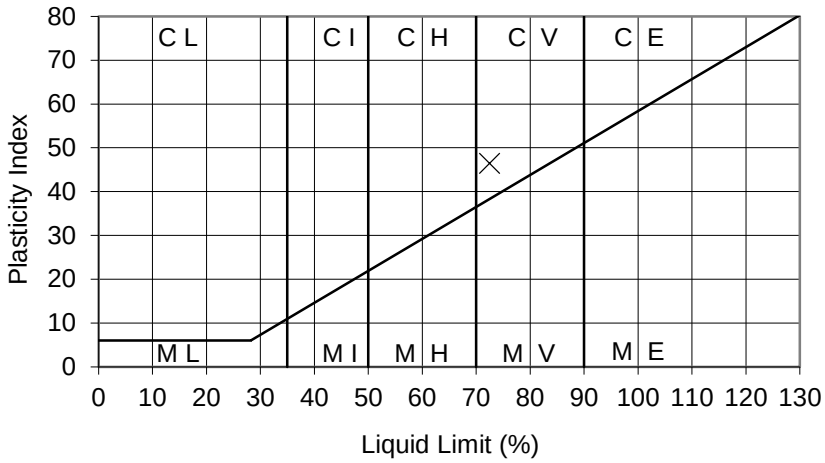
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH02-22
Engineer		Sample Ref	D22
		Sample Type	Disturbed

Non Engineering Description : Dark grey CLAY.

Preparation : Sample as received





Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	23	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	72	%
Plastic Limit :	26	%
Plasticity Index :	46	
Equivalent moisture content of material passing 425µm sieve :	23	%
Liquidity Index :	-0.07	

Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method)** **Plastic Limit, Plasticity Index & Liquidity Index** BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Tk
SP	25/10/2022		Sheet 1 of 1

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH02-22
Engineer		Sample Ref	D6
		Sample Type	Disturbed

Non Engineering Description : Brown slightly gravelly SAND. Gravel is fine to coarse.

Preparation : Sample washed and air dried

Sample was determined to be Non-Plastic after preparation

Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	8.2	%
Percentage retained on 425µm sieve :	74	%
Equivalent moisture content of material passing 425µm sieve :	31	%

Originator	Checked & Approved
SP	25/10/2022

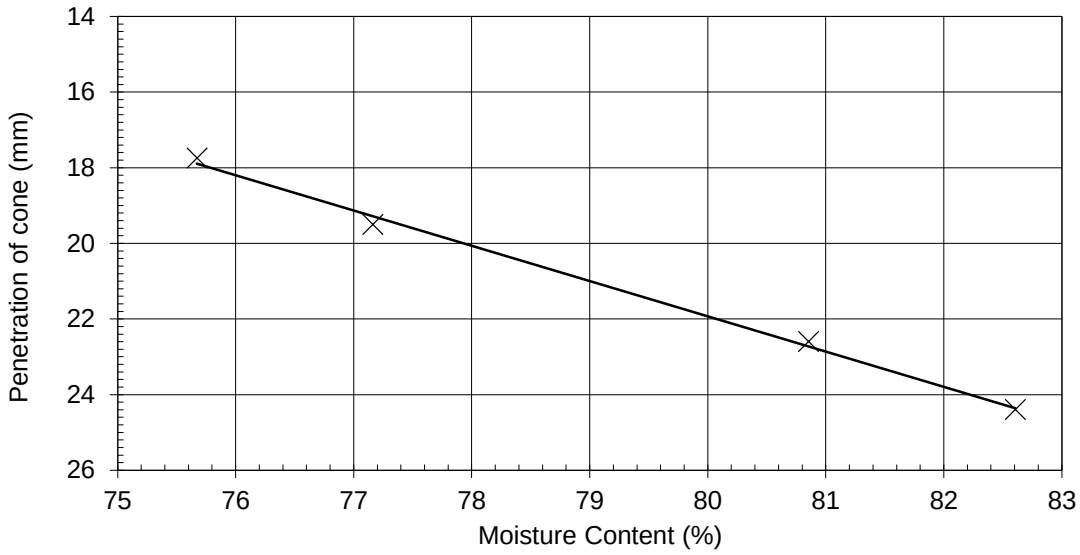
Plastic Limit
BS 1377:Part 2:Clause 5:1990

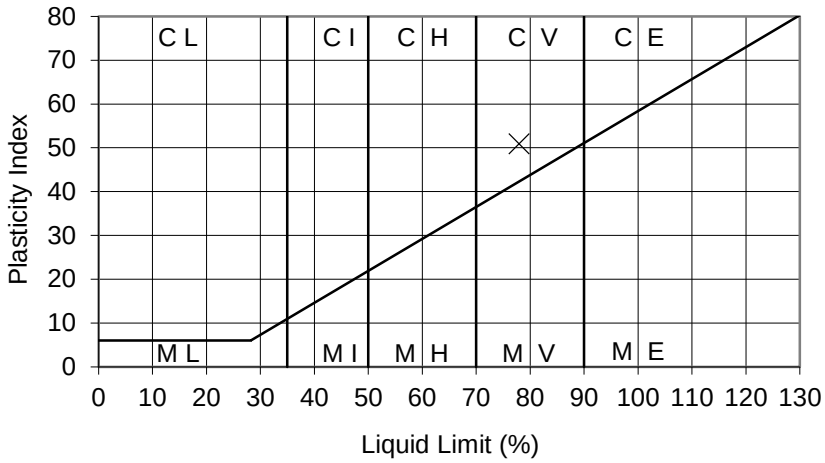
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole ID	BH03-22
Engineer		Sample Ref	D16
		Sample Type	Disturbed

Non Engineering Description : Dark grey CLAY.

Preparation : Sample as received





Results :

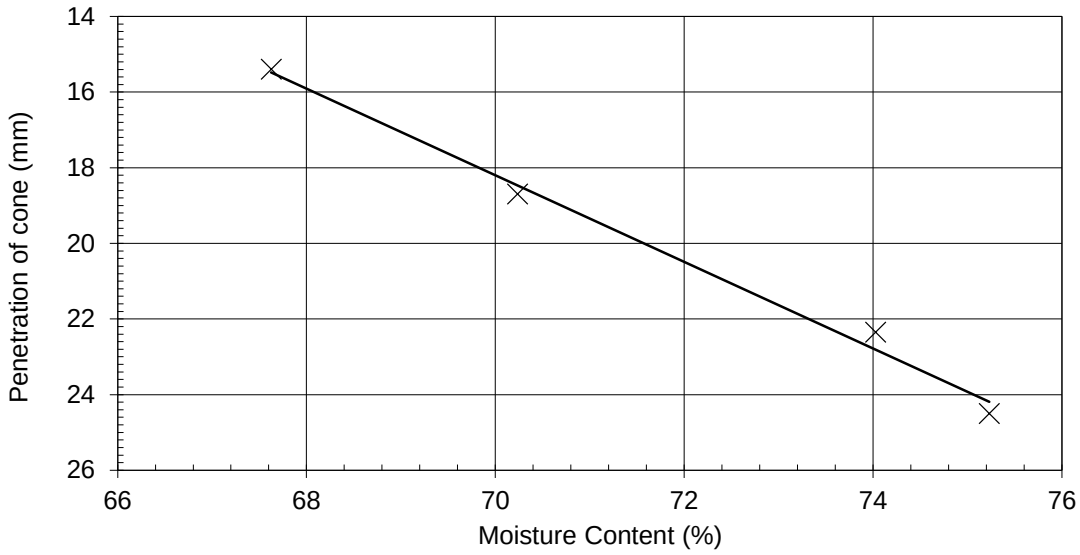
As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	22	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	78	%
Plastic Limit :	27	%
Plasticity Index :	51	
Equivalent moisture content of material passing 425µm sieve :	22	%
Liquidity Index :	-0.10	

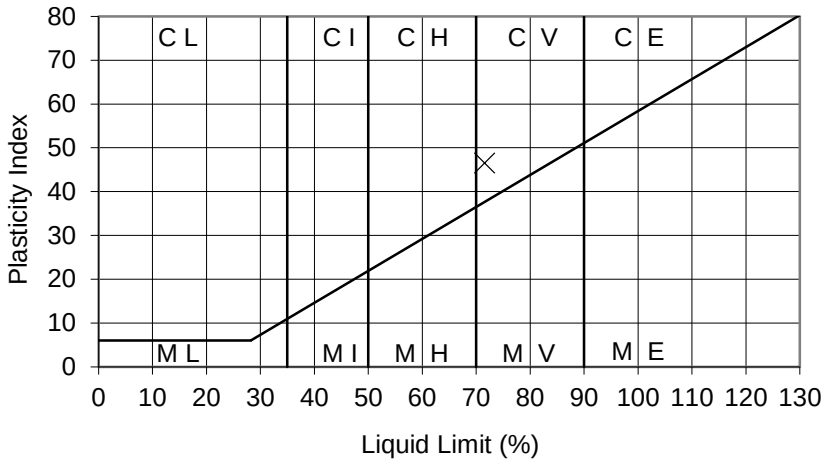
Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index**	
SP	25/10/2022	BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Sheet 1 of 1

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES	Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
			Hole ID	BH03-22
	Client	RSK Environment Ltd	Sample Ref	D26
	Engineer		Sample Type	Disturbed

Non Engineering Description : Dark grey CLAY.

Preparation : Sample as received





Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	27	%
Percentage retained on 425µm sieve :	0	%
Liquid Limit :	72	%
Plastic Limit :	25	%
Plasticity Index :	47	
Equivalent moisture content of material passing 425µm sieve :	27	%
Liquidity Index :	0.04	

Originator	Checked & Approved	**Liquid Limit (Four Point Cone Penetrometer Method)** **Plastic Limit, Plasticity Index & Liquidity Index** BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	Tk
SP	25/10/2022		Sheet 1 of 1

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH01-22
Engineer		Sample Ref	B5
		Sample Type	Bulk

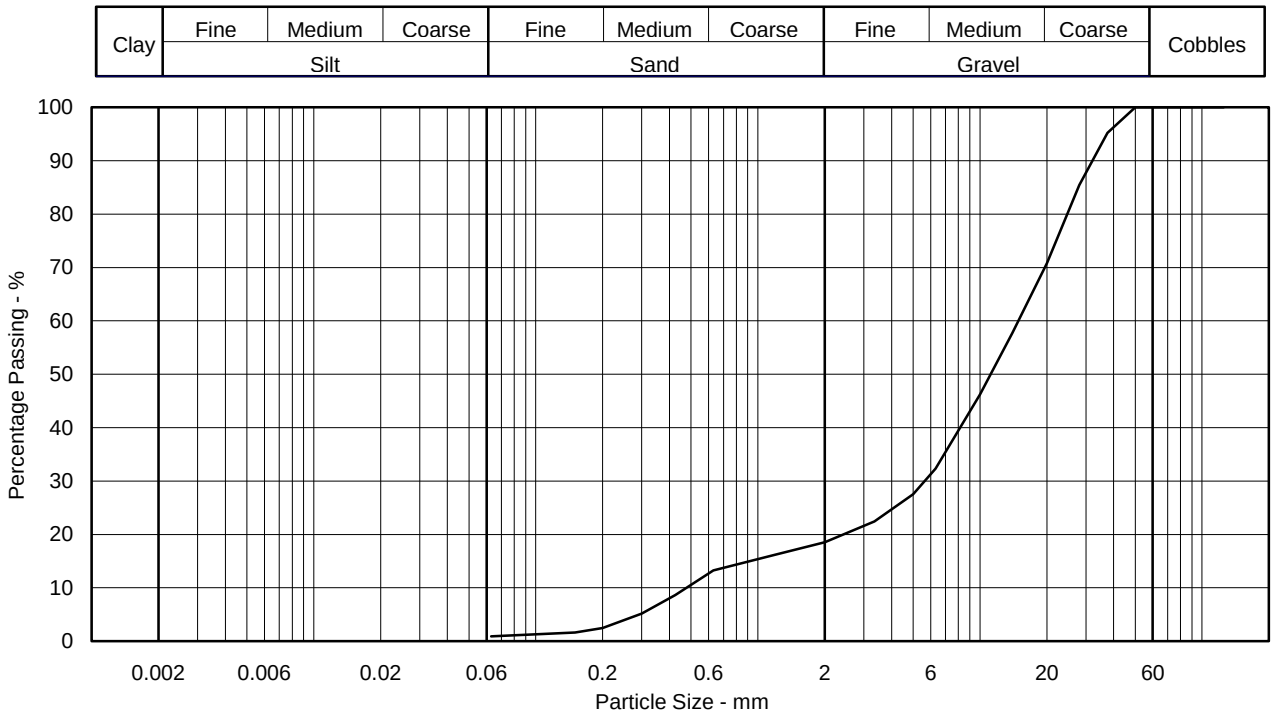
Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	95
28.0 mm	85
20.0 mm	71
14.0 mm	58
10.0 mm	46
6.30 mm	32
5.00 mm	28
3.35 mm	22
2.00 mm	19
1.18 mm	16
630 µm	13
425 µm	9
300 µm	5
200 µm	2
150 µm	2
63 µm	1

Non Engineering Description
Brown sandy fine to coarse GRAVEL.

Sample Proportions - %	
Cobbles	0.0
Gravel	81.5
Sand	17.6
Silt & Clay	0.9

Particle Diameter - mm	
D100	50
D60	15
D10	0.48
Uniformity Coefficient (SHW series 600, Table 6/1, footnote 5)	31.3

Notes



Originator	Checked & Approved
AM	25/10/2022

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	B2
		Sample Type	Bulk

Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	96
20.0 mm	88
14.0 mm	81
10.0 mm	74
6.30 mm	68
5.00 mm	64
3.35 mm	60
2.00 mm	56
1.18 mm	52
630 µm	49
425 µm	43
300 µm	37
200 µm	30
150 µm	26
63 µm	21

Non Engineering Description

Brown clayey silty very sandy fine to coarse GRAVEL.

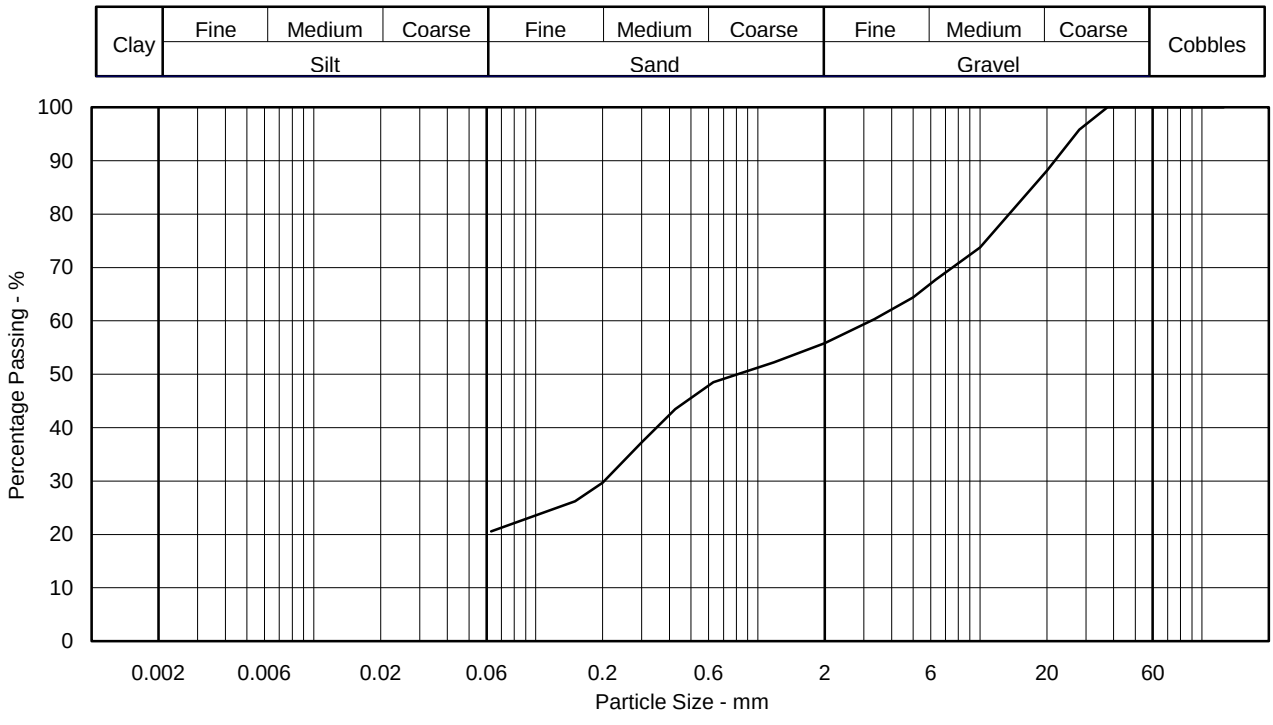
Sample Proportions - %

Cobbles	0.0
Gravel	44.2
Sand	35.2
Silt & Clay	20.6

Particle Diameter - mm

D100	38
D60	3.2
D10	
Uniformity Coefficient (SHW series 600, Table 6/1, footnote 5)	N/A

Notes



Originator	Checked & Approved
AM	25/10/2022

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	B7
		Sample Type	Bulk

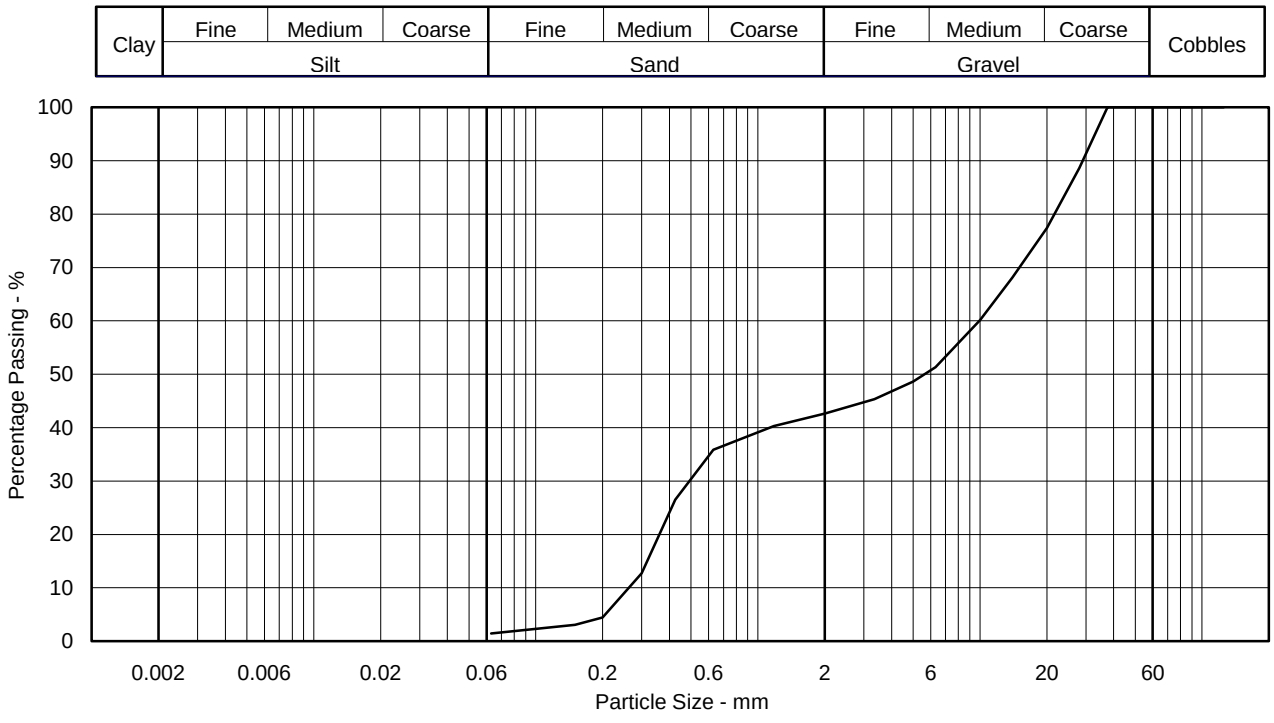
Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	89
20.0 mm	77
14.0 mm	68
10.0 mm	60
6.30 mm	51
5.00 mm	49
3.35 mm	45
2.00 mm	43
1.18 mm	40
630 µm	36
425 µm	27
300 µm	13
200 µm	4
150 µm	3
63 µm	1

Non Engineering Description
Brown slightly ilty very sandy fine to coarse GRAVEL.

Sample Proportions - %	
Cobbles	0.0
Gravel	57.3
Sand	41.2
Silt & Clay	1.5

Particle Diameter - mm	
D100	38
D60	9.9
D10	0.26
Uniformity Coefficient (SHW series 600, Table 6/1, footnote 5)	38.1

Notes
Sample does not comply with BS EN ISO 17892-4 minimum mass requirements



Originator	Checked & Approved
AM	25/10/2022

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH03-22
Engineer		Sample Ref	B4
		Sample Type	Bulk

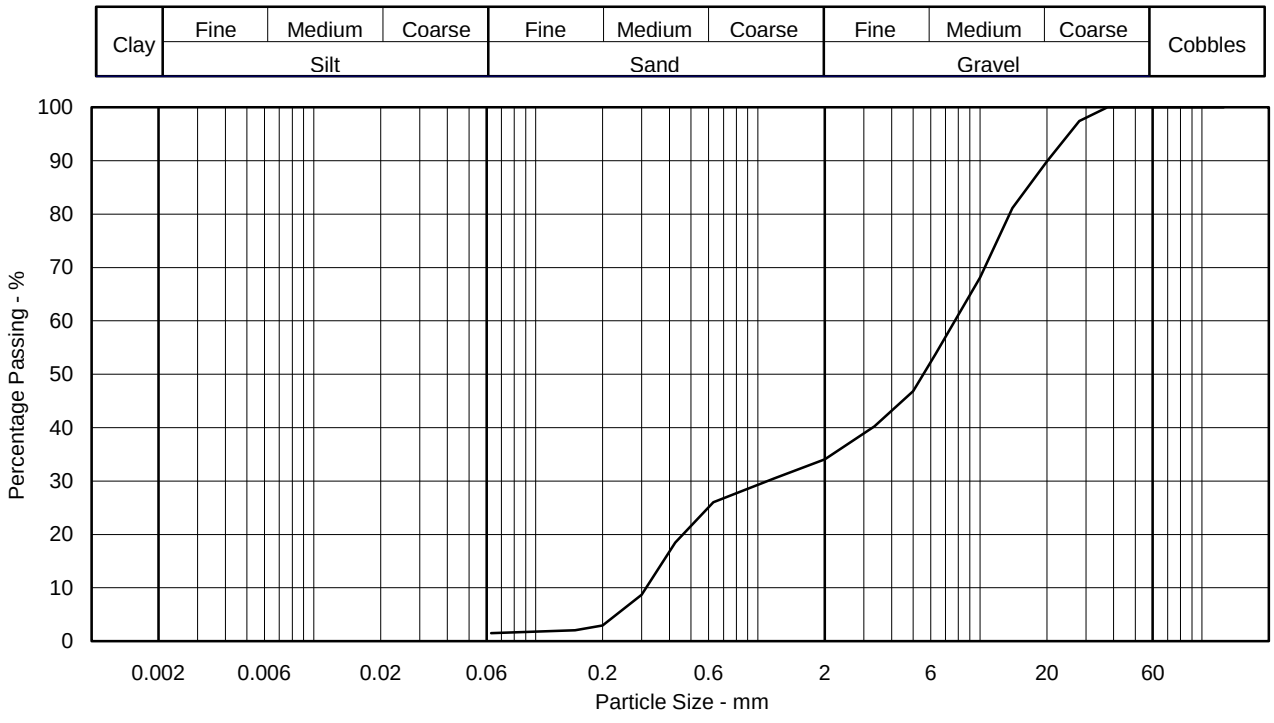
Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	97
20.0 mm	90
14.0 mm	81
10.0 mm	68
6.30 mm	54
5.00 mm	47
3.35 mm	40
2.00 mm	34
1.18 mm	30
630 µm	26
425 µm	18
300 µm	9
200 µm	3
150 µm	2
63 µm	2

Non Engineering Description
Light brown slightly silty very sandy fine to coarse GRAVEL.

Sample Proportions - %	
Cobbles	0.0
Gravel	65.9
Sand	32.6
Silt & Clay	1.5

Particle Diameter - mm	
D100	38
D60	7.7
D10	0.31
Uniformity Coefficient (SHW series 600, Table 6/1, footnote 5)	24.8

Notes



Originator	Checked & Approved
AM	25/10/2022

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No** **1921744**
Client	RSK Environment Ltd	Hole BH03-22
Engineer		Sample Ref B7
		Sample Type Bulk

Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	94
20.0 mm	89
14.0 mm	85
10.0 mm	83
6.30 mm	76
5.00 mm	73
3.35 mm	69
2.00 mm	66
1.18 mm	64
630 µm	59
425 µm	40
300 µm	12
200 µm	2
150 µm	1
63 µm	0

Non Engineering Description

Light brown very gravelly SAND. Gravel is fine to coarse.

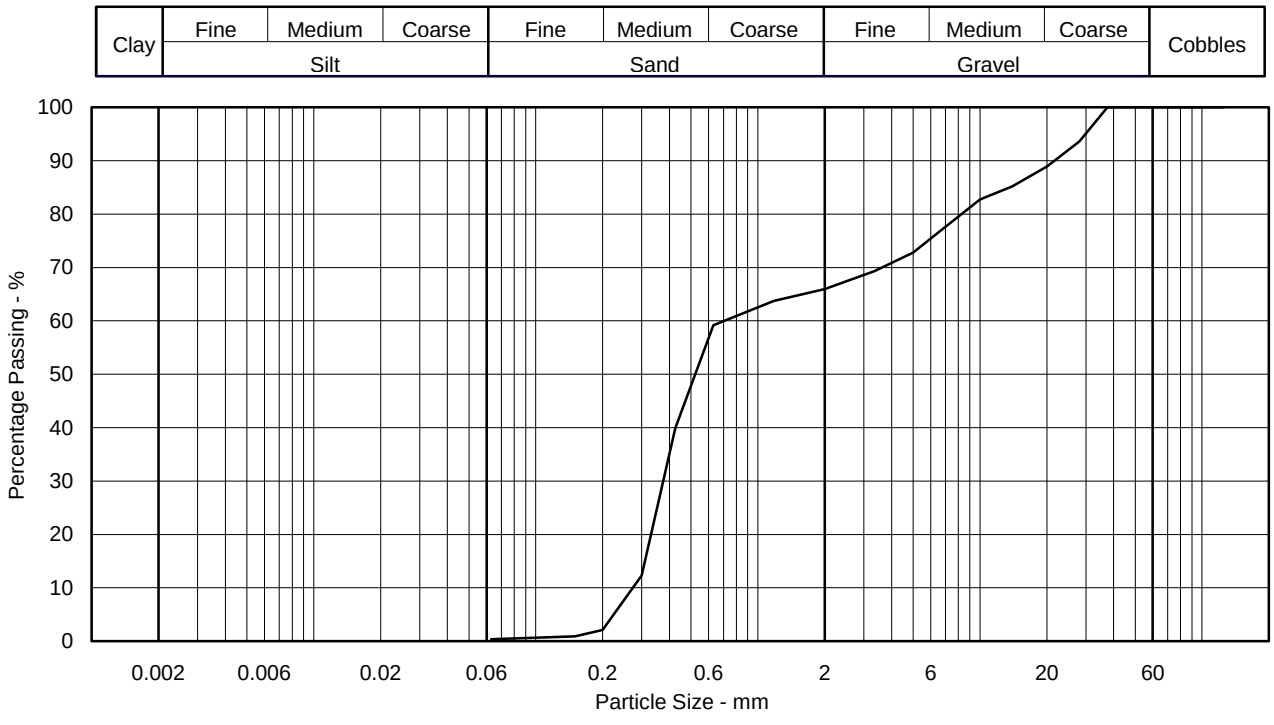
Sample Proportions - %

Cobbles	0.0
Gravel	34.1
Sand	65.6
Silt & Clay	0.4

Particle Diameter - mm

D100	38
D60	0.70
D10	0.27
Uniformity Coefficient (SHW series 600, Table 6/1, footnote 5)	2.6

Notes



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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

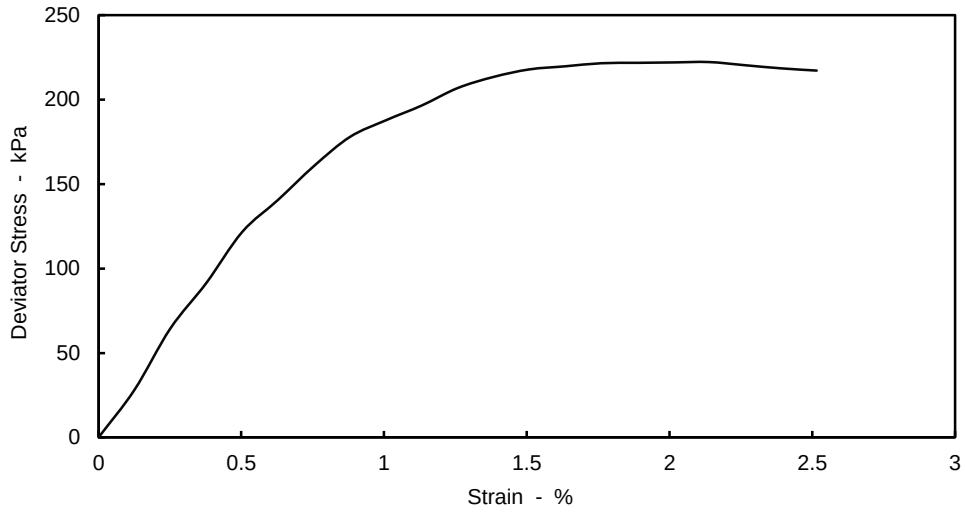
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

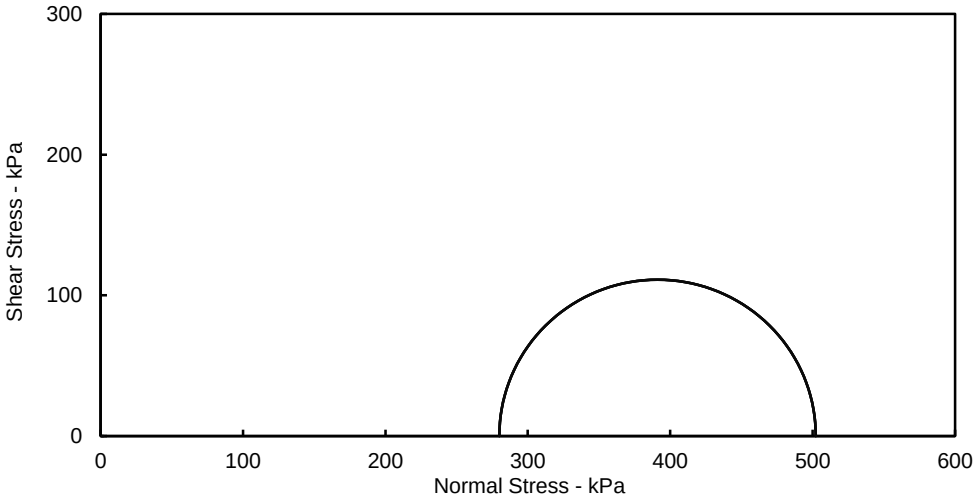
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH01-22
Engineer		Sample Ref	U3
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	198.8		
Diameter	mm	104.3		
Moisture Content	%	28		
Bulk Density	Mg/m³	0.00		
Dry Density	Mg/m³	0.00		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.11		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	280		
Strain at Failure	%	2.1		
Maximum Deviator Stress	kPa	222		
Shear Strength	kPa	111		
Mode of Failure		Compound		
Non Engineering Description		Stiff fisured greyish brown CLAY.		

Comments
Undisturbed specimen taken 14mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





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UNCONSOLIDATED UNDRAINED SINGLE STAGE TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH01-22
Engineer		Sample Ref	U3
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

Please note that these photographs are intended to show the failure mode, and do not necessarily show accurately the colouration of the soil.

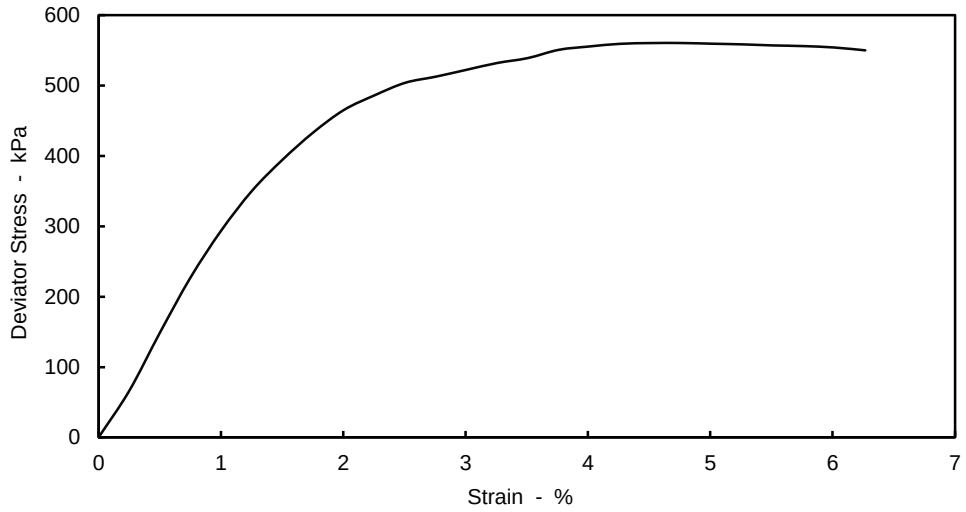
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

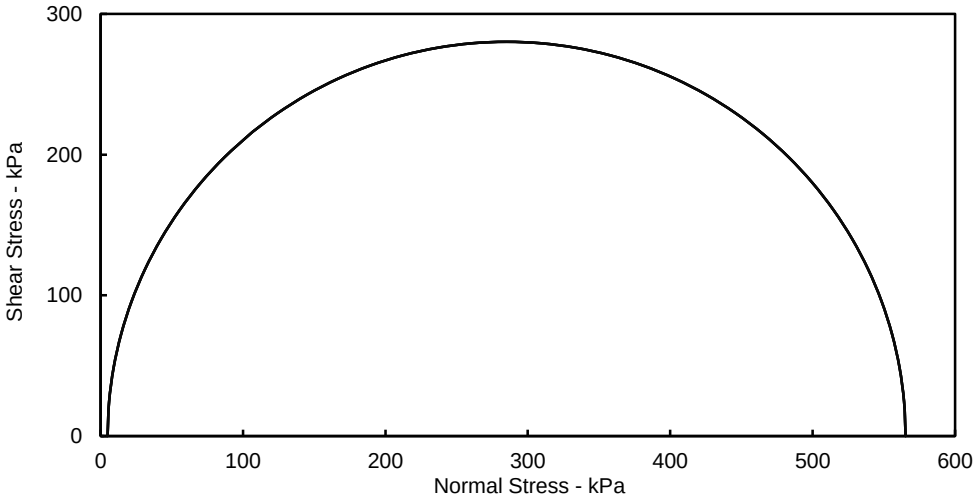
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH01-22
Engineer		Sample Ref	U8
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	199.5		
Diameter	mm	103.0		
Moisture Content	%	24		
Bulk Density	Mg/m³	2.07		
Dry Density	Mg/m³	1.66		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.24		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	5		
Strain at Failure	%	4.8		
Maximum Deviator Stress	kPa	560		
Shear Strength	kPa	280		
Mode of Failure		Brittle		
Non Engineering Description		Very stiff fissured brown CLAY.		

Comments
Undisturbed specimen taken 10mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





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BS 1377 : Part 7 : 1990 Clause 8

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH01-22
Engineer		Sample Ref	U8
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

Please note that these photographs are intended to show the failure mode, and do not necessarily show accurately the colouration of the soil.

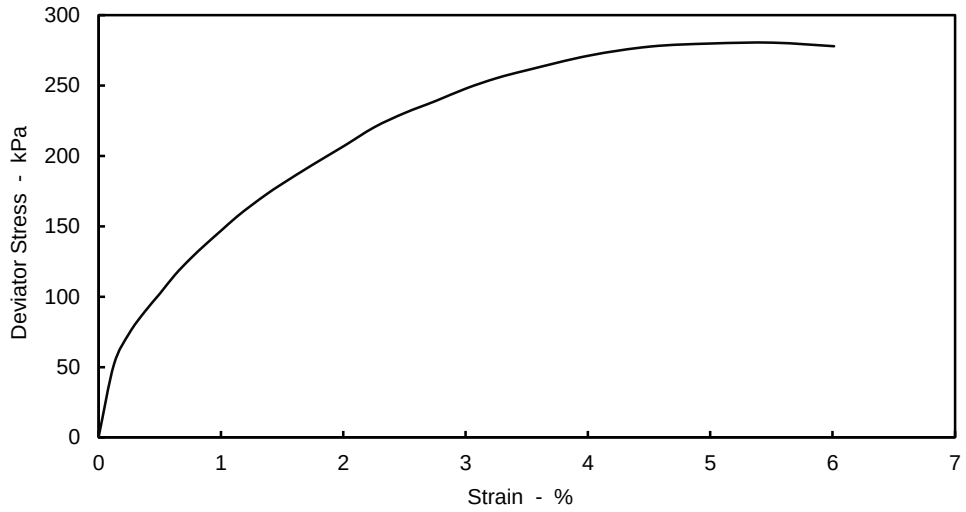
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

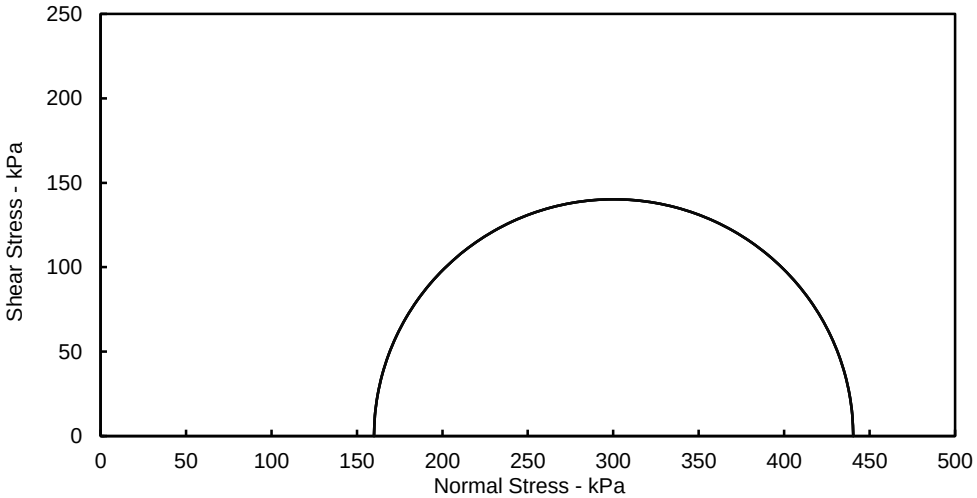
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	U1
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	199.6		
Diameter	mm	102.8		
Moisture Content	%	27		
Bulk Density	Mg/m³	2.02		
Dry Density	Mg/m³	1.59		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.27		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	160		
Strain at Failure	%	5.5		
Maximum Deviator Stress	kPa	280		
Shear Strength	kPa	140		
Mode of Failure		Compound		
Non Engineering Description		Stiff fissured grey CLAY.		

Comments
Undisturbed specimen taken 16mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





Originator	Checked & Approved
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Unit 2 Springfield Road, Chesham, Bucks, HP51PW

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	U1
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

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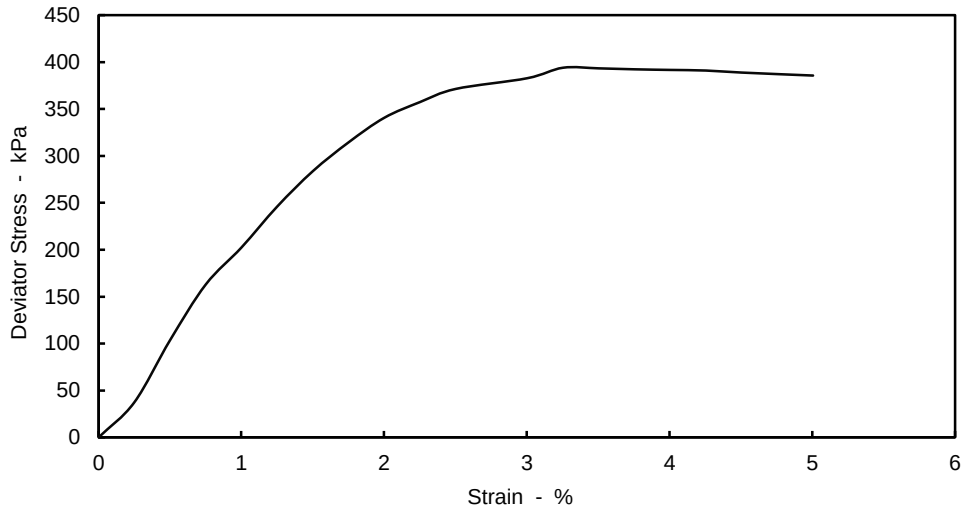
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

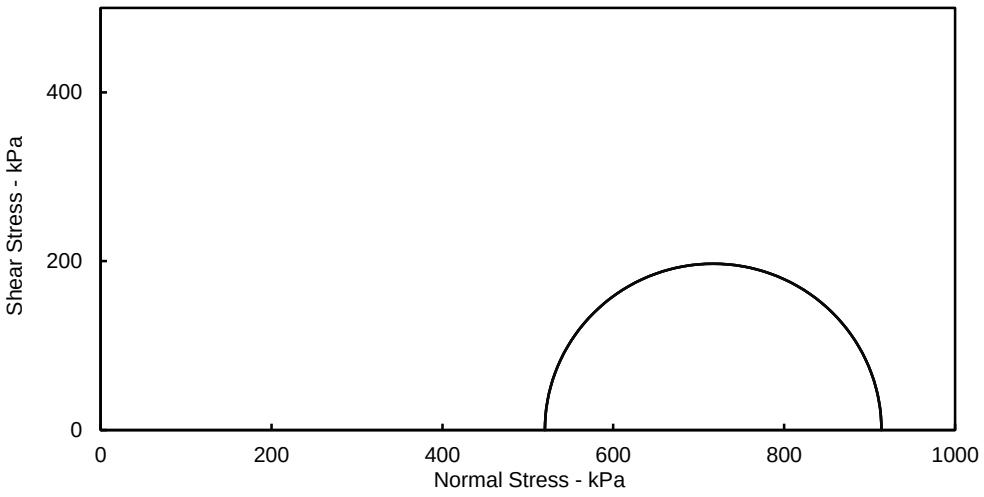
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	U6
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	199.8		
Diameter	mm	104.7		
Moisture Content	%	26		
Bulk Density	Mg/m³	2.29		
Dry Density	Mg/m³	1.82		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.17		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	520		
Strain at Failure	%	3.3		
Maximum Deviator Stress	kPa	394		
Shear Strength	kPa	197		
Mode of Failure		Brittle		
Non Engineering Description		Very stiff fissured grey slightly sandy CLAY.		

Comments
Undisturbed specimen taken 20mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





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Unit 2 Springfield Road, Chesham, Bucks, HP51PW

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH02-22
Engineer		Sample Ref	U6
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

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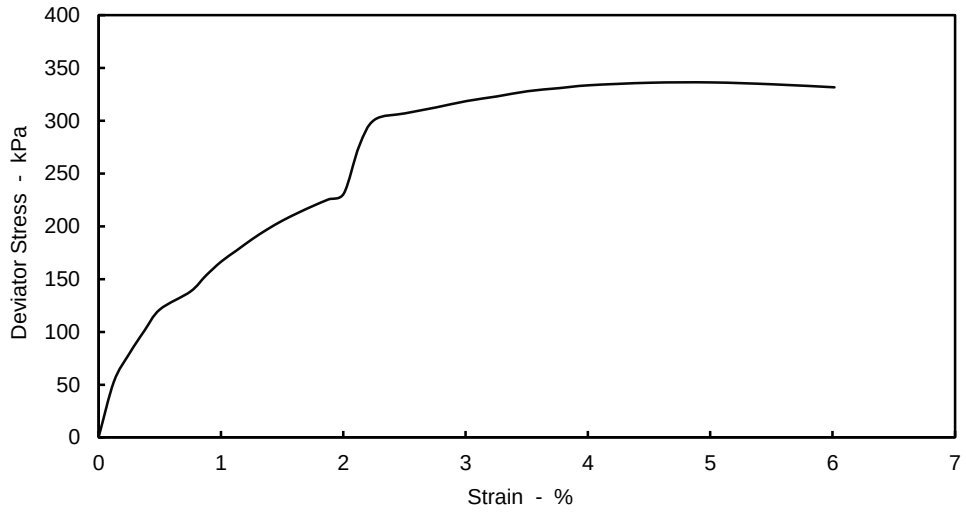
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

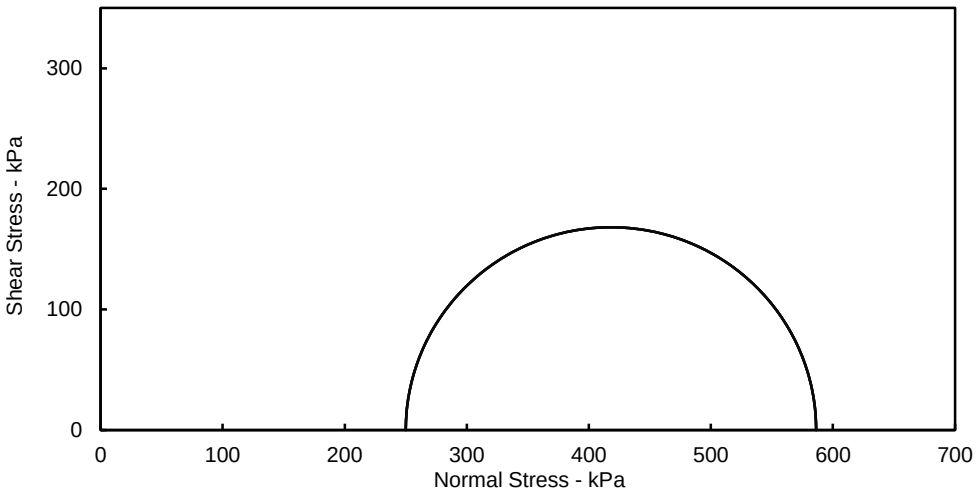
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH03-22
Engineer		Sample Ref	U2
		Depth (m)	
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	199.5		
Diameter	mm	103.3		
Moisture Content	%	29		
Bulk Density	Mg/m³	1.97		
Dry Density	Mg/m³	1.53		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.25		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	250		
Strain at Failure	%	5.0		
Maximum Deviator Stress	kPa	336		
Shear Strength	kPa	168		
Mode of Failure		Compound		
Non Engineering Description		Very stiff fissured grey CLAY.		

Comments
Undisturbed specimen taken 27mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





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AM	25/10/2022

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BS 1377 : Part 7 : 1990 Clause 8

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH03-22
Engineer		Sample Ref	U2
		Depth (m)	
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

Please note that these photographs are intended to show the failure mode, and do not necessarily show accurately the colouration of the soil.

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Lab Project No C7825

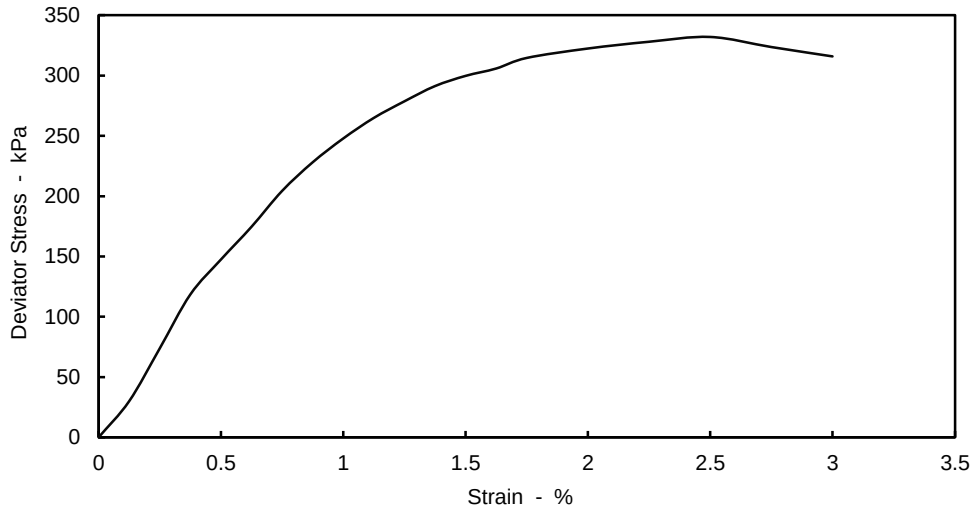
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

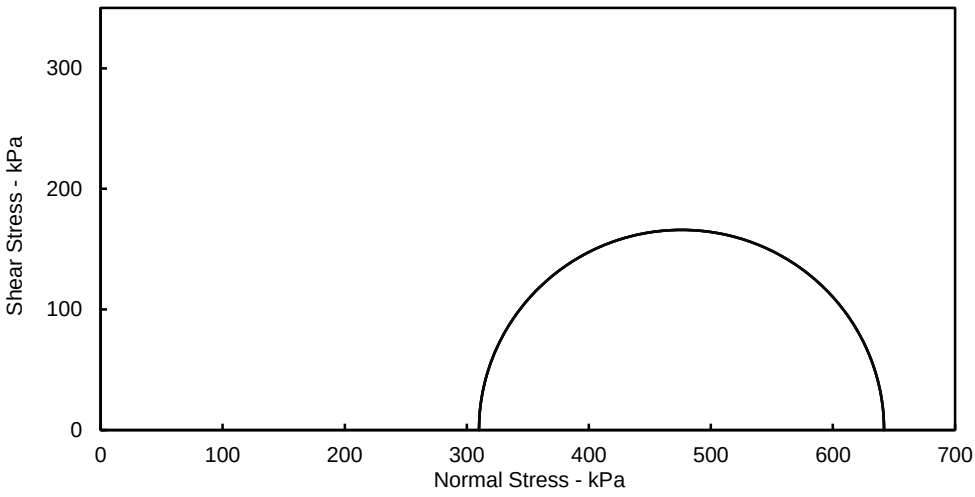
Site	RICHMOND COLLEGE	**Contract No.**	**1921744**
Client	RSK Environment Ltd	Hole	BH03-22
Engineer		Sample Ref	U5
		Sample Type	U100

Sample Details				
Sample Condition		Undisturbed		
Height	mm	200.0		
Diameter	mm	102.9		
Moisture Content	%	24		
Bulk Density	Mg/m³	2.36		
Dry Density	Mg/m³	1.91		
Test Details				
Membrane Thickness	mm	0.20		
Membrane Correction	kPa	0.13		
Rate of Axial Displacement	%/min	0.76		
Cell Pressure	kPa	310		
Strain at Failure	%	2.5		
Maximum Deviator Stress	kPa	332		
Shear Strength	kPa	166		
Mode of Failure		Brittle		
Non Engineering Description		Very stiff fissured grey slightly sandy CLAY.		

Comments
Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters		
C	n/a	kPa
Phi	n/a	°





Originator	Checked & Approved
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BS 1377 : Part 7 : 1990 Clause 8

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

TERRA TEK
SITE INVESTIGATION AND LABORATORY SERVICES

Site	RICHMOND COLLEGE	**Contract No**	**1921744**
Client	RSK Environment Ltd	Hole	BH03-22
Engineer		Sample Ref	U5
		Sample Type	U100

Originator	Checked & Approved
AM	25/10/2022

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APPENDIX N
LABORATORY CERTIFICATES FOR GROUNDWATER/SURFACE WATER ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/09699
Issue Number: 1 **Date:** 20 October, 2022

Client:
RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Danielle Evans
Project Name: Richmond College
Project Ref: 1921744
Order No: N/A
Date Samples Received: 04/10/22
Date Instructions Received: 04/10/22
Date Analysis Completed: 20/10/22

Approved by:

Holly Neary-King
Client Services Supervisor

UKAS TESTING
1247

Envirolab Job Number: 22/09699

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/09699/1							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	SW1									
Depth to Top										
Depth To Bottom										
Date Sampled	23-Sep-22									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
pH (w)$_A^\#$	8.42							pH	0.01	A-T-031w
DOC - Dissolved Organic Carbon (w)$_A^\#$	3.6							mg/l	2	A-T-032w
Calcium (dissolved)$_A^\#$	93							mg/l	1	A-T-049w

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Hemel, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, UK, HP3 9RT

Project: Richmond College

Clients Project No: 1921744

Project No: 22/09699

Date Received: 04/10/2022 (am)

Cool Box Temperatures (°C): 17.6

Lab Sample ID	22/09699/1
Client Sample No	
Client Sample ID/Depth	SW1
Date Sampled	23/09/22
Deviation Code	
A7 (no HNO3)	✓
A9 (no H2SO4)	✓
F	✓

Key

A7 (no HNO3)	*No HNO3 preserved bottle provided (dissolved metals will be deviating)*
A9 (no H2SO4)	*No H2SO4 preserved bottle provided (phenols, ammonia, DOC, COD will be deviating)*
F	*Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/09699/1
Client Sample No	
Client Sample ID/Depth	SW1
Date Sampled	23/09/22
pH (w)	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/09699/1
Client Sample No	
Client Sample ID/Depth	SW1
Date Sampled	23/09/22
A-T-031w	10/10/2022
A-T-032w	15/10/2022
A-T-049w	20/10/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/10095
Issue Number: 1 **Date:** 24 October, 2022

Client:
RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Danielle Evans/Rhys Jones
Project Name: Richmond College
Project Ref: 1921744
Order No: N/A
Date Samples Received: 14/10/22
Date Instructions Received: 14/10/22
Date Analysis Completed: 24/10/22

Approved by:

Holly Neary-King
Client Services Supervisor

UKAS TESTING
1247

Envirolab Job Number: 22/10095

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/10095/1	22/10095/2	22/10095/3	22/10095/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	River	BH1	BH2	BH3						
Depth to Top		3.50	3.50	3.50						
Depth To Bottom										
Date Sampled	13-Oct-22	13-Oct-22	13-Oct-22	13-Oct-22						
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW						
Sample Matrix Code	N/A	N/A	N/A	N/A						
pH (w)$_{A}^{\#}$	7.84	7.31	6.79	6.81				pH	0.01	A-T-031w
Sulphate (w)$_{A}^{\#}$	67	67	154	153				mg/l	1	A-T-026w
Arsenic (dissolved)$_{A}^{\#}$	1	2	7	10				µg/l	1	A-T-025w
Cadmium (dissolved)$_{A}^{\#}$	<0.2	<0.2	<0.2	<0.2				µg/l	0.2	A-T-025w
Copper (dissolved)$_{A}$	<4	88	<4	<4				µg/l	4	A-T-025w
Chromium (dissolved)$_{A}^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-025w
Lead (dissolved)$_{A}^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-025w
Mercury (dissolved)$_{A}^{\#}$	<0.1	<0.1	<0.1	<0.1				µg/l	0.1	A-T-025w
Nickel (dissolved)$_{A}^{\#}$	2	2	4	4				µg/l	2	A-T-025w
Selenium (dissolved)$_{A}^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-025w
Zinc (dissolved)$_{A}^{\#}$	7	4	5	3				µg/l	2	A-T-025w

Envirolab Job Number: 22/10095

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/10095/1	22/10095/2	22/10095/3	22/10095/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	River	BH1	BH2	BH3						
Depth to Top		3.50	3.50	3.50						
Depth To Bottom										
Date Sampled	13-Oct-22	13-Oct-22	13-Oct-22	13-Oct-22						
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW						
Sample Matrix Code	N/A	N/A	N/A	N/A						
PAH 16MS (w)										
Acenaphthene (w)$_A^{\#}$	<0.01	<0.01	<0.01	0.01				µg/l	0.01	A-T-019w
Acenaphthylene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Anthracene (w)$_A^{\#}$	<0.01	<0.01	<0.01	0.01				µg/l	0.01	A-T-019w
Benzo(a)anthracene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Benzo(a)pyrene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Benzo(b)fluoranthene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Benzo(ghi)perylene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Benzo(k)fluoranthene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Chrysene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Dibenzo(ah)anthracene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Fluoranthene (w)$_A^{\#}$	<0.01	0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Fluorene (w)$_A^{\#}$	<0.01	<0.01	<0.01	0.01				µg/l	0.01	A-T-019w
Indeno(123-cd)pyrene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Naphthalene (w)$_A^{\#}$	<0.01	<0.01	<0.01	0.04				µg/l	0.01	A-T-019w
Phenanthrene (w)$_A^{\#}$	<0.01	<0.01	<0.01	0.04				µg/l	0.01	A-T-019w
Pyrene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01				µg/l	0.01	A-T-019w
Total PAH 16MS (w)$_A^{\#}$	<0.01	0.01	<0.01	0.11				µg/l	0.01	A-T-019w

Envirolab Job Number: 22/10095

Client Project Name: Richmond College

Client Project Ref: 1921744

Lab Sample ID	22/10095/1	22/10095/2	22/10095/3	22/10095/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	River	BH1	BH2	BH3						
Depth to Top		3.50	3.50	3.50						
Depth To Bottom										
Date Sampled	13-Oct-22	13-Oct-22	13-Oct-22	13-Oct-22						
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW						
Sample Matrix Code	N/A	N/A	N/A	N/A						
TPH CWG (w) with Clean Up										
Ali >C5-C6 (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
Ali >C6-C8 (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
Ali >C8-C10 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Ali >C10-C12 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Ali >C12-C16 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Ali >C16-C21 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Ali >C21-C35 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Total Aliphatics (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	Calc-As Recd
Aro >C5-C7 (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
Aro >C7-C8 (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
Aro >C8-C10 (w)$_A$	<5	<5	<5	<5				µg/l	5	A-T-055w
Aro >C10-C12 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Aro >C12-C16 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Aro >C16-C21 (w)$_A^{\#}$	<5	<5	<5	<5				µg/l	5	A-T-055w
Aro >C21-C35 (w)$_A$	<10	<10	<10	<10				µg/l	10	A-T-055w
Total Aromatics (w)$_A$	<10	<10	<10	<10				µg/l	10	Calc-As Recd
TPH (Ali & Aro >C5-C35) (w)$_A$	<10	<10	<10	<10				µg/l	10	Calc-As Recd
BTEX - Benzene (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - Toluene (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - m & p Xylene (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - o Xylene (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w
MTBE (w)$_A^{\#}$	<1	<1	<1	<1				µg/l	1	A-T-022w

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Hemel, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, UK, HP3 9RT

Project: Richmond College

Clients Project No: 1921744

Project No: 22/10095

Date Received: 14/10/2022 (am)

Cool Box Temperatures (°C): 14.1

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/10095/1	22/10095/2	22/10095/3	22/10095/4
Client Sample No				
Client Sample ID/Depth	River	BH1 3.50m	BH2 3.50m	BH3 3.50m
Date Sampled	13/10/22	13/10/22	13/10/22	13/10/22
A-T-019w	19/10/2022	19/10/2022	19/10/2022	19/10/2022
A-T-022w	20/10/2022	20/10/2022	20/10/2022	20/10/2022
A-T-025w	24/10/2022	24/10/2022	24/10/2022	24/10/2022
A-T-026w	24/10/2022	24/10/2022	24/10/2022	24/10/2022
A-T-031w	19/10/2022	19/10/2022	19/10/2022	19/10/2022
A-T-055w	19/10/2022	19/10/2022	19/10/2022	19/10/2022
Calc-As Recd	20/10/2022	20/10/2022	20/10/2022	20/10/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX O
GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH

Generic assessment criteria for human health: residential scenario with home-grown produce

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009[1]. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009[2]. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014, the publication of Category 4 Screening Levels (C4SL)[3,4], as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)[5] used in the generation of SGVs.

C4SL were initially published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010[3]). Further C4SL were published in 2021 for vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE). Where a C4SL has been published, the RSK GAC duplicates the C4SL using all input parameters within the SP1010 final project report[3] and associated chemical specific reports[6], and adopts them as GAC for these substances. Due to the use of decimal places rather than significant figures applied to the Contaminated Land Exposure Assessment (CLEA) tool outputs, the GAC presented may be marginally differently to the C4SL values, however any differences between the values are minimal and would not equate to an unacceptable risk.

For all other substances the C4SL exposure modifications, with the exception of the "top two" produce type approach taken in the C4SL, have been applied to the current RSK GAC. These include alterations to daily inhalation rates for residential and commercial scenarios, reducing soil adherence factors in children (age classes 1 to 12 only) for residential land use, reducing exposure frequency for dermal contact outdoors for residential land use, and updated produce type consumption rates (90th percentile) based on recent data from the National Diet and Nutrition Survey.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015[7] or by the USEPA[14], where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the CLEA tool v1.071, supporting EA guidance[5,8,9] and revised exposure scenarios published for the C4SL[3]. The SAC are also termed GAC.

Conceptual model

In accordance with SR3[5], the residential with home-grown produce scenario considers risks to a female child between the ages of 0 and 6 years old as the highest risk scenario. In accordance with Box 3.1 of SR3[5], the pathways considered for production of the SAC in the residential with home-grown produce scenario are

- direct soil and dust ingestion
- consumption of home-grown produce
- consumption of soil attached to home-grown produce
- dermal contact with soil and indoor dust
- inhalation of indoor and outdoor dust and vapours.

Figure 1 is a conceptual model illustrating these linkages.

In line with guidance in the EA SGV report for cadmium[1], the RSK GAC for cadmium has been derived based on estimates representative of lifetime exposure. Although young children are generally more likely to have higher exposures to soil contaminants, the renal toxicity of cadmium, and the derivation of the TDI_{oral} and TDI_{inh}, are based on considerations of the kidney burden accumulated over 50 years or so. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase[9]. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached[9]. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required[9]:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook[9], this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook[9], which explains how to calculate an effective assessment criterion manually.

SR3[5] states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7[10], the EA TOX[1] reports, the C4SL SP1010 project report and associated appendices[3,6], the 2015 LQM/CIEH report[7] or the USEPA IRIS database[14]. Where a LLTC[3,6] has been published for a substance, RSK has used these input parameters to derive the RSK GAC. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene, barium, methyl tertiary-butyl ether (MTBE), 1,1,2-trichlorethane, 1,1-dichloroethene, 1,2-dichloropropane, 2-chloronaphthalene, chloroethane, chloromethane, cis 1,2-dichloroethene, dichloromethane, hexachloroethane and trans 1,2-dichloroethene were obtained from the CL:AIRE Soil Generic Assessment Criteria report[11].

For TPH, aromatic hydrocarbons C_5–C_8 were not modelled, as this range comprises benzene (>EC5-EC7) and toluene (>EC7-EC8), which are modelled separately.

Physical parameters

For the residential with home-grown produce scenario, the CLEA default building is a small, two-storey terrace house with a concrete ground-bearing slab. The house is assumed to have a 100m^2 private garden consisting of lawn and flowerbeds, incorporating a 20m^2 plot for growing fruit and vegetables consumed by the residents. SR3[5] notes this residential building type to be the most conservative in terms of potential for vapour intrusion. The building parameters used in the production of the RSK GACs are the default CLEA v1.06 inputs presented in Table 3.3 of SR3[3], with a dust loading factor detailed in Section 9.3 of SR3[5]. The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3[5]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

Summary of modifications to the default CLEA SR3[5] input parameters for residential with home-grown produce land-use scenario

In summary, the RSK GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3[5]. Modifications to the default SR3[5] exposure scenarios based on the C4SL exposure scenarios[3] are presented in Tables 2 and 3 below.

The final selected GAC are presented by pathway in Table 4 and the combined GAC in Table 5.

Figure 1: Conceptual model for residential scenario with home-grown produce

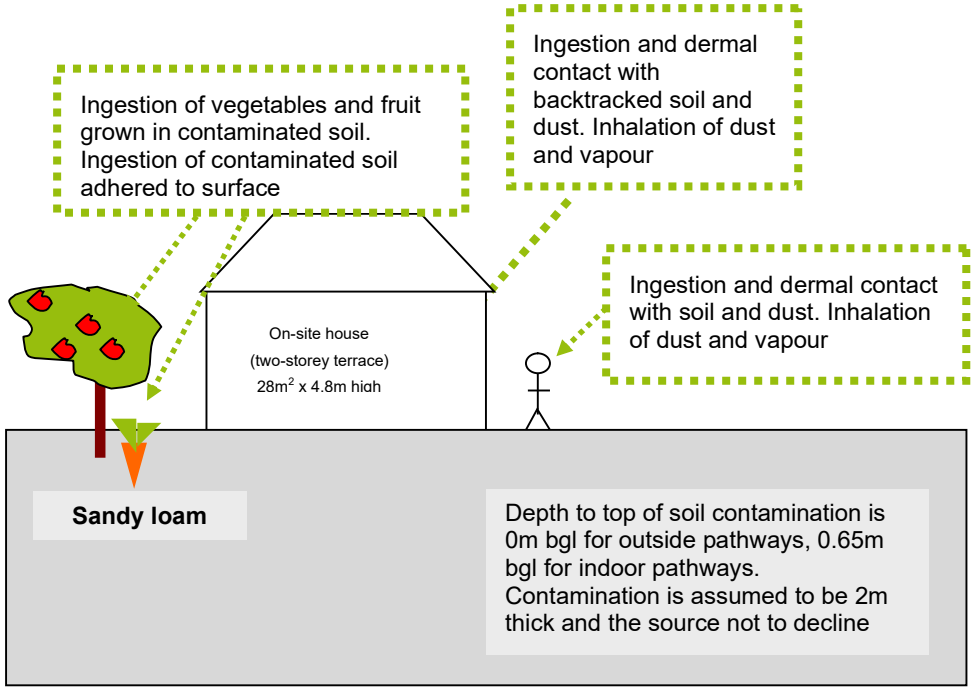

Table 1: Exposure assessment parameters for residential scenario with home-grown produce – inputs for CLEA model

Parameter	Value	Justification
Land use	Residential with homegrown produce	Chosen land use
Receptor	Female child age 1 to 6	Key generic assumption given in Box 3.1, SR3[5]
Building	Small terraced house	Key generic assumption given in Box 3.1, SR3. Small, two-storey terraced house chosen, as it is the most conservative residential building type in terms of protection from vapor intrusion (Section 3.4.6, SR3)[5]
Soil type	Sandy Loam	Most common UK soil type (Section 4.3.1, from Table 3.1, SR3)[5]
Start AC (age class)	1	Range of age classes corresponding to key generic assumption that the critical receptor is a young female child aged 0–6. From Box 3.1, SR3[5]
End AC (age class)	6	
SOM (%)	6	Representative of sandy loamy soil according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[13]
	1	To provide SAC for sites where SOM <6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Residential with home-grown produce – modified home-grown produce data

Name	Consumption rate 90th percentile (g FW kg^{-1} BW day^{-1}) by age class						Dry weight conversion factor (g DW g^{-1} FW)	Home-grown fraction (average)	Home-grown fraction (high end)	Soil loading factor (g g^{-1} DW)	Preparation correction factor
	1	2	3	4	5	6					
Green vegetables	7.12	5.87	5.87	5.87	4.53	4.53	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	10.7	2.83	2.83	2.83	2.14	2.14	0.103	0.06	0.4	1.00E-03	1.00E+00
Tuber vegetables	16	6.6	6.6	6.6	4.95	4.95	0.21	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	1.83	3.39	3.39	3.39	2.24	2.24	0.058	0.06	0.4	1.00E-03	6.00E-01
Shrub fruit	2.23	0.46	0.46	0.46	0.19	0.19	0.166	0.09	0.6	1.00E-03	6.00E-01
Tree fruit	3.82	10.3	10.3	10.3	5.16	5.16	0.157	0.04	0.27	1.00E-03	6.00E-01
Justification	Table 3.4, SP1010 (3)						Table 6.3, SR3(5)	Table 4.19, SR3(5)		Table 6.3, SR3(5)	

Table 3: Residential with home-grown produce – modified and use and receptor data

Parameter	Unit	Age class					
		1	2	3	4	5	6
EF (soil and dust ingestion)	day yr^{-1}	180	365	365	365	365	365
EF (consumption of home-grown produce)	day yr^{-1}	180	365	365	365	365	365
EF (skin contact, indoor)	day yr^{-1}	180	365	365	365	365	365
EF (skin contact, outdoor)	day yr^{-1}	170	170	170	170	170	170
EF (inhalation of dust and vapour, indoor)	day yr^{-1}	365	365	365	365	365	365
EF (inhalation of dust and vapour, outdoor)	day yr^{-1}	365	365	365	365	365	365
Justification		Table 3.5, SP1010(3); Table 3.1, SR3(5)					
Soil to skin adherence factor (outdoor)	mg cm^{-2} day^{-1}	0.1	0.1	0.1	0.1	0.1	0.1
Justification		Table 3.5, SP1010(3)					
Inhalation rate	m^3 day^{-1}	5.4	8.0	8.9/f	10.1	10.1	10.1
Justification		Mean value USEPA, 2011(12); Table 3.2, SP1010(3)					
Notes: For **cadmium**, the exposure assessment for a residential land use is based on estimates representative of lifetime exposure AC1-18. This is because the TDI_{oral} and TDI_{inh} are based on considerations of the kidney burden accumulated over 50 years. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period. See the Environment Agency Science Report SC05002/ TOX 3(1), Science Report SC050021/Cadmium SGV(1) and the project report SP1010(3) for more information.							

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE

Table 4

Human Health Generic Assessment Criteria by Pathway for Residential With Home-Grown Produce Scenario

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	3.71E+01	5.26E+02	NR	NR	3.71E+01	5.26E+02	NR	NR	3.71E+01	5.26E+02	NR	NR
Barium	(b)	1.34E+03	NR	NR	NR	1.34E+03	NR	NR	NR	1.34E+03	NR	NR	NR
Beryllium		1.13E+02	1.72E+00	NR	NR	1.13E+02	1.72E+00	NR	NR	1.13E+02	1.72E+00	NR	NR
Boron		3.00E+02	5.20E+06	NR	NR	3.00E+02	5.20E+06	NR	NR	3.00E+02	5.20E+06	NR	NR
Cadmium	(a)	2.30E+01	4.88E+02	2.21E+01	NR	2.30E+01	4.88E+02	2.21E+01	NR	2.30E+01	4.88E+02	2.21E+01	NR
Chromium (III) - trivalent	(c)	1.84E+04	9.07E+02	NR	NR	1.84E+04	9.07E+02	NR	NR	1.84E+04	9.07E+02	NR	NR
Chromium (VI) - hexavalent	(a,d)	5.85E+01	2.06E+01	NR	NR	5.85E+01	2.06E+01	NR	NR	5.85E+01	2.06E+01	NR	NR
Copper		2.72E+03	1.41E+04	2.47E+03	NR	2.72E+03	1.41E+04	2.47E+03	NR	2.72E+03	1.41E+04	2.47E+03	NR
Lead	(a)	2.01E+02	NR	NR	NR	2.01E+02	NR	NR	NR	2.01E+02	NR	NR	NR
Elemental Mercury (Hg^0)	(d)	NR	2.35E-01	NR	4.31E+00	NR	5.60E-01	NR	1.07E+01	NR	1.22E+00	NR	2.58E+01
Inorganic Mercury (Hg^{2+})		3.95E+01	3.63E+03	3.91E+01	NR	3.95E+01	3.63E+03	3.91E+01	NR	3.95E+01	3.63E+03	3.91E+01	NR
Methyl Mercury (Hg^{4+})		1.26E+01	1.87E+01	7.52E+00	7.33E+01	1.26E+01	3.62E+01	9.34E+00	1.42E+02	1.26E+01	7.68E+01	1.08E+01	3.04E+02
Nickel	(d)	1.27E+02	1.81E+02	NR	NR	1.27E+02	1.81E+02	NR	NR	1.27E+02	1.81E+02	NR	NR
Selenium	(b)	2.58E+02	NR	NR	NR	2.58E+02	NR	NR	NR	2.58E+02	NR	NR	NR
Vanadium		4.13E+02	1.46E+03	NR	NR	4.13E+02	1.46E+03	NR	NR	4.13E+02	1.46E+03	NR	NR
Zinc	(b)	3.86E+03	3.63E+07	NR	NR	3.86E+03	3.63E+07	NR	NR	3.86E+03	3.63E+07	NR	NR
Cyanide (free)		1.37E+00	1.37E+04	1.37E+00	NR	1.37E+00	1.37E+04	1.37E+00	NR	1.37E+00	1.37E+04	1.37E+00	NR
Volatile Organic Compounds													
Benzene	(a)	2.62E-01	9.01E-01	2.03E-01	1.22E+03	5.39E-01	1.68E+00	4.08E-01	2.26E+03	1.16E+00	3.48E+00	8.72E-01	4.71E+03
Toluene		1.53E+02	9.08E+02	1.31E+02	8.69E+02	3.49E+02	2.00E+03	2.97E+02	1.92E+03	7.95E+02	4.55E+03	6.77E+02	4.36E+03
Ethylbenzene		1.10E+02	8.34E+01	4.74E+01	5.18E+02	2.61E+02	1.96E+02	1.12E+02	1.22E+03	6.00E+02	4.58E+02	2.60E+02	2.84E+03
Xylene - m		2.10E+02	8.25E+01	5.92E+01	6.25E+02	5.01E+02	1.95E+02	1.40E+02	1.47E+03	1.15E+03	4.56E+02	3.27E+02	3.46E+03
Xylene - o		1.92E+02	8.87E+01	6.07E+01	4.78E+02	4.56E+02	2.08E+02	1.43E+02	1.12E+03	1.05E+03	4.86E+02	3.32E+02	2.62E+03
Xylene - p		1.98E+02	7.93E+01	5.66E+01	5.76E+02	4.70E+02	1.86E+02	1.33E+02	1.35E+03	1.08E+03	4.36E+02	3.10E+02	3.17E+03
Total xylene		1.92E+02	7.93E+01	5.66E+01	6.25E+02	4.56E+02	1.86E+02	1.33E+02	1.47E+03	1.05E+03	4.36E+02	3.10E+02	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		1.54E+02	1.04E+02	6.22E+01	2.04E+04	2.97E+02	1.69E+02	1.08E+02	3.31E+04	6.03E+02	3.21E+02	2.10E+02	6.27E+04
1,1,1,2 Tetrachloroethane		5.39E+00	1.54E+00	1.20E+00	2.60E+03	1.27E+01	3.56E+00	2.78E+00	6.02E+03	2.92E+01	8.29E+00	6.46E+00	1.40E+04
1,1,2,2-Tetrachloroethane		2.81E+00	3.92E+00	1.64E+00	2.67E+03	6.10E+00	8.04E+00	3.47E+00	5.46E+03	1.36E+01	1.76E+01	7.67E+00	1.20E+04
1,1,1-Trichloroethane		3.33E+02	9.01E+00	8.77E+00	1.43E+03	7.26E+02	1.84E+01	1.80E+01	2.92E+03	1.62E+03	4.04E+01	3.94E+01	6.39E+03
1,1,2 Trichloroethane		1.95E+00	1.25E+00	7.62E-01	4.03E+03	4.21E+00	2.55E+00	1.59E+00	8.21E+03	9.35E+00	5.59E+00	3.50E+00	1.80E+04
1,1-Dichloroethene		1.93E+01	3.29E-01	3.23E-01	2.23E+03	3.85E+01	5.82E-01	5.74E-01	3.94E+03	8.15E+01	1.17E+00	1.16E+00	7.94E+03
1,2-Dichloroethane		3.17E-02	9.20E-03	7.13E-03	3.41E+03	5.73E-02	1.33E-02	1.08E-02	4.91E+03	1.09E-01	2.28E-02	1.88E-02	8.43E+03
1,2,4-Trimethylbenzene		NR	1.76E+00	NR	4.74E+02	NR	4.26E+00	NR	1.16E+03	NR	9.72E+00	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
1,2-Dichloropropane		4.28E+00	3.40E-02	3.37E-02	1.19E+03	8.44E+00	6.00E-02	5.96E-02	2.11E+03	1.77E+01	1.21E-01	1.20E-01	4.24E+03
Carbon Tetrachloride (tetrachloromethane)		3.10E+00	2.58E-02	2.57E-02	1.52E+03	7.11E+00	5.65E-02	5.62E-02	3.32E+03	1.62E+01	1.28E-01	1.27E-01	7.54E+03
Chloroethane		NR	1.17E+01	NR	2.61E+03	NR	1.59E+01	NR	3.54E+03	NR	2.57E+01	NR	5.71E+03
Chloromethane		NR	1.17E-02	NR	1.91E+03	NR	1.38E-02	NR	2.24E+03	NR	1.85E-02	NR	2.99E+03
Cis 1,2 Dichloroethene		1.56E-01	NR	NR	3.94E+03	2.66E-01	NR	NR	6.61E+03	5.18E-01	NR	NR	1.29E+04
Dichloromethane		7.04E-01	3.05E+00	6.24E-01	7.27E+03	1.27E+00	4.06E+00	1.08E+00	9.68E+03	2.33E+00	6.42E+00	1.92E+00	1.53E+04
Tetrachloroethene (PCE)		1.33E+01	3.19E-01	3.11E-01	4.24E+02	3.11E+01	7.15E-01	6.99E-01	9.51E+02	7.12E+01	1.64E+00	1.60E+00	2.18E+03
Trans 1,2 Dichloroethene		6.45E+00	2.76E-01	NR	3.42E+03	1.29E+01	4.99E-01	NR	6.17E+03	2.74E+01	1.02E+00		1.26E+04
Trichloroethene (TCE)		9.30E-03	3.61E-02	NR	1.54E+03	1.95E-02	7.57E-02	NR	3.22E+03	4.34E-02	1.68E-01	NR	7.14E+03
Vinyl Chloride (chloroethene)		1.13E-02	1.47E-02	6.38E-03	1.36E+03	2.09E-02	1.90E-02	9.97E-03	1.76E+03	3.88E-02	2.91E-02	1.66E-02	2.69E+03
Semi-Volatile Organic Compounds													
2-Chloronaphthalene		2.76E+02	5.39E+00	5.29E+00	1.14E+02	6.59E+02	1.33E+01	1.30E+01	2.80E+02	1.45E+03	3.17E+01	3.10E+01	6.69E+02

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE

Table 4

Human Health Generic Assessment Criteria by Pathway for Residential With Home-Grown Produce Scenario

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Acenaphthene		2.27E+02	4.86E+04	2.26E+02	5.70E+01	5.41E+02	1.18E+05	5.38E+02	1.41E+02	1.18E+03	2.68E+05	1.17E+03	3.36E+02
Acenaphthylene		1.85E+02	4.59E+04	1.84E+02	8.61E+01	4.42E+02	1.11E+05	4.40E+02	2.12E+02	9.78E+02	2.53E+05	9.74E+02	5.06E+02
Anthracene		2.43E+03	1.53E+05	2.39E+03	1.17E+00	5.53E+03	3.77E+05	5.45E+03	2.91E+00	1.10E+04	8.76E+05	1.09E+04	6.96E+00
Benzo(a)anthracene		1.01E+01	2.47E+01	7.18E+00	1.71E+00	1.42E+01	4.37E+01	1.07E+01	4.28E+00	1.69E+01	6.26E+01	1.33E+01	1.03E+01
Benzo(a)pyrene	(a)	4.96E+00	3.51E+01	NR	9.11E-01	4.96E+00	3.77E+01	NR	2.28E+00	4.96E+00	3.89E+01	NR	5.46E+00
Benzo(b)fluoranthene		2.96E+00	1.93E+01	2.56E+00	1.22E+00	3.89E+00	2.13E+01	3.29E+00	3.04E+00	4.43E+00	2.22E+01	3.69E+00	7.29E+00
Benzo(g,h,i)perylene		3.77E+02	1.87E+03	3.14E+02	1.54E-02	4.09E+02	1.94E+03	3.38E+02	3.85E-02	4.23E+02	1.97E+03	3.48E+02	9.23E-02
Benzo(k)fluoranthene		8.92E+01	5.41E+02	7.66E+01	6.87E-01	1.10E+02	5.76E+02	9.22E+01	1.72E+00	1.21E+02	5.91E+02	1.00E+02	4.12E+00
Chrysene		1.66E+01	1.19E+02	1.46E+01	4.40E-01	2.54E+01	1.49E+02	2.17E+01	1.10E+00	3.19E+01	1.66E+02	2.67E+01	2.64E+00
Dibenzo(a,h)anthracene		2.90E-01	1.45E+00	2.41E-01	3.93E-03	3.43E-01	1.64E+00	2.84E-01	9.82E-03	3.69E-01	1.74E+00	3.04E-01	2.36E-02
Fluoranthene		2.87E+02	3.83E+04	2.85E+02	1.89E+01	5.63E+02	8.87E+04	5.60E+02	4.73E+01	9.00E+02	1.83E+05	8.96E+02	1.13E+02
Fluorene		1.77E+02	6.20E+03	1.72E+02	3.09E+01	4.19E+02	1.53E+04	4.07E+02	7.65E+01	8.98E+02	3.62E+04	8.77E+02	1.83E+02
Hexachloroethane		2.68E-01	NR	NR	8.17E+00	6.57E-01	NR	NR	2.01E+01	1.55E+00	NR	NR	4.81E+01
Indeno(1,2,3-cd)pyrene		3.09E+01	2.12E+02	2.70E+01	6.13E-02	4.22E+01	2.38E+02	3.59E+01	1.53E-01	4.92E+01	2.50E+02	4.11E+01	3.68E-01
Naphthalene		2.78E+01	2.33E+01	1.27E+01	7.64E+01	6.66E+01	5.58E+01	3.04E+01	1.83E+02	1.53E+02	1.31E+02	7.06E+01	4.32E+02
Phenanthrene		9.85E+01	7.17E+03	9.72E+01	3.60E+01	2.24E+02	1.76E+04	2.22E+02	8.96E+01	4.48E+02	4.07E+04	4.43E+02	2.14E+02
Pyrene		6.25E+02	8.79E+04	6.20E+02	2.20E+00	1.25E+03	2.04E+05	1.24E+03	5.49E+00	2.05E+03	4.23E+05	2.04E+03	1.32E+01
Phenol		1.60E+02	4.58E+02	1.20E+02	2.42E+04	2.96E+02	6.95E+02	2.09E+02	3.81E+04	5.86E+02	1.19E+03	3.93E+02	7.03E+04
Total Petroleum Hydrocarbons													
Aliphatic hydrocarbons EC_5-EC_6		4.99E+03	4.24E+01	4.23E+01	3.04E+02	1.13E+04	7.79E+01	7.78E+01	5.58E+02	2.50E+04	1.61E+02	1.60E+02	1.15E+03
Aliphatic hydrocarbons >EC_6-EC_8		1.49E+04	1.04E+02	1.03E+02	1.44E+02	3.43E+04	2.31E+02	2.31E+02	3.22E+02	7.11E+04	5.29E+02	5.28E+02	7.36E+02
Aliphatic hydrocarbons >EC_8-EC_{10}		1.61E+03	2.68E+01	2.67E+01	7.77E+01	2.91E+03	6.55E+01	6.51E+01	1.90E+02	4.26E+03	1.56E+02	1.54E+02	4.51E+02
Aliphatic hydrocarbons >EC_{10}-EC_{12}		4.57E+03	1.33E+02	1.32E+02	4.75E+01	5.51E+03	3.31E+02	3.26E+02	1.18E+02	5.98E+03	7.93E+02	7.65E+02	2.83E+02
Aliphatic hydrocarbons >EC_{12}-EC_{16}		6.27E+03	1.11E+03	1.06E+03	2.37E+01	6.34E+03	2.78E+03	2.41E+03	5.91E+01	6.36E+03	6.67E+03	4.34E+03	1.42E+02
Aliphatic hydrocarbons >EC_{16}-EC_{35}	(b)	6.46E+04	NR	NR	8.48E+00	9.17E+04	NR	NR	2.12E+01	1.10E+05	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC_{35}-EC_{44}	(b)	6.46E+04	NR	NR	8.48E+00	9.17E+04	NR	NR	2.12E+01	1.10E+05	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC_{10}		5.76E+01	4.74E+01	3.45E+01	6.13E+02	1.38E+02	1.16E+02	8.38E+01	1.50E+03	3.07E+02	2.77E+02	1.94E+02	3.58E+02
Aromatic hydrocarbons >EC_{10}-EC_{12}		8.29E+01	2.58E+02	7.52E+01	3.64E+02	1.96E+02	6.39E+02	1.79E+02	8.99E+02	4.25E+02	1.52E+03	3.91E+02	2.15E+03
Aromatic hydrocarbons >EC_{12}-EC_{16}		1.47E+02	2.85E+03	1.45E+02	1.69E+02	3.36E+02	7.07E+03	3.32E+02	4.19E+02	6.81E+02	1.68E+04	6.74E+02	1.00E+03
Aromatic hydrocarbons >EC_{16}-EC_{21}	(b)	2.63E+02	NR	NR	5.37E+01	5.45E+02	NR	NR	1.34E+02	9.34E+02	NR	NR	3.21E+02
Aromatic hydrocarbons >EC_{21}-EC_{35}	(b)	1.09E+03	NR	NR	4.83E+00	1.47E+03	NR	NR	1.21E+01	1.70E+03	NR	NR	2.90E+01
Aromatic hydrocarbons >EC_{35}-EC_{44}	(b)	1.09E+03	NR	NR	4.83E+00	1.47E+03	NR	NR	1.21E+01	1.70E+03	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. SAC - soil assessment criteria.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.

Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.

Calculated SAC does not exceed the soil saturation limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for boron and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE

Table 5
Human Health Generic Assessment Criteria for Residential with home-grown produce

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	37	37	37
Barium	1,300	1,300	1,300
Beryllium	1.7	1.7	1.7
Boron	300	300	300
Cadmium	22	22	22
Chromium (III) - trivalent	910	910	910
Chromium (VI) - hexavalent	21	21	21
Copper	2,500	2,500	2,500
Lead	200	200	200
Elemental Mercury (Hg^0)	0.2	0.6	1.2
Inorganic Mercury (Hg^{2+})	39	39	39
Methyl Mercury (Hg^{4+})	10	10	10
Nickel	130	130	130
Selenium	258	258	258
Vanadium	410	410	410
Zinc	3,900	3,900	3,900
Cyanide (free)	1.4	1.4	1.4
Volatile Organic Compounds			
Benzene	0.20	0.41	0.87
Toluene	130	300	680
Ethylbenzene	50	110	260
Xylene - m	59	140	327
Xylene - o	61	143	332
Xylene - p	57	133	310
Total xylene	57	133	310
Methyl tertiary-Butyl ether (MTBE)	60	110	210
1,1,1,2 Tetrachloroethane	1.20	2.78	6.46
1,1,2,2-Tetrachloroethane	1.6	3.5	7.7
1,1,1-Trichloroethane	9	18	39
1,1,2 Trichloroethane	0.8	1.6	3.5
1,1-Dichloroethene	0.32	0.57	1.16
1,2-Dichloroethane	0.007	0.011	0.019
1,2,4-Trimethylbenzene	1.8	4.3	9.7
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	0.034	0.060	0.120
Carbon Tetrachloride (tetrachloromethane)	0.026	0.056	0.127
Chloroethane	11.7	15.9	25.7
Chloromethane	0.012	0.014	0.019
Cis 1,2 Dichloroethene	0.16	0.27	0.52
Dichloromethane	0.62	1.08	1.92
Tetrachloroethene (PCE)	0.31	0.70	1.60
Trans 1,2 Dichloroethene	0.28	0.50	1.02
Trichloroethene (TCE)	0.009	0.020	0.043
Vinyl Chloride (chloroethene)	0.006	0.010	0.017
Semi-Volatile Organic Compounds			
2-Chloronaphthalene	5	13	31
Acenaphthene	230	540	1,170
Acenaphthylene	180	440	970
Anthracene	2,400	5,500	10,900
Benzo(a)anthracene	7	11	13
Benzo(a)pyrene	5	5	5
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(g,h,i)perylene	310	340	350
Benzo(k)fluoranthene	77	92	100
Chrysene	15	22	27
Dibenzo(a,h)anthracene	0.24	0.28	0.30
Fluoranthene	290	560	900
Fluorene	170	410	880
Hexachloroethane	0.27	0.66	1.55
Indeno(1,2,3-cd)pyrene	13	30	71
Naphthalene	13	30	71
Phenanthrene	100	220	440
Pyrene	620	1,240	2,040
Phenol	120	210	390
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC_5-EC_6	42	78	160
Aliphatic hydrocarbons >EC_6-EC_8	100	230	530
Aliphatic hydrocarbons >EC_8-EC_{10}	27	65	154
Aliphatic hydrocarbons >EC_{10}-EC_{12}	130 (48)	330 (118)	760 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	1,100 (24)	2,400 (59)	4,300 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	65,000 (8)	92,000 (21)	110,000
Aliphatic hydrocarbons >EC_{35}-EC_{44}	65,000 (8)	92,000 (21)	110,000
Aromatic hydrocarbons >EC_8-EC_{10}	30	80	190
Aromatic hydrocarbons >EC_{10}-EC_{12}	80	180	390
Aromatic hydrocarbons >EC_{12}-EC_{16}	140	330	670
Aromatic hydrocarbons >EC_{16}-EC_{21}	260	540	930
Aromatic hydrocarbons >EC_{21}-EC_{35}	1,100	1,500	1,700
Aromatic hydrocarbons >EC_{35}-EC_{44}	1,100	1,500	1,700
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC)[1]		

Notes:

'-' Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used

EC - equivalent carbon. SAC - soil assessment criteria.

[1] LOD for weight of asbestos per unit weight of soil calculated on a dry weight basis using PLM, handpicking and gravimetry.

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS)

RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

APPENDIX P
GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

APPENDIX P
GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

Several compounds can inhibit plant growth; hence it is important to have generic assessment criteria (GAC) to promote healthy plant growth. In the absence of other published GAC, the GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

The Council of European Communities Sewage Sludge Directive (86/278/EEC) dated 1986, has been transposed into UK law by Statutory Instrument No. 1263, The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as ammended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land (however the status of this document is unclear as it is on the archive section of the Defra website).

The directive seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to "***prevent harmful effects on soil, vegetation, animals and man".*** To this end, it prohibits the use of untreated sludge on agricultural land unless it is injected or incorporated into the soil. Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use". To provide protection against potential health risks from residual pathogens, sludge must not be applied to soil in which fruit and vegetable crops are growing, or less than ten months before fruit and vegetable crops are to be harvested. Grazing animals must not be allowed access to grassland or forage land less than three weeks after the application of sludge.

The specified limits of concentrations of selected elements in soil are presented in Table 4 of the updated 2nd Edition of the DoE Code of Practice and are designed to protect plant growth. It is noted that these values are more stringent than the values set in current UK regulations. However since they were ammended following recommendations from the Independent Scientific Committee in 1993. (MAFF/DOE 1993). The GAC are presented in Table 1.

Table 1: Generic assessment criteria

Determinant	Generic assessment criteria (mg/kg)			
	pH 5.0 < 5.5	pH 5.5 < 6.0	pH 6.0 < 7.0	pH >7.0
Zinc	200	200	200	300
Copper	80	100	135	200
Nickel	50	60	75	110
Lead	300	300	300	300
Cadmium	3	3	3	3
Mercury	1	1	1	1
Note: Only compounds with assessment criteria documented within the Directive 86/278/EEC have been included, although criteria for 5 additional compounds have been presented within the 2006 CoP.				

APPENDIX Q
GENERIC ASSESSMENT CRITERIA POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75 m below finished ground levels, sample results from depths between 0.5 m and 1.5 m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5 m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table Q1: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	**PE**	**PVC**
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5–C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}–C_{20}	10	Suitable
4	Mineral oil C_{21}–C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

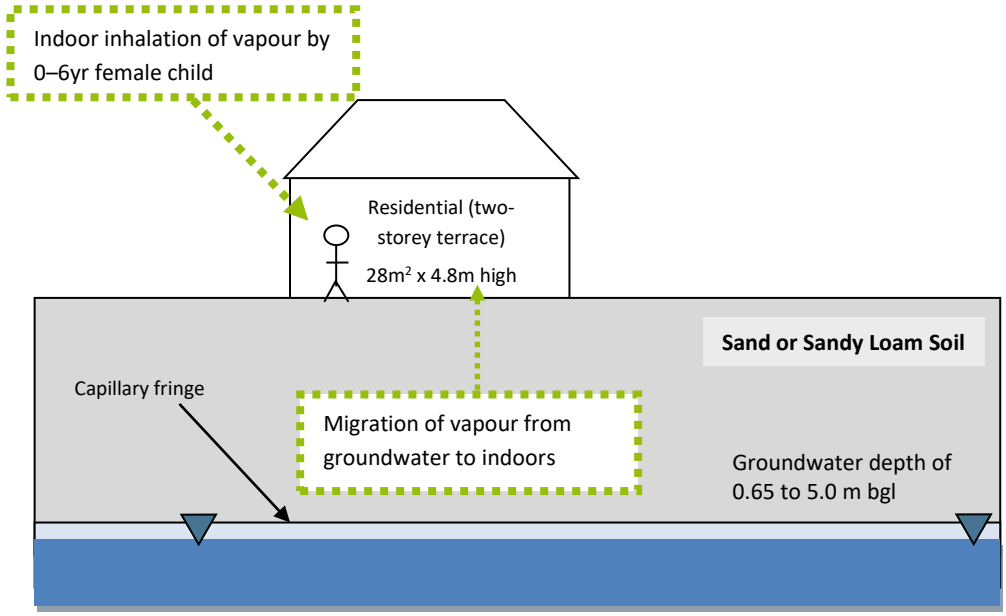
APPENDIX R
GENERIC GROUNDWATER ASSESSMENT CRITERIA (GRAC)

Generic groundwater assessment criteria (GrAC) for human health: residential scenario (child receptor)

Background

Volatile compounds in groundwater have the potential to pose risks to residential site end users via indoor and outdoor inhalation exposure. Due to significant dilution effects in outdoor air, risk from inhalation of volatile contaminants is generally dominated by indoor exposure. The GrAC conceptual site model (CSM) is shown in Figure 1 (not to scale).

Figure 1: GrAC conceptual model for a generic residential scenario



RSK GrAC derivation

Model selection

RSK GrAC have been calculated using the RBCA Toolkit for Chemical Releases (version 2.6) with the Johnson and Ettinger model, based on the CSM in Figure 1 for a small terrace house (as defined in SR3[3], Table 4.21). The Johnson & Ettinger model is adopted in the Environment Agency Contaminated Land Exposure Assessment tool for assessing risk to human health from inhalation of volatile contaminants in indoor air. However, the RBCA toolkit implementation of Johnson & Ettinger model allows consideration of a capillary fringe and is designed to directly model vapour intrusion to buildings from VOC in groundwater.

Conceptual model

The pollutant linkage considered in production of the GrAC is the volatilisation of compounds from groundwater and subsequent vapour inhalation by residents while indoors. Although the outdoor air inhalation pathway is also valid, this contributes little to the overall risks owing to the dilution of VOC in outdoor air.

In accordance with SR3[3], the residential scenario considers risks to a female child between the ages of 0 and 6 years old.

The building parameters used in the production of the RSK GACs are the default CLEA v1.06 inputs presented in Table 3.3 of SR3[3].

Default indoor air exchange rates and soil gas ingress rates have also been adopted.

The CLEA default building of a small, two-storey terrace house with a concrete ground-bearing slab was used in accordance with the standard residential scenario described in Environment Agency SR3 report.

The RSK GrAC have been calculated for both Sand and Sandy Loam soils using parameters presented in Table 3.1 of SR3[3]. The RSK GrAC have been derived for groundwater depths of 0.65 m, 1.5 m, 2.5 m and 5.0 m below ground level, incorporating a capillary fringe.

In line with recommendations provided in Environment Agency SR3[3] a sub-surface to indoor air attenuation factor of 10 has been applied to RBCA derived target levels for all volatile petroleum hydrocarbon fractions.

It is also assumed that contamination is present in the dissolved phase only. RBCA highlights when the assessment criterion exceeds the solubility limit of the pure compound.

Input selection – chemical and toxicological parameters

Key parameters used in the RBCA model are listed and justified in Table 1 of Annex A. The most up-to-date published chemical data was obtained from Environment Agency Report SC050021/SR7[2] where available. Toxicological and chemical data was also obtained from third party published sources including the following:

- Environment Agency TOX reports;
- LQM/CIEH S4UL:s for Human Health Risk Assessment by Land Quality Press (2015);
- CL:AIRE/EIC/AGS Soil Generic Assessment Criteria (2010); and
- CL:AIRE & DeFRA Category 4 Screening Levels (2014) & (2020).

For volatile compounds with published C4SLs (benzene, TCE, tetrachloroethene, and vinyl chloride) the published Low Level of Toxicological Concern (LLTC) has been adopted. For all other constituents the toxicological input parameters are associated with minimal risk derived in accordance with Environment Agency Report SC050021/SR2 guidance.

For the GrAC, the Health Criteria Values (HCV) used in the modelling were derived using the toxicological data for the Soil Assessment Criteria, amended as follows:

- A child weighing 13.3kg (average of 0–6-year-old female in accordance with Table 4.6 of SR3[3]) and breathing 8.77m^3 (average daily inhalation rate for a 0-6yr old female in accordance with SP1010 final project report for the C4SL (Table 3.2[8]) and USEPA data[9]
- Background inhalation (mean daily intake (MDI)) for a child (Age Classes 1-6)
- Residential amendments to the MDI for younger age groups following Table 3.4 and Section 3.4.1 of SR2[10],; amended to reflect average daily inhalation rates in accordance with SP1010 final project report for the C4SL (Table 3.2[8]) and USEPA data[9].

The amended HCV used in the derivation of the RSK GrAC are presented in Table 2 of Annex A.

Note on aqueous solubility and the RSK GrAC

Where the modelled assessment criteria, or the modelled assessment criteria with the correction factor applied to those contaminants specified below, exceed the aqueous solubility limit the assessment criteria defaults to this concentration and consequently the GrAC is set at the respective limit of solubility.

Where the GrAC exceeds the solubility limit the criteria area shaded red. In these circumstances there may not be a risk to human health in the dissolved phase. Consideration may need to be given to the potential for NAPL to be present at lower concentrations in mixtures in accordance with Raoults Law.

RSK GrAC derivation outputs

The RSK GrACs are presented in Table 1.

Within the RSK GrAC the following should be noted:

- GrAC do not take account of outdoor inhalation exposure to VOC, which is considered to contribute minimally to overall inhalation exposure
- GrAC do not take account of other exposure routes potentially relevant to VOC in shallow groundwater such as direct contact or root uptake
- No biodegradation is assumed to occur in the unsaturated zone. Where aerobic conditions on site are known to exist the GrAC for hydrocarbons may therefore be conservative
- GrAC do not take account of preferential flow into buildings such as through unsealed service entries. In such circumstances GrAC may not be appropriate for use
- GrAC are based on a soil vapour intrusion CSM and are not appropriate for use when the foundation is in direct contact with contaminated groundwater
- GrAC assume that the capillary fringe is un-contaminated with VOC, which is unlikely, particularly where groundwater levels are variable
- GrAC set at the theoretical aqueous solubility limit are not considered to pose a risk to human health
- GrAC do not take into account the interaction between contaminants and the influence this may have on the theoretical aqueous solubility
- GrACs are only applicable to dissolved phase contaminants where the modelled assessment criteria is below the aqueous solubility limits.

Table 1: RSK GrAC (µg/l)									
Land Use	**RESIDENTIAL**								
Soil Type	**SAND**					**SANDY LOAM**			
GW Depth (m)	**0.65**	**1.5**	**2.5**	**5**		**0.65**	**1.5**	**2.5**	**5**
Metals									
Elemental mercury	2.5	3.6	5.0	8.4		14.3	18.5	23.4	35.8
Methyl mercury	21550	27220	33880	50540		46300	48510	51110	57610
Volatile Organic Compounds									
Benzene (C4SL)	1100	1570	2120	3510		6820	8570	10620	15740
Toluene	515140	590000	590000	590000		590000	590000	590000	590000
Ethylbenzene	24300	35190	48000	80020		156380	180000	180000	180000
Xylene - m	22610	32750	44670	74480		144250	181800	200000	200000
Xylene - o	27570	39950	54500	90900		174260	173000	173000	173000
Xylene - p	23640	34230	46700	77860		150470	189710	200000	200000
Total xylene	22610	32750	44670	74480		144250	173000	173000	173000
Methyl tertiary-Butyl ether (MTBE)	185010	267500	364520	607070		945700	1245710	1598660	2481040
Trichloroethene (TCE) (C4SL)	27	39	53	87		172	220	270	400
Tetrachloroethene (PCE) (C4SL)	145	210	290	480		950	1190	1480	2180
1,1,1-Trichloroethane	7110	10230	13910	23090		46230	57820	71450	105540
1,1,1,2 Tetrachloroethane	550	800	1100	1830		3330	4250	5330	8040
1,1,2,2-Tetrachloroethane	3620	5320	7320	12320		14600	20600	27650	45290
Carbon Tetrachloride	12	17	24	39		79	98	120	180
1,2-Dichloroethane	20	28	38	63		100	140	170	260
Vinyl Chloride (chloroethene) (C4SL)	24.8	34.8	46.5	75.9		154	191	235	344
1,2,4-Trimethylbenzene	980	1430	1960	3270		6240	7900	9850	14720

Table 1: RSK GrAC (µg/l)									
Land Use	**RESIDENTIAL**								
Soil Type	**SAND**					**SANDY LOAM**			
GW Depth (m)	**0.65**	**1.5**	**2.5**	**5**		**0.65**	**1.5**	**2.5**	**5**
Semi-Volatile Organic Compounds									
Acenaphthene	4100	4100	4100	4100		4100	4100	4100	4100
Acenaphthylene	7950	7950	7950	7950		7950	7950	7950	7950
Naphthalene	5100	7530	10380	17510		19000	19000	19000	19000
Petroleum Hydrocarbons									
Aliphatic hydrocarbons EC5-EC6	4170	5900	7930	13020		26560	32990	35900	35900
Aliphatic hydrocarbons >EC6-EC8	3210	4540	5370	5370		5370	5370	5370	5370
Aliphatic hydrocarbons >EC8-EC10	120	170	230	380		427	427	427	427
Aliphatic hydrocarbons >EC10-EC12	33.9	33.9	33.9	33.9		33.9	33.9	33.9	33.9
Aliphatic hydrocarbons >EC12-EC16	0.759	0.759	0.759	0.759		0.759	0.759	0.759	0.759
Aromatic hydrocarbons >EC8-EC10	4150	5870	7900	12960		25730	32120	39630	58400
Aromatic hydrocarbons >EC10-EC12	14480	20510	24500	24500		245000	245000	245000	245000
Aromatic hydrocarbons >EC12-EC16	5750	5750	5750	5750		5750	5750	5750	5750

Notes:
Values less than 100 have not been rounded up or down; values greater than 100 have been rounded to the nearest 10.
Red highlighted values exceed solubility limit for the pure compound in water (aqueous solubility); GrAC defaults to the limit of solubility.
No vadose zone biodegradation considered
Sub-surface to indoor air correction factor of 10 applied to all petroleum (non-chlorinated) hydrocarbons
All GrAC are for 1% SOM (0.0058 FOC)

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Annex A – Model Input Parameters

Table 1: Residential scenario – RBCA inputs parameters

Parameter	Unit	Value	Justification
Receptor – female child			
Averaging time	Years	6	From Box 3.1, SR3[3]
Receptor weight	kg	13.3	Average of CLEA 0-6 year old female data, Table 4.6, SR3[3]
Exposure duration	Years	6	From Box 3.1, report , SR3[3]
Exposure frequency	Days yr^{-1}	350	Weighted using occupancy period of 23 hours per day for 365 days of the year
Soil type – sand			
Total porosity	-	0.54	CLEA value for sand. Parameters for sand from Table 4.4, SR3[3]. Volumetric water content in the vadose zone is a highly sensitive parameter within the model and potentially highly variable in the field.
Volumetric water content – unsaturated (vadose) zone	-	0.24	
Volumetric air content - unsaturated (vadose) zone	-	0.30	
Dry bulk density	g cm^{-3} or kg L^{-1}	1.18	
Volumetric water content – capillary zone	-	0.35	Calculated using SR3 Equation 4.1. Value taken as the average moisture content calculated for suction heads (cm H_2O); 0 (i.e. saturated), 10, 20, 30, 40, 50 (i.e. unsaturated soil at field capacity). This is a highly sensitive parameter within the model.
Volumetric air content - capillary zone	-	0.19	Calculated from total porosity and volumetric water content of capillary zone. This is a highly sensitive parameter within the model.
Vertical hydraulic conductivity	cm d^{-1}	636	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[3] equivalent to 7.36 E-03 cm s^{-1}
Vapour permeability	m^2	7.54 E-12	Calculated for sand using equations in Appendix 1, SR3[3]
Capillary zone thickness	m	0.25	Taken from C W Fetter, Applied Hydrogeology 4th Ed, 1994[11] and R Heath, Basic groundwater hydrology 1992[12] for a medium sand
Fraction organic carbon	%	0.0058	Equivalent to SOM = 1%. Note that GrAC are independent on FOC/SOM content since partitioning is assumed to be between aqueous and vapour phases only
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3[3]. Volumetric water content in the vadose zone is a highly sensitive parameter within the model and potentially highly variable in the field.
Volumetric water content – unsaturated (vadose) zone	-	0.33	
Volumetric air content - unsaturated (vadose) zone	-	0.20	
Dry bulk density	g cm^{-3} or kg/L	1.21	
Volumetric water content – capillary zone	-	0.42	Calculated using SR3 Equation 4.1[3]. Value taken as the average moisture content calculated for suction heads (cm H_2O); 0 (i.e. saturated), 10, 20, 30, 40, 50 (i.e. unsaturated soil at field capacity). This is a highly sensitive parameter within the model.
Volumetric air content - capillary zone	-	0.11	Calculated from total porosity and volumetric water content of capillary zone. This is a highly sensitive parameter within

Parameter	Unit	Value	Justification
			the model.
Vertical hydraulic conductivity	cm d^{-1}	308	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[3] equivalent to 3.56E-3 cm s^{-1}
Vapour permeability	m^2	3.05 E-12	Calculated for sandy loam using equations in Appendix 1, SR3[3]
Capillary zone thickness	m	0.4	Taken from R Heath, Basic Groundwater Hydrology 1992[12] for a fine sand. Note: C W Fetter, Applied Hydrogeology 4th Ed, 1994[11] value for fine sand is 0.5 m
Fraction organic carbon	%	0.0058	Equivalent to SOM = 1%. Note that GrAC are independent on FOC/SOM content since partitioning is assumed to be between aqueous and vapour phases only
Building – small terrace house			
Building volume/area ratio	m	4.8	Table 3.3, SR3[3]
Foundation area	m^2	28	
Foundation perimeter	m	21.16	Calculated using Equation A2 in SR3[3], which assumes the building to be of square proportions.
Building air exchange rate	d^{-1}	12	Table 3.3, SR3[3] Building air exchange rate equivalent to 1.4 E-04 s^{-1}
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	
Foundation crack fraction	-	0.00151	Calculated from floor crack area of 423cm^2 and building footprint of 28m^2 in Table 4.21, SR3[3]
Volumetric water content of cracks	-	0.24 / 0.33	For sand / sandy loam, assumed equal to underlying soil type in assumption that cracks become filled with unsaturated zone soil over time. Parameters for sand and sandy loam from Table 4.4, SR3[3]
Volumetric air content of cracks	-	0.30 / 0.20	
Indoor/outdoor differential pressure	Pa	3.1	From Table 3.3, SR3[3] Equivalent to 31 g/cm/s^2
Convective air flow through cracks (Q_{soil}) - Sand	m^3 s^{-1}	3.4 E-05	Soil-specific calculated parameter in RBCA equivalent (and cross checked) with equations A1, A2, A3, A8, A9 in SR3[3]. Equivalent to **34 cm^3 s^{-1}**
Convective air flow through cracks (Q_{soil}) – Sandy Loam	m^3 s^{-1}	1.4 E-05	Soil-specific calculated parameter in RBCA equivalent (and cross checked) with equations A1, A2, A3, A8, A9 in SR3[3]. Equivalent to **14 cm^3 s^{-1}**

Table 2: Tolerable Indoor Air Concentrations

Tolerable Indoor Air Concentration (mg/m^3)[1]	
VOC / SVOC	**Child (Residential)**
MTBE	1.0803
Benzene [C4SL]	0.0050
Toluene	2.1164
Ethylbenzene	0.1113
Xylenes	0.0834
Trimethylbenzenes*	0.0026
TPH_Aliphatic >EC5-EC6	3.7913
TPH_Aliphatic >EC6-EC8	3.7913
TPH_Aliphatic >EC8-EC10	0.2199
TPH_Aliphatic >EC10-EC12	0.2199
TPH_Aliphatic >EC12-EC16	0.2199

Tolerable Indoor Air Concentration (mg/m^3)[1]	
VOC / SVOC	**Child (Residential)**
TPH_Aromatic >EC8-EC9 (styrene)	0.1820
TPH_Aromatic >EC8-EC10	0.0455
TPH_Aromatic >EC10-EC12	0.0455
TPH_Aromatic >EC12-EC16	0.0455
Acenaphthene	0.0910
Acenaphthylene	0.0910
Naphthalene	0.0011
Vinyl chloride C4SL	0.0087
Dichloroethane-1,2	0.0002
Tetrachloroethene C4SL	0.0152
Carbon tetrachloride	0.0025
Trichloroethane-1,1,1	0.9099
Trichloroethene C4SL	0.0018
Tetrachloroethane 1,1,2,2 & 1,1,1,2	0.0086
1,1,2-Trichloroethane	0.0073
1,1-dichloroethane	0.3030
1,1-dichloroethene	0.0864
Chloroethane	4.3318
Chloromethane	0.0039
cis-1,2-dichloroethene	0.0087
Dichloromethane	0.1781
trans-1,2-dichloroethene	0.0253
Trichloromethane (chloroform)	0.0570
Mercury Elemental	0.00027
Mercury Methyl	0.0008

[1] Inhalation HCV has taken account of background inhalation for threshold compounds only

C4SL denotes value based on published Lower Limit of Toxicological Concern

* For trimethylbenzenes, the HCV incorporates a Mean Daily Intake of 0.309 ug m^{-3} based on urban air quality data obtained by RSK for Eltham, Southeast London rather than higher values (2.46-5.66 ug m^{-3}) reported by CL:AIRE from a Dutch study.

APPENDIX S
GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

Protection of the water environment

The water environment in the United Kingdom is protected under a number of regulatory regimes. The relevant environmental regulator is consulted where there may be a risk that pollution of 'controlled waters' may occur or may have occurred in the past.

The term 'controlled waters' refers to coastal waters, inland freshwaters and groundwater. The EU Water Framework Directive (WFD) (2000/60/EC) is implemented via domestic regulations and guidance, covering aspects of groundwater and surface water protection as well as drinking water supply policy. Domestic legislation and guidance will vary across the United Kingdom. Therefore, the relevant legislation for England, Wales, Northern Ireland and Scotland should be reviewed, alongside guidance provided by the Environment Agency (EA), Natural Resource Wales (NRW), the Scottish Environmental Protection Agency (SEPA) or the Northern Ireland Environment Agency (NIEA), as appropriate.

The main objectives of the protection and remediation of groundwater under threat from land contamination are set out within "The Environment Agency's approach to groundwater protection", version 1.0 (March 2017)[(1)] and the associated guidance "Land contamination groundwater compliance points: quantitative risk assessments (March 2017)[(1a)] that have replaced the previous guidance document "Groundwater Principles and Practice (GP3)". When assessing risks to groundwater, the following need to be considered:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to:
    - ***prevent*** *the input of* ***hazardous*** *substances into groundwater (see description of hazardous substances below)*
    - ***limit*** *the entry of other (non-hazardous) pollutants into groundwater to avoid pollution, deterioration in the status of groundwater bodies and to prevent sustained, upward trends in pollutant concentrations in groundwater.*
- Where pollutants have already entered groundwater, the priority is to take all necessary and reasonable measures to:
    - ***minimise*** *further entry of "contaminants" where there is a defined source*
    - ***limit the pollution*** *of groundwater or any effect on the status of the groundwater body from the future expansion of the 'plume', if necessary, by actively reducing its extent.*

Within the context of groundwater risk assessments on sites affected by land contamination, "reasonable" means feasible without involving disproportionate costs. What costs are "disproportionate" depends on site-specific circumstances, which may include:

- Considerations of technical feasibility such as identified by the remedial options appraisal, this may be due to the distribution or nature of the contamination and the available remedial methods to treat the identified contamination;
- Sustainability considerations.

DEFINITIONS AND SUBSTANCE CLASSIFICATIONS

Risks to surface waters:

When assessing risks to surface waters, the following list of definitions should be understood:

Priority substances (PS) are harmful substances originally identified under the Water Framework Directive (WFD) 2000/60/EC as substances 'presenting a significant risk to or via the aquatic environment' at a European level. Member States are required to incorporate the identified **PS** into their country-wide monitoring programmes. There are currently 33 **PS** defined within the Priority Substances Directive (2013/39/EU; Annex 1), with a further 12 additional substances due to come into force from 22 December 2018. Directive 2013/39/EU has been transposed into domestic legislation for England and Wales by The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Under the umbrella of **PS**, there is a sub-set of substances identified as being "hazardous", and these are referred to as **Priority hazardous substances (PHS).** The list of **PHS** is defined at EU level within the Priority Substances Directive (2013/39/EU). The WFD defines hazardous substances as 'substances (or groups of substances) that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.' There are currently **21 PHS** (previously 15 PHS, with a further 6 substances added in 22 December 2018).

There is also another group of substances defined at EU level and which are referred to as **other pollutants (OP)** in Directive 2013/39/EU**.** These are additional substances which although not **priority substances**, have EQS which are identical to those laid down in the legislation which applied prior to 13 January 2009 (Directive 2008/105/EU). The **OP** are listed along with the **priority substance (PS)** within the Priority Substances Directive (2013/39/EU),and their associated EQS are also listed therein. There are 6 **OP** defined within the Priority Substances Directive (2013/39/EU).

In addition to the EU level substances, there are also a group of pollutants defined at a Member State level, referred to as **Specific pollutants (SP)**. These substances are pollutants which are released in significant quantities into water bodies in each of the individual European Member States. Under the WFD, Member States are required to set their own EQS for these substances. An indicative list of **SP** is given in Annex VIII of the WFD. Many of the substances categorised as **SP** in the UK were formerly List 2 substances under the old Groundwater Directive (80/68/EEC). The **SP** are defined within Part 2 (Table 1) of The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Risks to groundwater:

When assessing risks to groundwater, the following definitions should be understood:

Under the requirements of the Groundwater Daughter Directive (2006/118/EU), the UK has published a list of substances it considers to be **hazardous substances** with respect to groundwater. In their advisory capacity to the government, this list has been derived by the UK Joint Agencies Groundwater Directive Advisory Group (JAGDAG), of which the Environment Agency is a member. The latest JAGDAG list of **hazardous substances** was published in January 2019 and the Environment Agency will use the updated list of hazardous substances from this date for all new activities that may lead to the discharge of hazardous substances to groundwater. The list is extensive and can be found in full at:

https://www.wfduk.org/stakeholders/jagdag

Selecting the appropriate assessment criteria

When assessing the risks to controlled waters, various assessment criteria apply, depending on the nature of the assessment and the conceptual site model.

Where a surface water body is involved, then Environmental Quality Standards (EQS) are the relevant assessment criteria as they are designed to be protective of surface water ecology.

Where a public water supply or a Principal aquifer is involved, then the standards defined in The Water Supply (Water Quality) Regulations(2) are the primary source of assessment criteria. The Private Water Supplies Regulations(3) may also be applicable in some cases. For instances where there are no UK assessment criteria, then the World Health Organisation (WHO) drinking water guidelines(4) may be used.

This appendix presents the generic assessment criteria (GAC) that RSK considers suitable for assessing risks to controlled waters for our most commonly encountered determinants. A full list of EQS for England and Wales are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

The RSK GAC for controlled waters are presented in **Table 1** and **Table 2**. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The appropriate target concentrations should be selected with consideration to:

- the site conceptual model (i.e. the receptor at potential risk);
- whether the substance is already present in groundwater at the site;
- whether or not the substance is classified as a priority hazardous substance under the Priority Substances Directive (2013/39/EC) (see above), or as a hazardous substance according to the current list of JAGDAG determinations(5); and
- background concentrations in the aquifer (if applicable).

It is important to remember that the WFD and Environment Agency guidance(1 & 1a) support a sustainable, risk-based approach be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is inevitably required.

Target concentrations shaded in green are statutory values	Target concentrations shaded in orange are non-statutory values

Note: Units µg/l throughout (unless otherwise stated)

Table 1: Target concentrations for controlled waters (excluding TPH CWG fractions)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Metals & other inorganics						
Hazardous substance	Specific pollutant	Arsenic	-	10[2]	50[6a]	25[6a]
Non-hazardous pollutant	Priority substance	Cadmium	0.1[7]	5[2]	≤0.08, 0.08, 0.09, 0.15, 0.25 [6b]	0.2[6a]
(Not determined)	-	Chromium (total)	-	50[2]	8.1 Sum values for chromium III and VI	-
(Not determined)	Specific pollutant	Chromium (III)	-	Use value for total chromium	4.7[6a]	-
Hazardous substance	Specific pollutant	Chromium (VI)			3.4[6a]	0.6[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	Specific pollutant	Copper	-	2,000[2]	1 bioavailable[6a]	3.76 dissolved, where DOC ≤1mg/l[6a]
						3.76µg/l + (2.677µg/l x ((DOC/2) – 0.5µg/l)) dissolved, where DOC >1mg/l[6a]
Hazardous substance	Priority substance	Lead	-	10[2]	1.2 bioavailable[6a]	1.3[6a]
Hazardous substance	**Priority hazardous substance**	Mercury	0.01[7]	1[2]	0.07[6c]	0.07[6c]
Non-hazardous pollutant	Priority substance	Nickel	-	20[2]	4.0 bioavailable[6a]	8.6[6a]
Non-hazardous pollutant	-	Selenium	-	10[2]	-	-
Non-hazardous pollutant	Specific pollutant	Zinc	-	3,000[8]	10.9 bioavailable[6a]	6.8 dissolved [6a]
(Not determined)	Specific pollutant	Iron	-	200[2]	1000[6a]*1	1000[6a])*1
(Not determined)	Specific pollutant	Manganese	-	50[2] (0.05mg/l)	123 bioavailable[6a] (0.123mg/l)	-
(Not determined)	-	Aluminium	-	200[2]	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
					EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	**Priority hazardous substance**	Tributyltin compounds (Tributyltin-cation)	0.001[7]	-	0.0002[6a]	0.0002[6a]
(Not determined)	-	Sodium	-	200,000[2] (200 mg/l)	-	-
Non-hazardous pollutant	Specific pollutant	Cyanide (Hydrogen cyanide)	-	50[2] (0.05 mg/l)	1[6a] (0.001 mg/l)	1[6a] (0.001 mg/l)
Non-hazardous pollutant	-	Total ammoniacal nitrogen[$]	-	500[2] (0.5 mg/l) as NH_4 (472 expressed as NH_3; 389 expressed as N)	300[6f] (0.3 mg/l) as N (364 expressed as NH_3; 386 expressed as NH_4)	-
Non-hazardous pollutant	Specific pollutant	Ammonia un-ionised (equilibrium ratio calculated) (NH_3)	-	-	-	21[6a] (0.021 mg/l)
Non-hazardous pollutant	Specific pollutant	Chlorine	-	-	2[6a] (0.002 mg/l)	10[6d] (0.01 mg/l)
(Not determined)	-	Chloride	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Sulphate	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Nitrate (as NO_3)	-	50,000[2] (50 mg/l)	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	-	Nitrite (as NO_2)	-	500[2] (0.5 mg/l)	10[9] (0.01 mg/l)	-
Volatile organic compounds (VOC)						
Non-hazardous pollutant	Other pollutant	Tetrachloroethene (tetrachloroethylene; PCE)	0.1[7]	10[2] sum of TCE and PCE	10[6a]	10[6a]
Hazardous substance	Other pollutant	Trichloroethene (trichloroethylene; TCE)	0.1[7]		10[6a]	10[6a]
Hazardous substance *(1,1,2,2-tetra - choloroethane)*	Specific pollutant	Tetrachloroethane	-	-	140[6a]	-
Hazardous substance	Other pollutant	Carbon tetrachloride (tetrachloromethane)	0.1[7]	3.0[2]	12[6a]	12[6a]
Non-hazardous pollutant	Priority substance	1,2-Dichloroethane	1.0[7]	3.0[2]	10[6a]	10[6a]
Non-hazardous pollutant	-	1.2-Dichloroethene (DCE) sum of cis and trans	-	50.0[4]	-	-
Hazardous substance	-	Vinyl chloride (chloroethene, chloroethylene)	-	0.5[2]	-	-
Non-hazardous pollutant	Priority substance	Dichloromethane	-	20[4]	20[6a]	20[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Priority substance	Trichlorobenzenes	0.01[7]	-	0.4[6a]	0.4[(6a)]
Hazardous substance	Priority substance	Trichloromethane (Chloroform)	0.1[7]	100[2a] (sum of **trihalomethanes** – chloroform, bromform, dibromochloromethane, bromodichloromethane)	2.5[6a]	2.5[6a]
(Not determined)	-	Bromoform	-		-	-
(Not determined)	-	Dibromochloromethane	-		-	-
(Not determined)	-	Bromodichloromethane	-		-	-
Non-hazardous pollutant	**Priority hazardous substance**	Di(2-ethylhexyl) phthalate (bis(2-ethylhexyl) phthalate, DEHP)	-	8[4]	1.3[6a]	1.3[6a]
(Not determined)	Specific pollutant	Benzyl butyl phthalate	-	-	7.5[6a]	0.75[6e]
Hazardous substance	**Priority hazardous substance**	Hexachlorobutadiene (as a pesticide, but reported in a VOC suite)	0.005[7]	0.1[2]	0.6[6c]	0.6[6c]
Semi-volatile organic compounds (SVOC)						
(Not determined) *Not to be confused with acenaphthene, which is a hazardous substance*	-	Acenaphthylene (Aro EC12-EC16)	-	-	5.8[10]	
Hazardous substance	**Priority hazardous substance**	Anthracene (Aro EC16-EC21)	-	-	0.1[6a]	0.1[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Priority substance	Naphthalene (Aro EC10-EC12)	-	-	2[6a]	2[6a]
Hazardous substance	Priority substance	Fluoranthene (Aro EC21-EC35) not used as an indicator for this EC band	-	-	0.0063[6a]	0.0063[6a]
Hazardous substance(s)	**Priority hazardous substance(s)**	Benzo(a)pyrene (Aro EC21-EC35)	-	0.01[2]	0.00017[6a]	0.00017[6a]
		Benzo(b)fluoranthene (Aro EC21-EC35)	-	0.1[2] sum of the concentration of the four specified compounds	No EQS for these substances. B(a)P should be used as the indicator compound instead.	
		Benzo(k)fluoranthene (Aro EC21-EC35)	-			
		Benzo(g,h,i)perylene (Aro EC21-EC35)	-			
		Indeno(1,2,3-cd) pyrene (Aro EC21-EC35)	-			
Non-hazardous pollutant	Specific pollutant	Phenol	-	-	7.7[6a]	7.7[6a]
Hazardous substance	Specific pollutant	2,4-Dichlorophenol	0.1[7]	-	4.2[6a]	0.42[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Pentachloro-phenol (PCP) (as a pesticide, but reported in an SVOC suite)	0.1[7]	0.1[2]	0.4[6a]	0.4[6a]
Petroleum hydrocarbons						
Hazardous substance	-	Total petroleum hydrocarbons	-	See Table 2 for individual (non-statutory) TPH CWG fractions with respect to drinking water receptors	See individual risk driving compounds (i.e. BTEX and PAH) for specific EQS	
Hazardous substance	Priority substance	Benzene (Aro EC5-EC7)	1[7]	1[2]	10[6a]	8[6a]
Hazardous substance	Specific pollutant	Toluene (Aro EC7-EC8)	4[7]	700[4]	74[6a]	74[6a]
Hazardous substance	-	Ethylbenzene (Aro EC8-EC10)	-	300[4]	300[11]	-
Hazardous substance	-	Xylenes (Aro EC8-EC10)	3[7]	500[4]	30[11]	-
Non-hazardous pollutant	-	Methyl tertiary butyl ether (MTBE)	-	15[12]	-	

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Pesticides, fungicides, insecticides and herbicides						
(Not determined) – assume to be Hazardous Substance as per below	-	Total pesticides	-	0.5[2]	-	-
(Not determined) - assume to be Hazardous Substance as per below	-	Other individual pesticides (unless otherwise detailed below)	-	0.1[2]	-	-
Hazardous substance(s)	Other pollutant (Cyclodiene pesticides)	Aldrin	0.003[7]	0.03[2]	0.01[6a] (sum of all four)	0.005[6a] (sum of all four)
		Dieldrin	0.003[7]	0.03[2]		
		Endrin	0.003[7]	0.1[2b] ('other individual pesticide')		
		Isodrin*[2]	0.003[7]	0.1[2b] ('other individual pesticide')		
Hazardous substance	Other pollutant	DDT (total)	0.002[7]	0.1[2] ('other individual pesticide')	0.025[6a]	0.025[6a]
Hazardous substance	Specific pollutant	Carbendazim	-	0.1[2] ('other individual pesticide')	0.15[6a]	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Chlorothalonil	-	0.1[2] ('other individual pesticide')	0.035[6a]	-
Hazardous substance	Priority substance	Cypermethrin	-	0.1[2] ('other individual pesticide')	8.0E^{-5}[6a]	8.0E^{-6}[6a]
Hazardous substance	Specific pollutant	Dimethoate	0.01[7]	0.1[2] ('other individual pesticide')	0.48[6a]	0.48[6a]
(Not determined)	Specific pollutant	Glyphosate	-	0.1[2] ('other individual pesticide')	196[6a]	196[6a]
Hazardous substance	Specific pollutant	Linuron	-	0.1[2] ('other individual pesticide')	0.5[6a]	0.5[6a]
Non-hazardous pollutant	Specific pollutant	Mecoprop	0.04[7]	0.1[2] ('other individual pesticide')	18[6a]	18[6a]
Non-hazardous pollutant	Specific pollutant	Methiocarb	-	0.1[2] ('other individual pesticide')	0.01[6a]	-
Non-hazardous pollutant	Specific pollutant	Pendimethalin	-	0.1[2] ('other individual pesticide')	0.3[6a]	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Permethrin	0.001[7]	0.1[2] ('other individual pesticide')	0.001[6a]	0.0002[6a]
Hazardous substance	Priority substance	Alachlor	-	0.1[2] ('other individual pesticide')	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Atrazine	0.03[7]	100[4] ('other individual pesticide')	0.6[6a]	0.6[6a]
Hazardous substance	Priority substance	Diuron	-	0.1[2] ('other individual pesticide')	0.2[6a]	0.2[6a]
Hazardous substance	**Priority hazardous substance**	Endosulphan	0.005[7]	0.1[2] ('other individual pesticide')	0.005[6a]	0.0005[6a]
Non-hazardous pollutant	Priority substance	Isoproturon	-	0.1[2] ('other individual pesticide')	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Simazine	0.03[7]	0.1[2] ('other individual pesticide')	1[6a]	1 [6a]
Hazardous substance	**Priority hazardous substance**	Trifluralin	0.01[7]	0.1[2] ('other individual pesticide')	0.03[6a]	0.03[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Dichlorvos	-	0.1[2] ('other individual pesticide')	6.0E^{-4}[6a]	6.0E^{-5}[6a]
Hazardous substance	Priority substance	Heptachlor and heptachlor epoxide	-	0.03[2]	2.0E^{-7}[6a]	1.0E^{-08}[6a]
Miscellaneous						
(Not determined)	Specific pollutant	Triclosan (antibacterial agent)	-	-	0.1[6a]	0.1[6a]
Hazardous substance	**Priority hazardous substance**	Perfluoro-octane sulfonic acid (and its derivatives) (PFOS)	-	-	6.5E^{-4}[6a]	1.3E^{-4}[6a]
Hazardous substance	**Priority hazardous substance**	Hexabromo cyclododecane (HBCDD)	-	-	0.0016[6a]	0.0008[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters

Notes:

'-' A target concentration is not available.

$Please note that total ammonia (NH_4^+ and NH_3) is equivalent to ammoniacal nitrogen in laboratory reports

*1 Please note that although iron is listed in the 2015 Direction as 1.000 µg/l, the EQS remains at 1mg/l in Scotland and it is assumed this is an error and should read either 1,000 or 1000µg/l.

*2 Please note that although Isodrin is not listed in name within the group of "Cyclodiene pesticides" in Table 1 of Schedule 3 Part 3 of the 2015 Direction[6], the CAS number for Isodrin (465-73-6) **is** listed and therefore it is assumed that it has been missed off the named list of substances.

*3 Total petroleum hydrocarbons is used for consistency, but is an analytical method-defined measurement for a mixture of hydrocarbons subject to environmental analysis[11].

"Bioavailable" in relation to copper, zinc, nickel and manganese (but not lead) is the generic EQSbioavailable[6a] derived from the Metal Bioavailability Assessment Tool (M-BAT) developed by the Water Framework Directive UK Technical Advisory Group (WFDTAG). Exceedance of this value should prompt a site-specific assessment using the M-BAT with pH, DOC and Ca to derive a site-specific EQS termed the $PNEC_{dissolved}$. http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat.

For zinc, if there is an exceedance of the EQSbioavailable in an initial GQRA, Tier 2 required that the EQS for zinc should also have the ambient background concentration of zinc added as well

Table 2: World Health Organization (WHO) guide values for TPH CWG fractions in drinking water[13] (as referenced in CL:AIRE, 2017[11])

TPH CWG fraction	WHO guide value for drinking water[13] (µg/l)
Aliphatic fractions:	
Aliphatic EC5-EC6	15,000
Aliphatic >EC6-EC8	15,000
Aliphatic >EC8-EC10	300
Aliphatic >EC10-EC12	300
Aliphatic >EC12-EC16	300
Aliphatic >EC16-EC21	-
Aliphatic >EC21-EC35	-
Aromatic fractions:	
Aromatic EC5-EC6	10 (benzene)
Aromatic >EC6-EC8	700 (toluene)
Aromatic >EC8-EC10	300 (ethyl benzene) 500 (xylenes)
Aromatic >EC10-EC12	90
Aromatic >EC12-EC16	90
Aromatic >EC16-EC21	90
Aromatic >EC21-EC35	90
Reference: World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva[13].	

References

1. Environment Agency (2018), 'The Environment Agency's approach to groundwater protection', version 1.2, February 2018 (formerly contained within GP3). https://www.gov.uk/government/collections/groundwater-protection

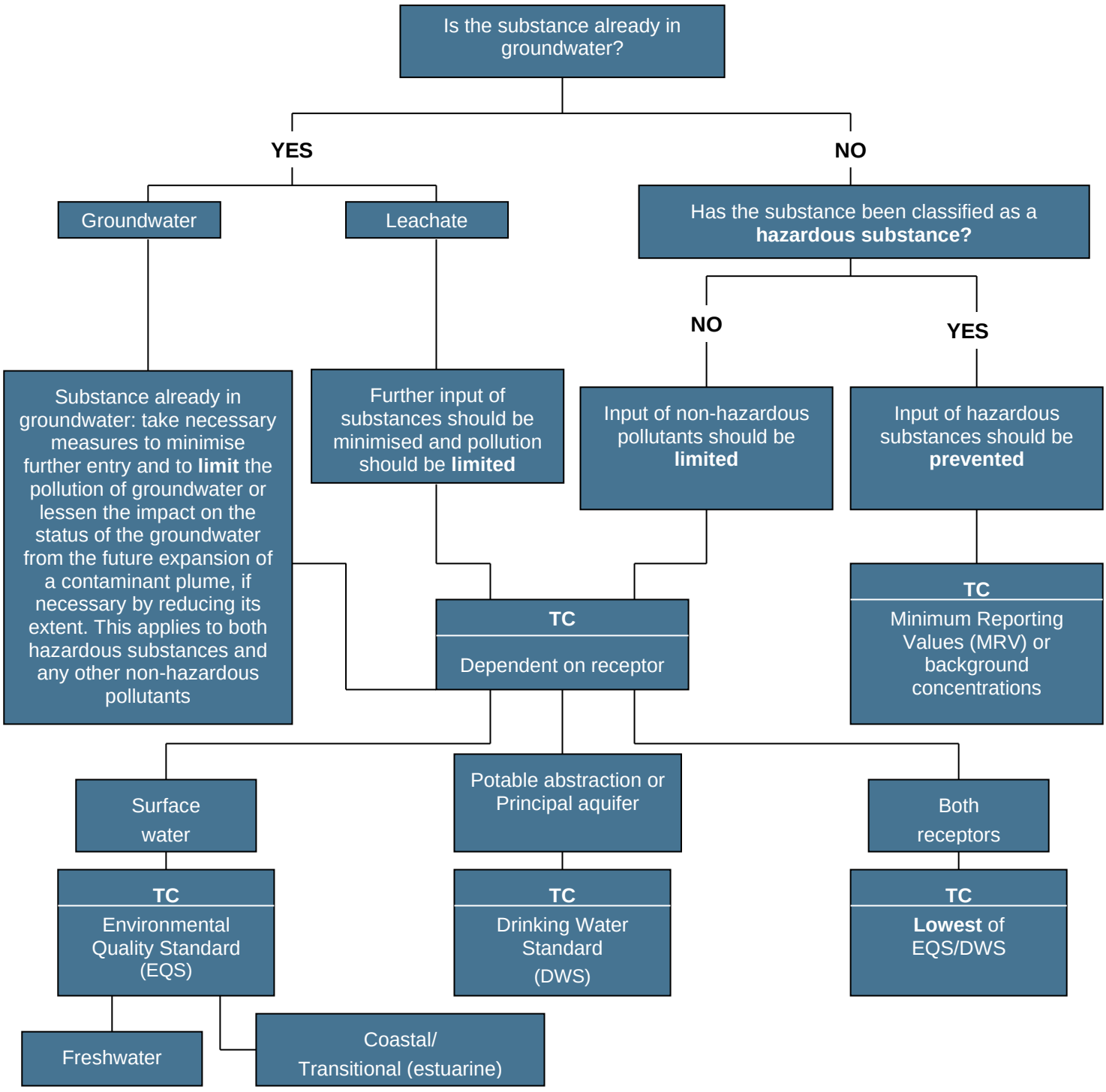
1a. Environment Agency (2017), 'Land contamination groundwater compliance points: quantitative risk assessments', March 2017 (formerly contained within GP3) [accessed 29 March 2017]. https://www.gov.uk/government/collections/groundwater-protection

2. The Water Supply (Water Quality) Regulations 2016 (SI 2016/619)
    - 2a. Sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane
    - 2b. Standard applies to individual pesticides except aldrin, dieldrin, heptachlor and heptachlor epoxide, for which a separate standard is defined.
3. The Private Water Supplies (England) Regulations 2016. SI 2016 / 618
4. WHO (2011), *Guidelines for drinking-water quality*, 4th edn
5. JAGDAG hazard substance determinations (January 2019): This list contains substances that are determined to be hazardous substances or non-hazardous pollutants for the purposes of the groundwater directive 2006/118/EC. https://www.wfduk.org/stakeholders/jagdag [accessed 1 February 2021]
   The absence of an assessment or substance from the list means an assessment has not been completed and is therefore presented as 'Not determined'. For further details on how substances are assessed, see the Joint Agencies Groundwater Directive Advisory Group (JAGDAG) 'Methodology for the determination of hazardous substances in groundwater for the purposes of the groundwater directive 2006/118/EC' which is available from the JAGDAG website. The methodology is a UK –wide framework that sets criteria for how to assess whether a substance is a hazardous substances in groundwater.
6. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
    - 6a. The EQS for these substances are based on a "long term mean" or an "annual average (AA)" EQS.
    - 6b. For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/l, Class 2: 40 to < 50 mg CaCO3/l, Class 3: 50 to < 100 mg CaCO3/l, Class 4: 100 to < 200 mg CaCO3/l and Class 5: ≥ 200 mg CaCO3/l).
    - 6c. The EQS for Mercury and hexachlorobutadiene are based on a "maximum acceptable concentration (MAC)" EQS in absence of an "annual average (AA)" EQS.
    - 6d. The EQS for chlorine in saltwater is based on the 95th percentile concentration of total residual oxidant, which refers to the sum of all oxidising agents existing in water, expressed as available chlorine.
    - 6e. The recommended saltwater standard is derived using a safety factor of 100. Where the standard is failed, it is recommended that supporting evidence of ecological damage should be obtained before committing to expensive action.
    - 6f. EQS for total ammonia is as per Schedule 3, Part 1, Table 7 of of the above directions. EQS applies to river types 1, 2 and 4 and 6 (namely upland and low alkalinity). The EQS for a lowland and high alkalinity rivers (types 3, 5 and 7) is 600µg/l (0.6mg/l).

   Additional information on the Metal Bioavailability Assessment Tool (M-BAT) is available at http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat

7. Minimum reporting values listed at https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values (updated 13 January 2017; accessed 29 March 2017). Note target concentration for xylenes is 3 μg/l each for o-xylene and m/p xylene as it may not be possible to separate m- and p-xylene; 135 tcb, 124 tcb, 123 tcb each to 0.01 μg/l)
8. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001
9. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)
10. WRc plc (2002), R&D Technical Report P45.
11. CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. V1.1.
12. Drinking Water Inspectorate (London, UK). Environmental Information Request on MTBE in drinking water. Ref. DWI 1/10/18; dated 28 November 2006. Value is based on the odour threshold for MTBE, which is lower than a health-based guideline value
13. World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva. [accessed 29 March 2017] http://www.who.int/water_sanitation_health/dwq/chemicals/petroleumproducts_2add_june2008.pdf

FLOW CHART TO ASSIST WITH SELECTION OF TARGET CONCENTRATIONS



TC = Target concentration

When leachate is being assessed the 'compliance point' is the groundwater body. Therefore dilution within the groundwater body may be applied with caution before comparing with the TC.

When directly assessing a receptor, e.g., a river, the appropriate TC should be selected.

APPENDIX T
GQRA DATA SCREENING TABLES - SOILS

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing
Address	
NGR	
Land use	Phytotoxic (pH >7.0)
SOM	1%
GAC version	2012_01

Notes

Lab sample ID										
Client sample ID	BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02
Depth to top	3.5	3.5	3.5				0.2	0.8	0.3	0.8
Depth to bottom										
Date sampled	13/10/22	13/10/22	13/10/22	13/10/22	23/09/22	27/09/22	23/09/22	23/09/22	23/09/22	23/09/22

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
Metals and Inorganics																		
Arsenic	mg/kg			13	4	8	8	0						13	10	8		4
Cadmium	mg/kg	3		1.3	<0.5	8	7	1						1.3	0.7	0.8		0.6
Chromium	mg/kg			42	20	8	8	0						42	24	25		27
Chromium (hexavalent)	mg/kg				<1	5	0	5						<1		<1	<1	
Copper	mg/kg	200		41	9	8	8	0						26	21	41		13
Lead	mg/kg	300		297	12	8	8	0						14	109	297		12
Mercury	mg/kg	1		0.68	<0.17	8	3	5						<0.17	0.68	0.64		<0.17
Nickel	mg/kg	110		56	14	8	8	0						56	21	22		17
Selenium	mg/kg				<1	8	0	8						<1	<1	<1		<1
Zinc	mg/kg	300		98	27	8	8	0						85	50	77		31
Cyanide (total)	mg/kg				<1	4	0	4							<1		<1	<1
Asbestos																		
Asbestos in soil		Detect				10	1	9						NAD	NAD	NAD	NAD	Chrysotile
Asbestos Matrix (microscope)		Detect				10	1	9						-	-	-	-	Loose Fibres
Asbestos in soil % composition (hand picking and weighing)	% w/w			0.004	0.004	1	1	0										0.004
Petroleum Hydrocarbons																		
Ali >C5-C6	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Ali >C6-C8	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Ali >C8-C10	mg/kg				<1	7	0	7							<1	<1		<1
Ali >C10-C12	mg/kg				<1	7	0	7							<1	<1		<1
Ali >C12-C16	mg/kg				<1	7	0	7							<1	<1		<1
Ali >C16-C21	mg/kg			2	<1	7	1	6							<1	<1		<1
Ali >C21-C35	mg/kg			167	<1	7	4	3							2	6		<1
Ali >C16-C35 calculated	mg/kg			167	<1	7	4	3							2	6		<1
Total Aliphatics	mg/kg			167	<1	7	4	3							2	7		<1
Aro >C5-C7	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Aro >C7-C8	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Aro >C8-C10	mg/kg			14	<1	7	4	3							14	2		<1
Aro >C10-C12	mg/kg				<1	7	0	7							<1	<1		<1
Aro >C12-C16	mg/kg			3	<1	7	2	5							<1	<1		<1
Aro >C16-C21	mg/kg			8	<1	7	3	4							<1	2		<1
Aro >C21-C35	mg/kg			49	<1	7	4	3							2	4		<1
Total Aromatics	mg/kg			61	<1	7	4	3							18	8		<1
TPH (Ali & Aro)	mg/kg			228	<1	7	4	3							19	15		<1
BTEX - Benzene	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - Toluene	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - Ethyl Benzene	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - o Xylene	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - m & p Xylene	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
TPH total (>C6-C40)	mg/kg			14	14	1	1	0						14				
TPH ID (for FID characterisations)						1								C20-C36 hydrocarbons with unknown profile				

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing
Address	
NGR	
Land use	Phytotoxic (pH >7.0)
SOM	1%
GAC version	2012_01

Lab sample ID	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9
Client sample ID	WS03	WS03	WS04	WS05	WS05
Depth to top	0.3	1	0.3	0..20	1.3
Depth to bottom					
Date sampled	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
Metals and Inorganics													
Arsenic	mg/kg			13	4	8	8	0		7	6	7	13
Cadmium	mg/kg	3		1.3	<0.5	8	7	1		0.9	<0.5	0.6	0.8
Chromium	mg/kg			42	20	8	8	0		37	20	23	26
Chromium (hexavalent)	mg/kg				<1	5	0	5	<1			<1	
Copper	mg/kg	200		41	9	8	8	0		15	10	23	9
Lead	mg/kg	300		297	12	8	8	0		19	61	76	13
Mercury	mg/kg	1		0.68	<0.17	8	3	5		<0.17	0.42	<0.17	<0.17
Nickel	mg/kg	110		56	14	8	8	0		25	14	19	20
Selenium	mg/kg				<1	8	0	8		<1	<1	<1	<1
Zinc	mg/kg	300		98	27	8	8	0		41	49	98	27
Cyanide (total)	mg/kg				<1	4	0	4	<1				
Asbestos													
Asbestos in soil		Detect				10	1	9	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix (microscope)		Detect				10	1	9	-	-	-	-	-
Asbestos in soil % composition (hand picking and weighing)	% w/w			0.004	0.004	1	1	0					
Petroleum Hydrocarbons													
Ali >C5-C6	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	mg/kg				<1	7	0	7		<1	<1	<1	<1
Ali >C10-C12	mg/kg				<1	7	0	7		<1	<1	<1	<1
Ali >C12-C16	mg/kg				<1	7	0	7		<1	<1	<1	<1
Ali >C16-C21	mg/kg			2	<1	7	1	6		<1	<1	2	<1
Ali >C21-C35	mg/kg			167	<1	7	4	3		<1	167	13	<1
Ali >C16-C35 calculated	mg/kg			167	<1	7	4	3		<1	167	15	<1
Total Aliphatics	mg/kg			167	<1	7	4	3		<1	167	14	<1
Aro >C5-C7	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	mg/kg			14	<1	7	4	3		<1	2	2	<1
Aro >C10-C12	mg/kg				<1	7	0	7		<1	<1	<1	<1
Aro >C12-C16	mg/kg			3	<1	7	2	5		<1	3	2	<1
Aro >C16-C21	mg/kg			8	<1	7	3	4		<1	5	8	<1
Aro >C21-C35	mg/kg			49	<1	7	4	3		<1	49	21	<1
Total Aromatics	mg/kg			61	<1	7	4	3		<1	61	32	<1
TPH (Ali & Aro)	mg/kg			228	<1	7	4	3		<1	228	46	<1
BTEX - Benzene	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
TPH total (>C6-C40)	mg/kg			14	14	1	1	0					
TPH ID (for FID characterisations)						1							

								Lab sample ID	22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4
								Client sample ID	BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02
								Depth to top	3.5	3.5	3.5				0.2	0.8	0.3	0.8
								Depth to bottom										
								Date sampled	13/10/22	13/10/22	13/10/22	13/10/22	23/09/22	27/09/22	23/09/22	23/09/22	23/09/22	23/09/22
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
TPH FID Chromatogram						1								Appended				
Fuel oxygenates																		
MTBE	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Polycyclic aromatic hydrocarbons																		
Acenaphthene	mg/kg				<0.01	8	0	8						<0.01	<0.01	<0.01		<0.01
Acenaphthylene	mg/kg			0.02	<0.01	8	1	7						<0.01	<0.01	<0.01		<0.01
Anthracene	mg/kg			0.04	<0.02	8	3	5						<0.02	0.04	0.04		<0.02
Benzo(a)anthracene	mg/kg			0.5	<0.04	8	4	4						<0.04	0.14	0.13		<0.04
Benzo(a)pyrene	mg/kg			0.76	<0.04	8	4	4						<0.04	0.17	0.16		<0.04
Benzo(b)fluoranthene	mg/kg			1.04	<0.05	8	4	4						<0.05	0.2	0.18		<0.05
Benzo(ghi)perylene	mg/kg			0.61	<0.05	8	4	4						<0.05	0.11	0.09		<0.05
Benzo(k)fluoranthene	mg/kg			0.37	<0.07	8	3	5						<0.07	0.09	0.08		<0.07
Chrysene	mg/kg			0.65	<0.06	8	4	4						<0.06	0.18	0.16		<0.06
Dibenzo(ah)anthracene	mg/kg			0.2	<0.04	8	1	7						<0.04	<0.04	<0.04		<0.04
Fluoranthene	mg/kg			0.55	<0.08	8	4	4						<0.08	0.3	0.3		<0.08
Fluorene	mg/kg				<0.01	8	0	8						<0.01	<0.01	<0.01		<0.01
Indeno(123-cd)pyrene	mg/kg			0.7	<0.03	8	4	4						<0.03	0.12	0.09		<0.03
Naphthalene	mg/kg				<0.03	8	0	8						<0.03	<0.03	<0.03		<0.03
Phenanthrene	mg/kg			0.16	<0.03	8	4	4						<0.03	0.15	0.16		<0.03
Pyrene	mg/kg			0.49	<0.07	8	4	4						<0.07	0.26	0.26		<0.07
Total PAH-16MS	mg/kg			6.03	<0.08	8	4	4						<0.08	1.76	1.65		<0.08
Other analytes																		
% Moisture	% w/w			19.2	19.2	1	1	0						19.2				
% Stones >10mm	% w/w			44.6	<0.1	10	7	3						<0.1	25.8	15.6	44.6	<0.1
pH	pH			11.88	8.04	8	8	0						8.48	11.88	10.67		8.76
pH (w)	pH			8.42	6.79	5	5	0	7.31	6.79	6.81	7.84	8.42					
Sulphate (acid soluble)	mg/kg			3100	<200	7	5	2							3100	1100		<200
Sulphate (water sol 2:1)	g/l			0.05	<0.01	7	6	1							0.03	0.03		0.03
Total Organic Carbon	% w/w			9.13	0.16	5	5	0								9.13	1.5	
Converted to SOM (x / 0.58)	% w/w			15.74138	0.275862	5	5	0								15.7413793	2.5862069	

								Lab sample ID	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9
								Client sample ID	WS03	WS03	WS04	WS05	WS05
								Depth to top	0.3	1	0.3	0..20	1.3
								Depth to bottom					
								Date sampled	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
TPH FID Chromatogram						1							
Fuel oxygenates													
MTBE	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Polycyclic aromatic hydrocarbons													
Acenaphthene	mg/kg				<0.01	8	0	8		<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg			0.02	<0.01	8	1	7		<0.01	0.02	<0.01	<0.01
Anthracene	mg/kg			0.04	<0.02	8	3	5		<0.02	0.03	<0.02	<0.02
Benzo(a)anthracene	mg/kg			0.5	<0.04	8	4	4		<0.04	0.5	0.11	<0.04
Benzo(a)pyrene	mg/kg			0.76	<0.04	8	4	4		<0.04	0.76	0.13	<0.04
Benzo(b)fluoranthene	mg/kg			1.04	<0.05	8	4	4		<0.05	1.04	0.15	<0.05
Benzo(ghi)perylene	mg/kg			0.61	<0.05	8	4	4		<0.05	0.61	0.09	<0.05
Benzo(k)fluoranthene	mg/kg			0.37	<0.07	8	3	5		<0.07	0.37	<0.07	<0.07
Chrysene	mg/kg			0.65	<0.06	8	4	4		<0.06	0.65	0.13	<0.06
Dibenzo(ah)anthracene	mg/kg			0.2	<0.04	8	1	7		<0.04	0.2	<0.04	<0.04
Fluoranthene	mg/kg			0.55	<0.08	8	4	4		<0.08	0.55	0.22	<0.08
Fluorene	mg/kg				<0.01	8	0	8		<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)pyrene	mg/kg			0.7	<0.03	8	4	4		<0.03	0.7	0.09	<0.03
Naphthalene	mg/kg				<0.03	8	0	8		<0.03	<0.03	<0.03	<0.03
Phenanthrene	mg/kg			0.16	<0.03	8	4	4		<0.03	0.11	0.08	<0.03
Pyrene	mg/kg			0.49	<0.07	8	4	4		<0.07	0.49	0.2	<0.07
Total PAH-16MS	mg/kg			6.03	<0.08	8	4	4		<0.08	6.03	1.2	<0.08
Other analytes													
% Moisture	% w/w			19.2	19.2	1	1	0					
% Stones >10mm	% w/w			44.6	<0.1	10	7	3	18.4	<0.1	24.2	22	13.5
pH	pH			11.88	8.04	8	8	0		8.49	8.94	8.04	8.35
pH (w)	pH			8.42	6.79	5	5	0					
Sulphate (acid soluble)	mg/kg			3100	<200	7	5	2		230	1000	290	<200
Sulphate (water sol 2:1)	g/l			0.05	<0.01	7	6	1		0.05	0.05	0.02	<0.01
Total Organic Carbon	% w/w			9.13	0.16	5	5	0	1.49			1.01	0.16
Converted to SOM (x / 0.58)	% w/w			15.74138	0.275862	5	5	0	2.56896552			1.74137931	0.27586207

Project name	
Project code	
Client name	
Address	
NGR	
Land use	Residential with home-grown produce
SOM	2.5%
GAC version	2021_00

Notes

Lab sample ID	22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4
Client sample ID	BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02
Depth to top	3.5	3.5	3.5				0.2	0.8	0.3	0.8
Depth to bottom										
Date sampled	13/10/22	13/10/22	13/10/22	13/10/22	23/09/22	27/09/22	23/09/22	23/09/22	23/09/22	23/09/22

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
Metals and Inorganics																		
Arsenic	mg/kg	37		13	4	8	8	0						13	10	8		4
Cadmium	mg/kg	22		1.3	<0.5	8	7	1						1.3	0.7	0.8		0.6
Chromium	mg/kg	910	21	42	20	8	8	0						42	24	25		27
Chromium (hexavalent)	mg/kg	21			<1	5	0	5						<1		<1	<1	
Copper	mg/kg	2500		41	9	8	8	0						26	21	41		13
Lead	mg/kg	200		297	12	8	8	0						14	109	297		12
Mercury	mg/kg	39	0.6	0.68	<0.17	8	3	5						<0.17	0.68	0.64		<0.17
Nickel	mg/kg	130		56	14	8	8	0						56	21	22		17
Selenium	mg/kg	258			<1	8	0	8						<1	<1	<1		<1
Zinc	mg/kg	3900		98	27	8	8	0						85	50	77		31
Cyanide (total)	mg/kg		1.4		<1	4	0	4							<1		<1	<1
Asbestos																		
Asbestos in soil		Detect				10	1	9						NAD	NAD	NAD	NAD	Chrysotile
Asbestos Matrix (microscope)		Detect				10	1	9						-	-	-	-	Loose Fibres
Asbestos in soil % composition (hand picking and weighing)	% w/w	0.001		0.004	0.004	1	1	0										0.004
Petroleum Hydrocarbons																		
Ali >C5-C6	mg/kg	78			<0.01	7	0	7							<0.01	<0.01		<0.01
Ali >C6-C8	mg/kg	230			<0.01	7	0	7							<0.01	<0.01		<0.01
Ali >C8-C10	mg/kg	65			<1	7	0	7							<1	<1		<1
Ali >C10-C12	mg/kg	330	118		<1	7	0	7							<1	<1		<1
Ali >C12-C16	mg/kg	2400	59		<1	7	0	7							<1	<1		<1
Ali >C16-C21	mg/kg			2	<1	7	1	6							<1	<1		<1
Ali >C21-C35	mg/kg			167	<1	7	4	3							2	6		<1
Ali >C16-C35 calculated	mg/kg	92000	21	167	<1	7	4	3							2	6		<1
Total Aliphatics	mg/kg			167	<1	7	4	3							2	7		<1
Aro >C5-C7	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Aro >C7-C8	mg/kg				<0.01	7	0	7							<0.01	<0.01		<0.01
Aro >C8-C10	mg/kg	80		14	<1	7	4	3							14	2		<1
Aro >C10-C12	mg/kg	180			<1	7	0	7							<1	<1		<1
Aro >C12-C16	mg/kg	330		3	<1	7	2	5							<1	<1		<1
Aro >C16-C21	mg/kg	540		8	<1	7	3	4							<1	2		<1
Aro >C21-C35	mg/kg	1500		49	<1	7	4	3							2	4		<1
Total Aromatics	mg/kg			61	<1	7	4	3							18	8		<1
TPH (Ali & Aro)	mg/kg			228	<1	7	4	3							19	15		<1
BTEX - Benzene	mg/kg	0.41			<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - Toluene	mg/kg	300			<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - Ethyl Benzene	mg/kg	110			<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - o Xylene	mg/kg	143			<0.01	7	0	7							<0.01	<0.01		<0.01
BTEX - m & p Xylene	mg/kg	133			<0.01	7	0	7							<0.01	<0.01		<0.01
TPH total (>C6-C40)	mg/kg			14	14	1	1	0						14				
TPH ID (for FID characterisations)						1								C20-C36 hydrocarbons with unknown profile				

Project name	
Project code	
Client name	
Address	
NGR	
Land use	Residential with home-grown produce
SOM	2.5%
GAC version	2021_00

Lab sample ID	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9
Client sample ID	WS03	WS03	WS04	WS05	WS05
Depth to top	0.3	1	0.3	0..20	1.3
Depth to bottom					
Date sampled	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
Metals and Inorganics													
Arsenic	mg/kg	37		13	4	8	8	0		7	6	7	13
Cadmium	mg/kg	22		1.3	<0.5	8	7	1		0.9	<0.5	0.6	0.8
Chromium	mg/kg	910	21	42	20	8	8	0		37	20	23	26
Chromium (hexavalent)	mg/kg	21			<1	5	0	5	<1			<1	
Copper	mg/kg	2500		41	9	8	8	0		15	10	23	9
Lead	mg/kg	200		297	12	8	8	0		19	61	76	13
Mercury	mg/kg	39	0.6	0.68	<0.17	8	3	5		<0.17	0.42	<0.17	<0.17
Nickel	mg/kg	130		56	14	8	8	0		25	14	19	20
Selenium	mg/kg	258			<1	8	0	8		<1	<1	<1	<1
Zinc	mg/kg	3900		98	27	8	8	0		41	49	98	27
Cyanide (total)	mg/kg		1.4		<1	4	0	4	<1				
Asbestos													
Asbestos in soil		Detect				10	1	9	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix (microscope)		Detect				10	1	9	-	-	-	-	-
Asbestos in soil % composition (hand picking and weighing)	% w/w	0.001		0.004	0.004	1	1	0					
Petroleum Hydrocarbons													
Ali >C5-C6	mg/kg	78			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	mg/kg	230			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	mg/kg	65			<1	7	0	7		<1	<1	<1	<1
Ali >C10-C12	mg/kg	330	118		<1	7	0	7		<1	<1	<1	<1
Ali >C12-C16	mg/kg	2400	59		<1	7	0	7		<1	<1	<1	<1
Ali >C16-C21	mg/kg			2	<1	7	1	6		<1	<1	2	<1
Ali >C21-C35	mg/kg			167	<1	7	4	3		<1	167	13	<1
Ali >C16-C35 calculated	mg/kg	92000	21	167	<1	7	4	3		<1	167	15	<1
Total Aliphatics	mg/kg			167	<1	7	4	3		<1	167	14	<1
Aro >C5-C7	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	mg/kg				<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	mg/kg	80		14	<1	7	4	3		<1	2	2	<1
Aro >C10-C12	mg/kg	180			<1	7	0	7		<1	<1	<1	<1
Aro >C12-C16	mg/kg	330		3	<1	7	2	5		<1	3	2	<1
Aro >C16-C21	mg/kg	540		8	<1	7	3	4		<1	5	8	<1
Aro >C21-C35	mg/kg	1500		49	<1	7	4	3		<1	49	21	<1
Total Aromatics	mg/kg			61	<1	7	4	3		<1	61	32	<1
TPH (Ali & Aro)	mg/kg			228	<1	7	4	3		<1	228	46	<1
BTEX - Benzene	mg/kg	0.41			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	mg/kg	300			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	mg/kg	110			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	mg/kg	143			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	mg/kg	133			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
TPH total (>C6-C40)	mg/kg			14	14	1	1	0					
TPH ID (for FID characterisations)						1							

Lab sample ID									22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4
Client sample ID									BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02
Depth to top									3.5	3.5	3.5				0.2	0.8	0.3	0.8
Depth to bottom																		
Date sampled									13/10/22	13/10/22	13/10/22	13/10/22	23/09/22	27/09/22	23/09/22	23/09/22	23/09/22	23/09/22
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
TPH FID Chromatogram						1								Appended				
Fuel oxygenates																		
MTBE	mg/kg	110			<0.01	7	0	7							<0.01	<0.01		<0.01
Polycyclic aromatic hydrocarbons																		
Acenaphthene	mg/kg	540			<0.01	8	0	8						<0.01	<0.01	<0.01		<0.01
Acenaphthylene	mg/kg	440		0.02	<0.01	8	1	7						<0.01	<0.01	<0.01		<0.01
Anthracene	mg/kg	5500		0.04	<0.02	8	3	5						<0.02	0.04	0.04		<0.02
Benzo(a)anthracene	mg/kg	11		0.5	<0.04	8	4	4						<0.04	0.14	0.13		<0.04
Benzo(a)pyrene	mg/kg	5		0.76	<0.04	8	4	4						<0.04	0.17	0.16		<0.04
Benzo(b)fluoranthene	mg/kg	3.3		1.04	<0.05	8	4	4						<0.05	0.2	0.18		<0.05
Benzo(ghi)perylene	mg/kg	340		0.61	<0.05	8	4	4						<0.05	0.11	0.09		<0.05
Benzo(k)fluoranthene	mg/kg	92		0.37	<0.07	8	3	5						<0.07	0.09	0.08		<0.07
Chrysene	mg/kg	22		0.65	<0.06	8	4	4						<0.06	0.18	0.16		<0.06
Dibenzo(ah)anthracene	mg/kg	0.28		0.2	<0.04	8	1	7						<0.04	<0.04	<0.04		<0.04
Fluoranthene	mg/kg	560		0.55	<0.08	8	4	4						<0.08	0.3	0.3		<0.08
Fluorene	mg/kg	410			<0.01	8	0	8						<0.01	<0.01	<0.01		<0.01
Indeno(123-cd)pyrene	mg/kg	36		0.7	<0.03	8	4	4						<0.03	0.12	0.09		<0.03
Naphthalene	mg/kg	30			<0.03	8	0	8						<0.03	<0.03	<0.03		<0.03
Phenanthrene	mg/kg	220		0.16	<0.03	8	4	4						<0.03	0.15	0.16		<0.03
Pyrene	mg/kg	1240		0.49	<0.07	8	4	4						<0.07	0.26	0.26		<0.07
Total PAH-16MS	mg/kg			6.03	<0.08	8	4	4						<0.08	1.76	1.65		<0.08
Other analytes																		
% Moisture	% w/w			19.2	19.2	1	1	0						19.2				
% Stones >10mm	% w/w			44.6	<0.1	10	7	3						<0.1	25.8	15.6	44.6	<0.1
pH	pH			11.88	8.04	8	8	0						8.48	11.88	10.67		8.76
pH (w)	pH			8.42	6.79	5	5	0	7.31	6.79	6.81	7.84	8.42					
Sulphate (acid soluble)	mg/kg			3100	<200	7	5	2							3100	1100		<200
Sulphate (water sol 2:1)	g/l			0.05	<0.01	7	6	1							0.03	0.03		0.03
Total Organic Carbon	% w/w			9.13	0.16	5	5	0								9.13	1.5	
Converted to SOM (x / 0.58)	% w/w			15.74138	0.275862	5	5	0								15.7413793	2.5862069	

								Lab sample ID	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9
								Client sample ID	WS03	WS03	WS04	WS05	WS05
								Depth to top	0.3	1	0.3	0..20	1.3
								Depth to bottom					
								Date sampled	23/09/22	23/09/22	23/09/22	23/09/22	23/09/22
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
TPH FID Chromatogram						1							
Fuel oxygenates													
MTBE	mg/kg	110			<0.01	7	0	7		<0.01	<0.01	<0.01	<0.01
Polycyclic aromatic hydrocarbons													
Acenaphthene	mg/kg	540			<0.01	8	0	8		<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg	440		0.02	<0.01	8	1	7		<0.01	0.02	<0.01	<0.01
Anthracene	mg/kg	5500		0.04	<0.02	8	3	5		<0.02	0.03	<0.02	<0.02
Benzo(a)anthracene	mg/kg	11		0.5	<0.04	8	4	4		<0.04	0.5	0.11	<0.04
Benzo(a)pyrene	mg/kg	5		0.76	<0.04	8	4	4		<0.04	0.76	0.13	<0.04
Benzo(b)fluoranthene	mg/kg	3.3		1.04	<0.05	8	4	4		<0.05	1.04	0.15	<0.05
Benzo(ghi)perylene	mg/kg	340		0.61	<0.05	8	4	4		<0.05	0.61	0.09	<0.05
Benzo(k)fluoranthene	mg/kg	92		0.37	<0.07	8	3	5		<0.07	0.37	<0.07	<0.07
Chrysene	mg/kg	22		0.65	<0.06	8	4	4		<0.06	0.65	0.13	<0.06
Dibenzo(ah)anthracene	mg/kg	0.28		0.2	<0.04	8	1	7		<0.04	0.2	<0.04	<0.04
Fluoranthene	mg/kg	560		0.55	<0.08	8	4	4		<0.08	0.55	0.22	<0.08
Fluorene	mg/kg	410			<0.01	8	0	8		<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)pyrene	mg/kg	36		0.7	<0.03	8	4	4		<0.03	0.7	0.09	<0.03
Naphthalene	mg/kg	30			<0.03	8	0	8		<0.03	<0.03	<0.03	<0.03
Phenanthrene	mg/kg	220		0.16	<0.03	8	4	4		<0.03	0.11	0.08	<0.03
Pyrene	mg/kg	1240		0.49	<0.07	8	4	4		<0.07	0.49	0.2	<0.07
Total PAH-16MS	mg/kg			6.03	<0.08	8	4	4		<0.08	6.03	1.2	<0.08
Other analytes													
% Moisture	% w/w			19.2	19.2	1	1	0					
% Stones >10mm	% w/w			44.6	<0.1	10	7	3	18.4	<0.1	24.2	22	13.5
pH	pH			11.88	8.04	8	8	0		8.49	8.94	8.04	8.35
pH (w)	pH			8.42	6.79	5	5	0					
Sulphate (acid soluble)	mg/kg			3100	<200	7	5	2		230	1000	290	<200
Sulphate (water sol 2:1)	g/l			0.05	<0.01	7	6	1		0.05	0.05	0.02	<0.01
Total Organic Carbon	% w/w			9.13	0.16	5	5	0	1.49			1.01	0.16
Converted to SOM (x / 0.58)	% w/w			15.74138	0.275862	5	5	0	2.56896552			1.74137931	0.27586207

APPENDIX U
GQRA DATA SCREENING TABLES - LEACHATE/WATERS

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing Group
Address	
NGR	
Output type	Interpretive Controlled Waters
Scenario	DWS or best equivalent / RPV, England, Wales and Northern Ireland
GAC version	Rev14

Notes

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects											
Lab sample ID									22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5
Client sample ID									BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02	WS03
Depth to top									3.5	3.5	3.5				0.2	0.8	0.3	0.8	0.3
Depth to bottom																			
Date sampled									13/10/2022	13/10/2022	13/10/2022	13/10/2022	23/09/2022	27/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022
Inorganics																			
Calcium (dissolved)	µg/l			93000	93000	1	1	0					93000						
DOC (w)	µg/l			3600	3600	1	1	0					3600						
pH (w)	pH					5			7.31	6.79	6.81	7.84	8.42						
Sulphate (w)	µg/l	250000		154000	67000	4	4	0	67000	154000	153000	67000							
Metals																			
Arsenic (dissolved)	µg/l	10		10	1	4	4	0	2	7	10	1							
Cadmium (dissolved)	µg/l	5		<0.2	<0.2	4	0	4	<0.2	<0.2	<0.2	<0.2							
Chromium (dissolved)	µg/l	50		<1	<1	4	0	4	<1	<1	<1	<1							
Copper (dissolved)	µg/l	2000		88	<4	4	1	3	88	<4	<4	<4							
Lead (dissolved)	µg/l	10		<1	<1	4	0	4	<1	<1	<1	<1							
Mercury (dissolved)	µg/l	1		<0.1	<0.1	4	0	4	<0.1	<0.1	<0.1	<0.1							
Nickel (dissolved)	µg/l	20		4	2	4	4	0	2	4	4	2							
Selenium (dissolved)	µg/l	10		<1	<1	4	0	4	<1	<1	<1	<1							
Zinc (dissolved)	µg/l	3000		7	3	4	4	0	4	5	3	7							
Polycyclic aromatic hydrocarbons (16)																			
Acenaphthene (w)	µg/l			0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Acenaphthylene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Anthracene (w)	µg/l			0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Benzo(a)anthracene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(a)pyrene (w)	µg/l	0.01		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(b)fluoranthene (w)	µg/l	0.1		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(ghi)perylene (w)	µg/l	0.1		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(k)fluoranthene (w)	µg/l	0.1		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Chrysene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Dibenzo(ah)anthracene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Fluoranthene (w)	µg/l			0.01	<0.01	4	1	3	0.01	<0.01	<0.01	<0.01							
Fluorene (w)	µg/l			0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Indeno(123-cd)pyrene (w)	µg/l	0.1		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Naphthalene (w)	µg/l			0.04	<0.01	4	1	3	<0.01	<0.01	0.04	<0.01							
Phenanthrene (w)	µg/l			0.04	<0.01	4	1	3	<0.01	<0.01	0.04	<0.01							
Pyrene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Total PAH 16MS (w)	µg/l			0.11	<0.01	4	2	2	0.01	<0.01	0.11	<0.01							
SUM - polycyclic aromatic hydrocarbons (sum of four)	µg/l	0.1		<0.01	<0.01	4	0	4	*<0.01*	*<0.01*	*<0.01*	*<0.01*							
Petroleum hydrocarbons																			
Ali >C5-C6 (w)	µg/l	15000*		<1	<1	4	0	4	<1	<1	<1	<1							
Ali >C6-C8 (w)	µg/l	15000*		<1	<1	4	0	4	<1	<1	<1	<1							
Ali >C8-C10 (w)	µg/l	300*		<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C10-C12 (w)	µg/l	300*		<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C12-C16 (w)	µg/l	300*		<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C16-C21 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C21-C35 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing Group
Address	
NGR	
Output type	Interpretive Controlled Waters
Scenario	DWS or best equivalent / RPV, England, Wales and Northern Ireland
GAC version	Rev14

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete				
Lab sample ID									22/09713/6	22/09713/7	22/09713/8	22/09713/9
Client sample ID									WS03	WS04	WS05	WS05
Depth to top									1	0.3	0..20	1.3
Depth to bottom												
Date sampled									23/09/2022	23/09/2022	23/09/2022	23/09/2022
Inorganics												
Calcium (dissolved)	µg/l			93000	93000	1	1	0				
DOC (w)	µg/l			3600	3600	1	1	0				
pH (w)	pH					5						
Sulphate (w)	µg/l	250000		154000	67000	4	4	0				
Metals												
Arsenic (dissolved)	µg/l	10		10	1	4	4	0				
Cadmium (dissolved)	µg/l	5		<0.2	<0.2	4	0	4				
Chromium (dissolved)	µg/l	50		<1	<1	4	0	4				
Copper (dissolved)	µg/l	2000		88	<4	4	1	3				
Lead (dissolved)	µg/l	10		<1	<1	4	0	4				
Mercury (dissolved)	µg/l	1		<0.1	<0.1	4	0	4				
Nickel (dissolved)	µg/l	20		4	2	4	4	0				
Selenium (dissolved)	µg/l	10		<1	<1	4	0	4				
Zinc (dissolved)	µg/l	3000		7	3	4	4	0				
Polycyclic aromatic hydrocarbons (16)												
Acenaphthene (w)	µg/l			0.01	<0.01	4	1	3				
Acenaphthylene (w)	µg/l			<0.01	<0.01	4	0	4				
Anthracene (w)	µg/l			0.01	<0.01	4	1	3				
Benzo(a)anthracene (w)	µg/l			<0.01	<0.01	4	0	4				
Benzo(a)pyrene (w)	µg/l	0.01		<0.01	<0.01	4	0	4				
Benzo(b)fluoranthene (w)	µg/l	0.1		<0.01	<0.01	4	0	4				
Benzo(ghi)perylene (w)	µg/l	0.1		<0.01	<0.01	4	0	4				
Benzo(k)fluoranthene (w)	µg/l	0.1		<0.01	<0.01	4	0	4				
Chrysene (w)	µg/l			<0.01	<0.01	4	0	4				
Dibenzo(ah)anthracene (w)	µg/l			<0.01	<0.01	4	0	4				
Fluoranthene (w)	µg/l			0.01	<0.01	4	1	3				
Fluorene (w)	µg/l			0.01	<0.01	4	1	3				
Indeno(123-cd)pyrene (w)	µg/l	0.1		<0.01	<0.01	4	0	4				
Naphthalene (w)	µg/l			0.04	<0.01	4	1	3				
Phenanthrene (w)	µg/l			0.04	<0.01	4	1	3				
Pyrene (w)	µg/l			<0.01	<0.01	4	0	4				
Total PAH 16MS (w)	µg/l			0.11	<0.01	4	2	2				
SUM - polycyclic aromatic hydrocarbons (sum of four)	µg/l	0.1		<0.01	<0.01	4	0	4				
Petroleum hydrocarbons												
Ali >C5-C6 (w)	µg/l	15000*		<1	<1	4	0	4				
Ali >C6-C8 (w)	µg/l	15000*		<1	<1	4	0	4				
Ali >C8-C10 (w)	µg/l	300*		<5	<5	4	0	4				
Ali >C10-C12 (w)	µg/l	300*		<5	<5	4	0	4				
Ali >C12-C16 (w)	µg/l	300*		<5	<5	4	0	4				
Ali >C16-C21 (w)	µg/l			<5	<5	4	0	4				
Ali >C21-C35 (w)	µg/l			<5	<5	4	0	4				

								Lab sample ID	22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5
								Client sample ID	BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02	WS03
								Depth to top	3.5	3.5	3.5				0.2	0.8	0.3	0.8	0.3
								Depth to bottom											
								Date sampled	13/10/2022	13/10/2022	13/10/2022	13/10/2022	23/09/2022	27/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects											
Total Aliphatics (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C5-C7 (w)	µg/l	1		<1	<1	4	0	4	<1	<1	<1	<1							
Aro >C7-C8 (w)	µg/l	700*		<1	<1	4	0	4	<1	<1	<1	<1							
Aro >C8-C10 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C10-C12 (w)	µg/l	90*		<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C12-C16 (w)	µg/l	90*		<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C16-C21 (w)	µg/l	90*		<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C21-C35 (w)	µg/l	90*		<10	<10	4	0	4	<10	<10	<10	<10							
Total Aromatics (w)	µg/l			<10	<10	4	0	4	<10	<10	<10	<10							
TPH (Ali & Aro >C5-C35) (w)	µg/l			<10	<10	4	0	4	<10	<10	<10	<10							
BTEX - Benzene (w)	µg/l	1		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - Toluene (w)	µg/l	700*		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - Ethyl Benzene (w)	µg/l	300*		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - m & p Xylene (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - o Xylene (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
SUM - xylenes (BTEX o plus m&p)	µg/l	500*		<1	<1	4	0	4	*<1*	*<1*	*<1*	*<1*							
Fuel Oxygenates																			
MTBE (w)	µg/l	15*		<1	<1	4	0	4	<1	<1	<1	<1							

								Lab sample ID	22/09713/6	22/09713/7	22/09713/8	22/09713/9
								Client sample ID	WS03	WS04	WS05	WS05
								Depth to top	1	0.3	0..20	1.3
								Depth to bottom				
								Date sampled	23/09/2022	23/09/2022	23/09/2022	23/09/2022
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete				
Total Aliphatics (w)	µg/l			<5	<5	4	0	4				
Aro >C5-C7 (w)	µg/l	1		<1	<1	4	0	4				
Aro >C7-C8 (w)	µg/l	700*		<1	<1	4	0	4				
Aro >C8-C10 (w)	µg/l			<5	<5	4	0	4				
Aro >C10-C12 (w)	µg/l	90*		<5	<5	4	0	4				
Aro >C12-C16 (w)	µg/l	90*		<5	<5	4	0	4				
Aro >C16-C21 (w)	µg/l	90*		<5	<5	4	0	4				
Aro >C21-C35 (w)	µg/l	90*		<10	<10	4	0	4				
Total Aromatics (w)	µg/l			<10	<10	4	0	4				
TPH (Ali & Aro >C5-C35) (w)	µg/l			<10	<10	4	0	4				
BTEX - Benzene (w)	µg/l	1		<1	<1	4	0	4				
BTEX - Toluene (w)	µg/l	700*		<1	<1	4	0	4				
BTEX - Ethyl Benzene (w)	µg/l	300*		<1	<1	4	0	4				
BTEX - m & p Xylene (w)	µg/l			<1	<1	4	0	4				
BTEX - o Xylene (w)	µg/l			<1	<1	4	0	4				
SUM - xylenes (BTEX o plus m&p)	µg/l	500*		<1	<1	4	0	4				
Fuel Oxygenates												
MTBE (w)	µg/l	15*		<1	<1	4	0	4				

Notes for GQRA (water) Screening Tool Output	
Details of the **GAC used in the GQRA and the GAC version** are displayed at the top of the output screening sheet.	
Full details of the **GAC derivation** are included in a separate appendix document	
Any laboratory results that are shown as appended (e.g. Tentatively Identified Compounds, certain subcontracted results e.g. Hg etc.) are not screened against the GAC in the report output. These results will be included in an appendix to the main report.	
Certain groups of analytes are summed within the tool (these results are shown as the analyte names with the pre-fix "SUM", for example 'SUM - chromium trivalent plus hexavalent), which is required to enable a comparison of laboratory results to the GAC, which is a sum of certain analytes.	
Where analytes have been summed, any concentration reported as below the laboratory method detection limited is treated as zero.	
Certain GACs are calculated (e.g. ammoniacal nitrogen reported as N, NH_3 or NH_4) from the primary GAC. The GAC is therefore the same, but expressed as a different molecular weight. These are shown in italics.	
Relevant laboratory methods (e.g. leachate dilutions) are included in the section entitled 'Methods'.	
Analyte groupings are based on the Envirolab laboratory reporting groups.	
* denotes a non-statutory GACs (e.g. *ethylbenzene* *).	
Shading of cells (individual results and the GAC/T1) has the following meaning:	
GAC	GAC definitely exceeded
GAC	GAC may be exceeded (e.g. lab results include a < or > symbol)
T1	First level screening threshold definitely exceeded (for project specific GAC please refer to the appended GAC document for details of derivation of T1)
T1	First level screening threshold may be exceeded (e.g. lab results include a < or > symbol)
T1	**First level screening threshold, equating to**:
	GrAC: Result compared to the theoretical aqeuous solublity limit.
Comment	Applicable across all GrACs. Where the GrAC has been set at the theoretical aqueous solubility for the analyte, which is below the modelled assessment criteria.
	EQS Cadmium: Compared to lowest EQS for Class 1 <40mg/l $CaCO_3$/l.
Comment	Freshwater EQS for cadmium is hardness dependent.
	EQS Copper: Compared to EWS for the lowest Dissolved Organc Carbon (DOC) of <1mg/l.
Comment	Transitional waters EQS for copper is DOC dependent, compared to lowest Dissolved Organc Carbon (DOC) of <1mg/l.
	EQS Aluminium (Scotland only): Compared to EQS for pH >6.5.
Comment	Freshwater EQS for aluminium (Scotland) is pH dependent and only applicable at a pH >6.5.
	DWS/RPV Aro EC8-10: Total compared to DWS/RPV for ethylbenzene (conservative assessment).
Comment	Aro EC8-10 fraction contains xylenes, ethylbenzene and trimethylbenzene.
	DWS/RPV chromium total: Total is compared to CrVI (conservative assessment) for either freshwater or for transitional waters.
Comment	Freshwater and transitional EQS are a sum of the individual EQS for CrVI and CrIII (8.1ug/l).
grey font	Where individual reported concentrations are presented in grey (not black) font, the result was below the laboratory method detection limit.
	Where cells are shaded grey, all results for that analyte are below the laboratory method detection limit

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects	# exceeding GAC	# exceeding T1	Max sample (ID, depth and date)
Metals											
Arsenic (di	µg/l	10		10	1	4	4	0	1		BH3: 3.5 (10/13/2022)

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing Group
Address	
NGR	
Output type	Interpretive Controlled Waters
Scenario	EQS freshwater, England, Wales and Northern Ireland
GAC version	Rev14

Notes

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects											
Lab sample ID									22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5
Client sample ID									BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02	WS03
Depth to top									3.5	3.5	3.5				0.2	0.8	0.3	0.8	0.3
Depth to bottom																			
Date sampled									13/10/2022	13/10/2022	13/10/2022	13/10/2022	23/09/2022	27/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022
Inorganics																			
Calcium (dissolved)	µg/l			93000	93000	1	1	0					93000						
DOC (w)	µg/l			3600	3600	1	1	0					3600						
pH (w)	pH					5			7.31	6.79	6.81	7.84	8.42						
Sulphate (w)	µg/l			154000	67000	4	4	0	67000	154000	153000	67000							
Metals																			
Arsenic (dissolved)	µg/l	50		10	1	4	4	0	2	7	10	1							
Cadmium (dissolved)	µg/l	0.25	0.08	<0.2	<0.2	4	0	4	<0.2	<0.2	<0.2	<0.2							
Chromium (dissolved)	µg/l	8.1	3.4	<1	<1	4	0	4	<1	<1	<1	<1							
Copper (dissolved)	µg/l	1		88	<4	4	1	3	88	<4	<4	<4							
Lead (dissolved)	µg/l	1.2		<1	<1	4	0	4	<1	<1	<1	<1							
Mercury (dissolved)	µg/l	0.07		<0.1	<0.1	4	0	4	<0.1	<0.1	<0.1	<0.1							
Nickel (dissolved)	µg/l	4		4	2	4	4	0	2	4	4	2							
Selenium (dissolved)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
Zinc (dissolved)	µg/l	10.9		7	3	4	4	0	4	5	3	7							
Polycyclic aromatic hydrocarbons (16)																			
Acenaphthene (w)	µg/l			0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Acenaphthylene (w)	µg/l	5.8*		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Anthracene (w)	µg/l	0.1		0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Benzo(a)anthracene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(a)pyrene (w)	µg/l	0.00017		<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(b)fluoranthene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(ghi)perylene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Benzo(k)fluoranthene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Chrysene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Dibenzo(ah)anthracene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Fluoranthene (w)	µg/l	0.0063		0.01	<0.01	4	1	3	0.01	<0.01	<0.01	<0.01							
Fluorene (w)	µg/l			0.01	<0.01	4	1	3	<0.01	<0.01	0.01	<0.01							
Indeno(123-cd)pyrene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Naphthalene (w)	µg/l	2		0.04	<0.01	4	1	3	<0.01	<0.01	0.04	<0.01							
Phenanthrene (w)	µg/l			0.04	<0.01	4	1	3	<0.01	<0.01	0.04	<0.01							
Pyrene (w)	µg/l			<0.01	<0.01	4	0	4	<0.01	<0.01	<0.01	<0.01							
Total PAH 16MS (w)	µg/l			0.11	<0.01	4	2	2	0.01	<0.01	0.11	<0.01							
SUM - polycyclic aromatic hydrocarbons (sum of four)	µg/l			<0.01	<0.01	4	0	4	*<0.01*	*<0.01*	*<0.01*	*<0.01*							
Petroleum hydrocarbons																			
Ali >C5-C6 (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
Ali >C6-C8 (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
Ali >C8-C10 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C10-C12 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C12-C16 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C16-C21 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Ali >C21-C35 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							

Project name	Richmond College
Project code	1921744
Client name	Clarion Housing Group
Address	
NGR	
Output type	Interpretive Controlled Waters
Scenario	EQS freshwater, England, Wales and Northern Ireland
GAC version	Rev14

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete				
Lab sample ID									22/09713/6	22/09713/7	22/09713/8	22/09713/9
Client sample ID									WS03	WS04	WS05	WS05
Depth to top									1	0.3	0..20	1.3
Depth to bottom												
Date sampled									23/09/2022	23/09/2022	23/09/2022	23/09/2022
Inorganics												
Calcium (dissolved)	µg/l			93000	93000	1	1	0				
DOC (w)	µg/l			3600	3600	1	1	0				
pH (w)	pH					5						
Sulphate (w)	µg/l			154000	67000	4	4	0				
Metals												
Arsenic (dissolved)	µg/l	50		10	1	4	4	0				
Cadmium (dissolved)	µg/l	0.25	0.08	<0.2	<0.2	4	0	4				
Chromium (dissolved)	µg/l	8.1	3.4	<1	<1	4	0	4				
Copper (dissolved)	µg/l	1		88	<4	4	1	3				
Lead (dissolved)	µg/l	1.2		<1	<1	4	0	4				
Mercury (dissolved)	µg/l	0.07		<0.1	<0.1	4	0	4				
Nickel (dissolved)	µg/l	4		4	2	4	4	0				
Selenium (dissolved)	µg/l			<1	<1	4	0	4				
Zinc (dissolved)	µg/l	10.9		7	3	4	4	0				
Polycyclic aromatic hydrocarbons (16)												
Acenaphthene (w)	µg/l			0.01	<0.01	4	1	3				
Acenaphthylene (w)	µg/l	5.8*		<0.01	<0.01	4	0	4				
Anthracene (w)	µg/l	0.1		0.01	<0.01	4	1	3				
Benzo(a)anthracene (w)	µg/l			<0.01	<0.01	4	0	4				
Benzo(a)pyrene (w)	µg/l	0.00017		<0.01	<0.01	4	0	4				
Benzo(b)fluoranthene (w)	µg/l			<0.01	<0.01	4	0	4				
Benzo(ghi)perylene (w)	µg/l			<0.01	<0.01	4	0	4				
Benzo(k)fluoranthene (w)	µg/l			<0.01	<0.01	4	0	4				
Chrysene (w)	µg/l			<0.01	<0.01	4	0	4				
Dibenzo(ah)anthracene (w)	µg/l			<0.01	<0.01	4	0	4				
Fluoranthene (w)	µg/l	0.0063		0.01	<0.01	4	1	3				
Fluorene (w)	µg/l			0.01	<0.01	4	1	3				
Indeno(123-cd)pyrene (w)	µg/l			<0.01	<0.01	4	0	4				
Naphthalene (w)	µg/l	2		0.04	<0.01	4	1	3				
Phenanthrene (w)	µg/l			0.04	<0.01	4	1	3				
Pyrene (w)	µg/l			<0.01	<0.01	4	0	4				
Total PAH 16MS (w)	µg/l			0.11	<0.01	4	2	2				
SUM - polycyclic aromatic hydrocarbons (sum of four)	µg/l			<0.01	<0.01	4	0	4				
Petroleum hydrocarbons												
Ali >C5-C6 (w)	µg/l			<1	<1	4	0	4				
Ali >C6-C8 (w)	µg/l			<1	<1	4	0	4				
Ali >C8-C10 (w)	µg/l			<5	<5	4	0	4				
Ali >C10-C12 (w)	µg/l			<5	<5	4	0	4				
Ali >C12-C16 (w)	µg/l			<5	<5	4	0	4				
Ali >C16-C21 (w)	µg/l			<5	<5	4	0	4				
Ali >C21-C35 (w)	µg/l			<5	<5	4	0	4				

								Lab sample ID	22/10095/2	22/10095/3	22/10095/4	22/10095/1	22/09699/1	22/09713/10	22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5
								Client sample ID	BH1	BH2	BH3	River	SW1	Waste Arising	WS01	WS01	WS02	WS02	WS03
								Depth to top	3.5	3.5	3.5				0.2	0.8	0.3	0.8	0.3
								Depth to bottom											
								Date sampled	13/10/2022	13/10/2022	13/10/2022	13/10/2022	23/09/2022	27/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022	23/09/2022
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects											
Total Aliphatics (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C5-C7 (w)	µg/l	10		<1	<1	4	0	4	<1	<1	<1	<1							
Aro >C7-C8 (w)	µg/l	74		<1	<1	4	0	4	<1	<1	<1	<1							
Aro >C8-C10 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C10-C12 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C12-C16 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C16-C21 (w)	µg/l			<5	<5	4	0	4	<5	<5	<5	<5							
Aro >C21-C35 (w)	µg/l			<10	<10	4	0	4	<10	<10	<10	<10							
Total Aromatics (w)	µg/l			<10	<10	4	0	4	<10	<10	<10	<10							
TPH (Ali & Aro >C5-C35) (w)	µg/l			<10	<10	4	0	4	<10	<10	<10	<10							
BTEX - Benzene (w)	µg/l	10		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - Toluene (w)	µg/l	74		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - Ethyl Benzene (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - m & p Xylene (w)	µg/l	30*		<1	<1	4	0	4	<1	<1	<1	<1							
BTEX - o Xylene (w)	µg/l	30*		<1	<1	4	0	4	<1	<1	<1	<1							
SUM - xylenes (BTEX o plus m&p)	µg/l	30*		<1	<1	4	0	4	*<1*	*<1*	*<1*	*<1*							
Fuel Oxygenates																			
MTBE (w)	µg/l			<1	<1	4	0	4	<1	<1	<1	<1							

Lab sample ID	22/09713/6	22/09713/7	22/09713/8	22/09713/9
Client sample ID	WS03	WS04	WS05	WS05
Depth to top	1	0.3	0..20	1.3
Depth to bottom				
Date sampled	23/09/2022	23/09/2022	23/09/2022	23/09/2022

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete				
Total Aliphatics (w)	µg/l			<5	<5	4	0	4				
Aro >C5-C7 (w)	µg/l	10		<1	<1	4	0	4				
Aro >C7-C8 (w)	µg/l	74		<1	<1	4	0	4				
Aro >C8-C10 (w)	µg/l			<5	<5	4	0	4				
Aro >C10-C12 (w)	µg/l			<5	<5	4	0	4				
Aro >C12-C16 (w)	µg/l			<5	<5	4	0	4				
Aro >C16-C21 (w)	µg/l			<5	<5	4	0	4				
Aro >C21-C35 (w)	µg/l			<10	<10	4	0	4				
Total Aromatics (w)	µg/l			<10	<10	4	0	4				
TPH (Ali & Aro >C5-C35) (w)	µg/l			<10	<10	4	0	4				
BTEX - Benzene (w)	µg/l	10		<1	<1	4	0	4				
BTEX - Toluene (w)	µg/l	74		<1	<1	4	0	4				
BTEX - Ethyl Benzene (w)	µg/l			<1	<1	4	0	4				
BTEX - m & p Xylene (w)	µg/l	30*		<1	<1	4	0	4				
BTEX - o Xylene (w)	µg/l	30*		<1	<1	4	0	4				
SUM - xylenes (BTEX o plus m&p)	µg/l	30*		<1	<1	4	0	4				
Fuel Oxygenates												
MTBE (w)	µg/l			<1	<1	4	0	4				

Notes for GQRA (water) Screening Tool Output	
Details of the **GAC used in the GQRA and the GAC version** are displayed at the top of the output screening sheet.	
Full details of the **GAC derivation** are included in a separate appendix document	
Any laboratory results that are shown as appended (e.g. Tentatively Identified Compounds, certain subcontracted results e.g. Hg etc.) are not screened against the GAC in the report output. These results will be included in an appendix to the main report.	
Certain groups of analytes are summed within the tool (these results are shown as the analyte names with the pre-fix "SUM", for example 'SUM - chromium trivalent plus hexavalent), which is required to enable a comparison of laboratory results to the GAC, which is a sum of certain analytes.	
Where analytes have been summed, any concentration reported as below the laboratory method detection limited is treated as zero.	
Certain GACs are calculated (e.g. ammoniacal nitrogen reported as N, NH_3 or NH_4) from the primary GAC. The GAC is therefore the same, but expressed as a different molecular weight. These are shown in italics.	
Relevant laboratory methods (e.g. leachate dilutions) are included in the section entitled 'Methods'.	
Analyte groupings are based on the Envirolab laboratory reporting groups.	
* denotes a non-statutory GACs (e.g. *ethylbenzene* *).	
Shading of cells (individual results and the GAC/T1) has the following meaning:	
GAC	GAC definitely exceeded
GAC	GAC may be exceeded (e.g. lab results include a < or > symbol)
T1	First level screening threshold definitely exceeded (for project specific GAC please refer to the appended GAC document for details of derivation of T1)
T1	First level screening threshold may be exceeded (e.g. lab results include a < or > symbol)
T1	**First level screening threshold, equating to**:
	GrAC: Result compared to the theoretical aqeuous solublity limit.
Comment	Applicable across all GrACs. Where the GrAC has been set at the theoretical aqueous solubility for the analyte, which is below the modelled assessment criteria.
	EQS Cadmium: Compared to lowest EQS for Class 1 <40mg/l $CaCO_3$/l.
Comment	Freshwater EQS for cadmium is hardness dependent.
	EQS Copper: Compared to EWS for the lowest Dissolved Organc Carbon (DOC) of <1mg/l.
Comment	Transitional waters EQS for copper is DOC dependent, compared to lowest Dissolved Organc Carbon (DOC) of <1mg/l.
	EQS Aluminium (Scotland only): Compared to EQS for pH >6.5.
Comment	Freshwater EQS for aluminium (Scotland) is pH dependent and only applicable at a pH >6.5.
	DWS/RPV Aro EC8-10: Total compared to DWS/RPV for ethylbenzene (conservative assessment).
Comment	Aro EC8-10 fraction contains xylenes, ethylbenzene and trimethylbenzene.
	DWS/RPV chromium total: Total is compared to CrVI (conservative assessment) for either freshwater or for transitional waters.
Comment	Freshwater and transitional EQS are a sum of the individual EQS for CrVI and CrIII (8.1ug/l).
grey font	Where individual reported concentrations are presented in grey (not black) font, the result was below the laboratory method detection limit.
	Where cells are shaded grey, all results for that analyte are below the laboratory method detection limit

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects	# exceeding GAC	# exceeding T1	Max sample (ID, depth and date)
Metals											
Cadmium (	µg/l	0.25	0.08	<0.2	<0.2	4	0	4		4	
Copper (di	µg/l	1		88	<4	4	1	3	4		BH1: 3.5 (10/13/2022)
Mercury (c	µg/l	0.07		<0.1	<0.1	4	0	4	4		
Nickel (diss	µg/l	4		4	2	4	4	0	2		BH2: 3.5 (10/13/2022) BH3: 3.5 (10/13/2022)
Polycyclic aromatic hydrocarbons (16)											
Benzo(a)py	µg/l	0.00017		<0.01	<0.01	4	0	4	4		
Fluoranthe	µg/l	0.0063		0.01	<0.01	4	1	3	4		BH1: 3.5 (10/13/2022)

APPENDIX V
GQRA DATA SCREENING TABLES - GAS

Calculations of borehole hazardous gas flow rate in accordance with BS8485

Project No.:	1921744
Client:	Clarion Housing Group
Site:	Richmond upon Thames College

In accordance with BS8485 Section 6.3.1 the data presented below are calculations of borehole hazardous gas flow rates (Q_{hg}).

The Q_{hg} can then be used, along with a robust conceptual site model and review of the data collected, to designate a site characteristic (or zone) gas screening value (GSV).

GSVs are used to characterise the potential risk and inform mitigation measures where appropriate.

The assessment below presents calculated Q_{hg} values and compares them directly to Characteristic Situations as presented in BS8485 Table 2.

The ultimate site characteristic GSV (for the site or for individual zones) to inform risk assessment and mitigation measures is detailed in the body of the report, and may be different to the individual calculations below.

The calculations below use peak concentrations and steady state flow to calculate the Q_{hg}.

Characteristic Situation	Hazard potential	GSV
1	Very Low	<0.07
2	Low	<0.7
3	Moderate	<3.5
4	Moderate to High	<15
5	High	<70
6	Very High	>=70

British Standard Institution (BSI) (2019), 'BS 8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

KEY	
Qhg	Borehole hazardous gas flow rate (steady state flow * (peak concentration / 100))
GSV	Gas Screening Value
	GSV / Q_{hg} indicates very low hazard potential
	GSV / Q_{hg} indicates low to moderate hazard potential
	GSV / Q_{hg} indicates moderate or greater hazard potential
	Data exceeds either 1% CH_4, 5% CO_2 or 70 L/hr flow (see BS8485 Table 2)

SUMMARY OF Qhg VALUES PER BOREHOLE, PER MONITORING ROUND

BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	O_2 min %v/v	Flow SS l/hr	Baro mbar	Q_{hg} CH_4	Q_{hg} CO_2	CS No.
WS02-22	03/10/2022	0	0	0.1	0.1	16.5	0	1023	0.00	0.00	CS1
	13/10/2022	0	0	0.2	0.2	12	0	1014	0.00	0.00	CS1
	19/10/2022	0	0	0	0	15.3	0	1020	0.00	0.00	CS1
	24/10/2022	0.1	0.1	0.1	0.1	17.7	0	998	0.00	0.00	CS1
	31/10/2022	0	0	0.9	0.9	13.7	0	1014	0.00	0.00	CS1
	07/11/2022	0	0	0.8	0.1	17.9	0	1004	0.00	0.00	CS1
WS04-22	03/10/2022	0.3	0.2	1.1	1.1	20.2	0	1023	0.00	0.00	CS1
	13/10/2022	0	0	0.6	0.6	20.2	0	1014	0.00	0.00	CS1
	19/10/2022	0	0	0.5	0.5	20.9	0	1020	0.00	0.00	CS1
	24/10/2022	0	0	0.7	0.7	19.2	0	999	0.00	0.00	CS1
	31/10/2022	0	0	0.5	0.5	20	0	1013	0.00	0.00	CS1
	07/11/2022	0	0	0.4	0.4	20	0	1013	0.00	0.00	CS1

WORST-CASE Qhg VALUES PER BOREHOLE

		Maximum CH_4		Maximum CO_2				Baro	Maximum Q_{hg}		
BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	Min O_2	Max SS Flow	mbar	CH_4	CO_2	CS No.
WS02-22		0.1	0.1	0.9	0.9	12	0		0.00	0.00	CS1
WS04-22		0.3	0.2	1.1	1.1	19.2	0		0.00	0.00	CS1

WORST-CASE Qhg CHECK FOR SITE (BS8485 Section 6.3.7.4)

		Maximum CH_4		Maximum CO_2				Baro	Maximum Q_{hg}		
BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	Min O_2	Max SS Flow	mbar	CH_4	CO_2	CS No
ALL		0.3	0.2	1.1	1.1	12	0		0.00	0.00	CS1

APPENDIX W
WM3 ASSESSMENT

Envirolab, Sandpits Business Park, Mottram Road, Hyde, Cheshire SK14 3AR.

envirolab

Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Site Code and Name																				
TP/WS/BH		WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS05	WS05	Waste Arising									
Depth (m)		0.20	0.80	0.30	0.80	0.30	1	0.30	0.20	1.30										
Envirolab reference		22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9	22/09713/10									
% Moisture	%										19.2									
pH (soil)		11.88	10.67		8.76		8.49	8.94	8.04	8.35	8.48									
pH (leachate)																				
Arsenic	mg/kg	10	8		4		7	6	7	13	13									
Cadmium	mg/kg	0.7	0.8		0.6		0.9	0.5	0.6	0.8	1.3									
Copper	mg/kg	21	41		13		15	10	23	9	26									
CrVI or Chromium	mg/kg	24	25		27		37	20	23	26	42									
Lead	mg/kg	109	297		12		19	61	76	13	14									
Mercury	mg/kg	0.68	0.64		0.17		0.17	0.42	0.17	0.17	0.17									
Nickel	mg/kg	21	22		17		25	14	19	20	56									
Selenium	mg/kg	1	1		1		1	1	1	1	1									
Zinc	mg/kg	50	77		31		41	49	98	27	85									
Barium	mg/kg																			
Beryllium	mg/kg																			
Vanadium	mg/kg																			
Cobalt	mg/kg																			
Manganese	mg/kg																			
Molybdenum	mg/kg																			
Antimony	mg/kg																			
Aluminium	mg/kg																			
Bismuth	mg/kg																			
CrIII	mg/kg																			
Iron	mg/kg																			
Strontium	mg/kg																			
Tellurium	mg/kg																			
Thallium	mg/kg																			
Titanium	mg/kg																			
Tungsten	mg/kg																			
Ammoniacal N as Nitrogen	mg/kg																			
PAH (Input Total PAH **OR** individual PAH results)																				
Acenaphthene	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01	0.01									
Acenaphthylene	mg/kg	0.01	0.01		0.01		0.01	0.02	0.01	0.01	0.01									
Anthracene	mg/kg	0.04	0.04		0.02		0.02	0.03	0.02	0.02	0.02									
Benzo(a)anthracene	mg/kg	0.14	0.13		0.04		0.04	0.50	0.11	0.04	0.04									
Benzo(a)pyrene	mg/kg	0.17	0.16		0.04		0.04	0.76	0.13	0.04	0.04									
Benzo(b)fluoranthene	mg/kg	0.20	0.18		0.05		0.05	1.04	0.15	0.05	0.05									
Benzo(ghi)perylene	mg/kg	0.11	0.09		0.05		0.05	0.61	0.09	0.05	0.05									
Benzo(k)fluoranthene	mg/kg	0.09	0.08		0.07		0.07	0.37	0.07	0.07	0.07									
Chrysene	mg/kg	0.18	0.16		0.06		0.06	0.65	0.13	0.06	0.06									
Dibenzo(ah)anthracene	mg/kg	0.04	0.04		0.04		0.04	0.20	0.04	0.04	0.04									
Fluoranthene	mg/kg	0.30	0.30		0.08		0.08	0.55	0.22	0.08	0.08									
Fluorene	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01	0.01									
Indeno(123cd)pyrene	mg/kg	0.12	0.09		0.03		0.03	0.70	0.09	0.03	0.03									
Naphthalene	mg/kg	0.03	0.03		0.03		0.03	0.03	0.03	0.03	0.03									
Phenanthrene	mg/kg	0.15	0.16		0.03		0.03	0.11	0.08	0.03	0.03									
Pyrene	mg/kg	0.26	0.26		0.07		0.07	0.49	0.20	0.07	0.07									
Coronene	mg/kg																			
Total PAHs (16 or 17)	mg/kg	1.76	1.65		0.08		0.08	6.03	1.2	0.08	0.08									
TPH																				
Petrol	mg/kg																			
Diesel	mg/kg																			
Lube Oil	mg/kg																			
Crude Oil	mg/kg																			
White Spirit / Kerosene	mg/kg																			
Creosote	mg/kg																			
Unknown TPH with ID	mg/kg																			
Unknown TPHCWG	mg/kg																			
Total Sulphide	mg/kg																			
Complex Cyanide	mg/kg																			
Free (or Total) Cyanide	mg/kg																			
Thiocyanate	mg/kg																			
Elemental/Free Sulphur	mg/kg																			
Phenols Input Total Phenols HPLC **OR** individual Phenol results.																				
Phenol	mg/kg																			
Cresols	mg/kg																			
Xylenols	mg/kg																			
Resourcinol	mg/kg																			
Phenols Total by HPLC	mg/kg																			
BTEX Input Total BTEX **OR** individual BTEX results.																				
Benzene	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01										
Toluene	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01										
Ethylbenzene	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01										
Xylenes	mg/kg	0.01	0.01		0.01		0.01	0.01	0.01	0.01										
Total BTEX	mg/kg																			
PCBs (POPs)																				
PCBs Total (eg EC7/WHO12)	mg/kg																			
PBBs (POPs)																				
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)	mg/kg																			
POPs Dioxins and Furans Input Total Dioxins and Furans **OR** individual Dioxin and Furan results.																				
2,3,7,8-TeCDD	mg/kg																			
1,2,3,7,8-PeCDD	mg/kg																			
1,2,3,4,7,8-HxCDD	mg/kg																			
1,2,3,6,7,8-HxCDD	mg/kg																			
1,2,3,7,8,9-HxCDD	mg/kg																			
1,2,3,4,6,7,8-HpCDD	mg/kg																			
OCDD	mg/kg																			
2,3,7,8-TeCDF	mg/kg																			
1,2,3,7,8-PeCDF	mg/kg																			
2,3,4,7,8-PeCDF	mg/kg																			
1,2,3,4,7,8-HxCDF	mg/kg																			
1,2,3,6,7,8-HxCDF	mg/kg																			
2,3,4,6,7,8-HxCDF	mg/kg																			
1,2,3,7,8,9-HxCDF	mg/kg																			
1,2,3,4,6,7,8-HpCDF	mg/kg																			
1,2,3,4,7,8,9-HpCDF	mg/kg																			
OCDF	mg/kg																			
Total Dioxins and Furans	mg/kg																			
Some Pesticides (POPs unless otherwise stated)																				
Aldrin	mg/kg																			
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg																			
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg																			
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg																			
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg																			
Dieldrin	mg/kg																			
Endrin	mg/kg																			
γ Hexachlorocyclohexane (gamma HCH) (lindane) ***OR*** *Total HCH*	mg/kg																			
Heptachlor	mg/kg																			
Hexachlorobenzene	mg/kg																			
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg																			
o,p'-DDT ***OR*** *Total DDT*	mg/kg																			
γ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg																			
Chlordecone (kepone)	mg/kg																			
Pentachlorobenzene	mg/kg																			
Mirex	mg/kg																			
Toxaphene (camphechlor)	mg/kg																			
Tin																				
Tin *(leave empty if Organotin and Tin excl Organotin results used)*	mg/kg																			
Organotin																				
Dibutyltin; DiBT	mg/kg																			
Tributyltin; TriBT	mg/kg																			
Triphenyltin; TriPT	mg/kg																			
Tetrabutyltin; TeBT	mg/kg																			
Tin excludina Oraanotin																				
Tin excl Organotin	mg/kg																			
Asbestos in Soil	Thresholds																			
Asbestos detected in Soil (enter Y or N)	Y	N	N	N	Y	N	N	N	N	N	N									
		If Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7										If Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7									
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%																		
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces) *Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.*	≥0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.										If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.									
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y																			
		If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.										If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.									
		Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres. All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.										Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres. All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.									

Hazardous Property	Thresholds	Cut Off Value	If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.										If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.								
Corrosive HP8	≥5%	<1%	0.00593	0.00586	0.00000	0.00571	0.00000	0.00803	0.00463	0.00534	0.00871	0.00790	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥10%	<1%	0.00369	0.00569	0.00000	0.00200	0.00000	0.00262	0.00192	0.00352	0.00273	0.00376	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥20%	<1%	0.00684	0.00929	0.00000	0.00493	0.00000	0.00677	0.00463	0.00659	0.00508	0.01153	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥20%		0.00018	0.00017	0.00000	0.00001	0.00000	0.00001	0.00060	0.00012	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥1%		0.00461	0.00480	0.00000	0.00518	0.00000	0.00710	0.00384	0.00442	0.00499	0.00914	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥10%		0.01090	0.02970	0.00000	0.00120	0.00000	0.00190	0.00610	0.00760	0.00130	0.00113	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Aspiration Toxicity HP5	≥10%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00139	0.00112	0.00000	0.00055	0.00000	0.00094	0.00083	0.00094	0.00173	0.00140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.00475	0.00494	0.00000	0.00533	0.00000	0.00725	0.00398	0.00456	0.00513	0.00683	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥25%	<1%	0.01781	0.03907	0.00000	0.00619	0.00000	0.00878	0.01078	0.01425	0.00646	0.01277	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00007	0.00006	0.00000	0.00002	0.00000	0.00002	0.00004	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00461	0.00480	0.00000	0.00518	0.00000	0.00710	0.00384	0.00442	0.00499	0.00652	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥25%	<1%	0.00007	0.00008	0.00000	0.00006	0.00000	0.00009	0.00005	0.00006	0.00008	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00475	0.00494	0.00000	0.00526	0.00000	0.00721	0.00393	0.00449	0.00509	0.00683	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00014	0.00014	0.00000	0.00014	0.00000	0.00014	0.00014	0.00014	0.00014	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 3 of the CLP, CL Inventory, ATPs, IARC, Concawe, MSDSs, REACH + Pesticide Properties databases. Worst case REACH + MSDS's used for "*" STOT + Acute Toxicity.

envirolab

Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!". If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!". If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Site Code and Name																			
TP/WS/BH			WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS05	WS05	Waste Arising								
Depth (m)			0.20	0.80	0.30	0.80	0.30	1	0.30	0.20	1.30									
Envirolab reference			22/09713/1	22/09713/2	22/09713/3	22/09713/4	22/09713/5	22/09713/6	22/09713/7	22/09713/8	22/09713/9	22/09713/10								
Acute Toxicity HP8	≥22.5%	<1%	0.01752	0.03878	0.00000	0.00611	0.00000	0.00855	0.01006	0.01404	0.00636	0.01265	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.01090	0.02970	0.00000	0.00518	0.00000	0.00710	0.00610	0.00760	0.00499	0.00914	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00018	0.00017	0.00000	0.00001	0.00000	0.00001	0.00060	0.00012	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		11.88	10.67	0.00	8.76	0.00	8.49	8.94	8.04	8.35	8.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		11.88	10.67	0.00	8.76	0.00	8.49	8.94	8.04	8.35	8.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.01090	0.02970	0.00000	0.00343	0.00000	0.00505	0.00610	0.00760	0.00404	0.00914	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Toxic for Reproduction HP10	≥3%		0.00461	0.00480	0.00000	0.00518	0.00000	0.00710	0.00384	0.00442	0.00499	0.00652	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11	≥0.1%		0.00461	0.00480	0.00000	0.00518	0.00000	0.00710	0.00384	0.00442	0.00499	0.00652	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00424	0.00444	0.00000	0.00343	0.00000	0.00505	0.00283	0.00384	0.00404	0.00914	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00461	0.00480	0.00000	0.00518	0.00000	0.00710	0.00384	0.00442	0.00499	0.00914	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14 amended v6	≥25%	<0.1%	0.03032	0.05487	0.00000	0.01598	0.00000	0.02211	0.02219	0.03209	0.01675	0.02942	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Ba, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Cresote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%)	0.03032	0.05488	0.00000	0.01598	0.00000	0.02212	0.02219	0.03210	0.01675	0.02942	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Ba, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Cresote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%)	3.03210	5.48730	0.00000	1.59760	0.00000	2.21140	2.21870	3.20940	1.67460	2.94201	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or PCP-Pesticides)	>0.005%		0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

Waste Classification

Guidance on the classification and assessment of waste (1st Edition v1.2.GB)

Technical Guidance WM3

SEPA Scottish Environment Protection Agency

Environment Agency

Cyfoeth Naturiol Cymru Natural

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Contents

List of Abbreviations

AH	Absolute hazardous
AN	Absolute non-hazardous
ATP	Adaptation to technical progress
AWCCT	Asphalt waste containing coal tar
BaP	Benzo[a]pyrene
BSI	British Standards Institute
CAS	Chemical Abstract Service
CEN	European Committee for Standardisation
CFC	Chlorofluorocarbon
CLI	Classification and Labelling Inventory
CLP	Classification, Labelling and Packaging of Substances Regulation (GB or EU)
EC	European Community
ECHA	European Chemicals Agency
ECVAM	European centre for the validation of alternative methods
EEC	European Economic Community
ELV	End of Life Vehicle
EU	European Union
GHS	Globally Harmonised System
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HSE	Health and Safety Executive
IARC	International Agency for Research on Cancer
LoW	List of Waste
LoWD	List of Wastes Decision (2002/532/EC)
MCL	Mandatory Classification List, under the GB CLP Regulation
MFSU	Manufacture, formulation, supply and use.
MH	Mirror hazardous
MN	Mirror non-hazardous
NIEA	Northern Ireland Environment Agency
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
POP	Persistent Organic Pollutant
REACH	Registration, evaluation, authorisation and restriction of chemicals (UK or EU)
SDS	Safety Data Sheet
SEPA	Scottish Environment Protection Agency
SoS	Secretary of State
STP	Standard temperature and pressure (25ºC and 1 atmosphere pressure)
TPH	Total Petroleum Hydrocarbons
WEEE	Waste electronic and electrical equipment
WFD	Waste Framework Directive (2008/98/EC)
XRD	X-Ray Diffraction

Introduction

Overview

As part of your waste duty of care you must classify the waste your business produces:

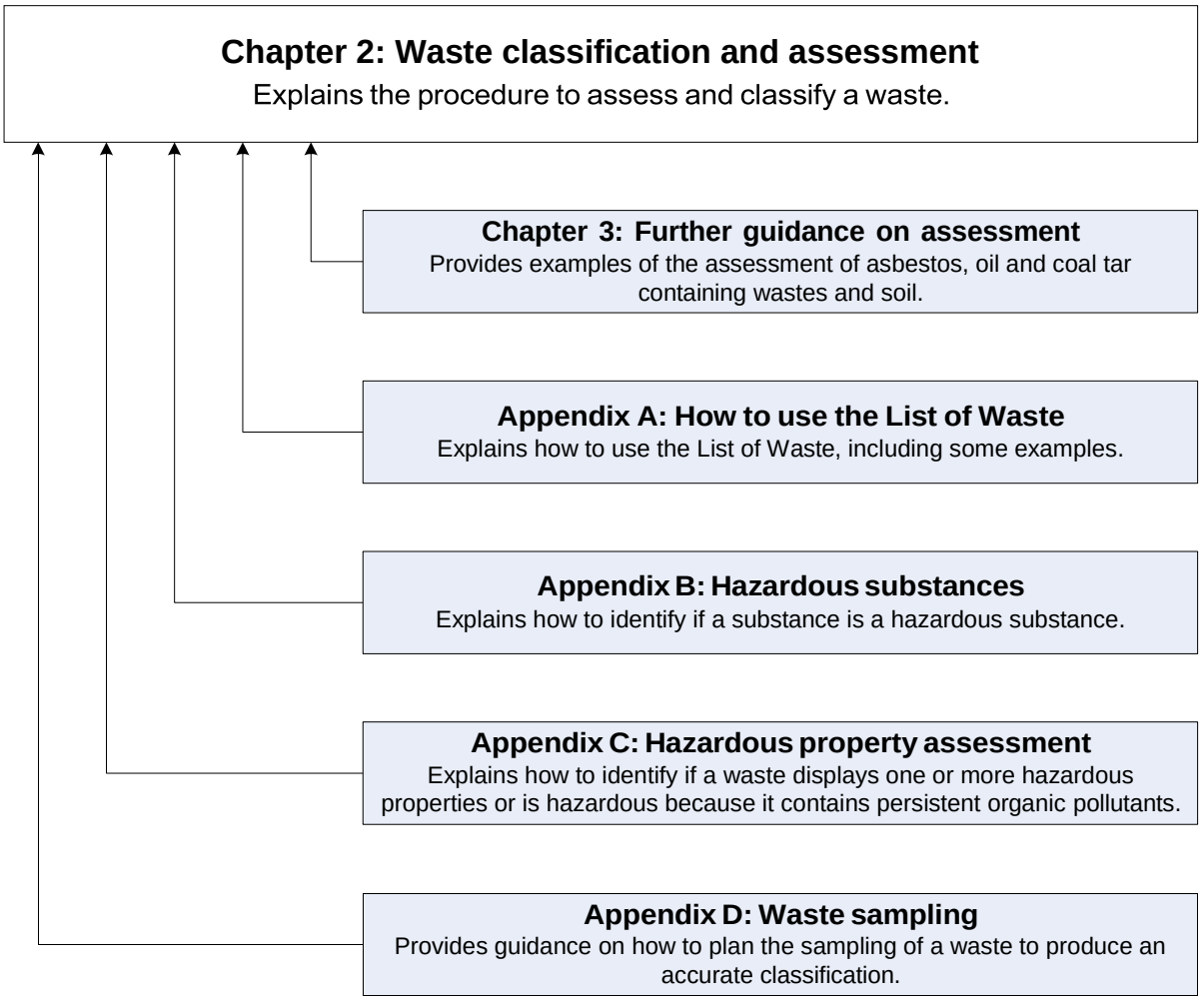
- before it is collected, disposed of or recovered
- to identify the controls that apply to the movement of the waste
- to complete waste documents and records
- to identify suitably authorised waste management options
- to prevent harm to people and the environment.

You should use this version (1.1.GB) of the guidance if you produce, manage or regulate waste in England, Scotland or Wales. If you are in Northern Ireland you should use version 1.1.NI instead.

For most wastes, you will need to identify if the waste has a hazardous property before you can classify or describe it.

This guidance explains how to assess if the waste displays a hazardous property and how to classify it.

Chapter 2 provides the procedure for waste classification and assessment. This procedure uses the supporting information provided in five appendices as shown below.



Waste classification and assessment

Introduction

This chapter explains how to classify a waste and identify its hazardous properties.

You need to classify each waste so you can describe it. The classification:

- must be worked out before the waste is moved, disposed of or recovered
- must be included on waste documents and records
- determines the controls that apply to movement of the waste
- is needed to identify a suitably authorised waste management option

Some examples of the classification of common wastes (for England) are provided by:

https://www.gov.uk/how-to-classify-different-types-of-waste/overview

Waste classification and assessment procedure

Steps to **classify** the waste

1. check if the waste needs to be classified
2. identify the code or codes that may apply to the waste
3. identify the assessment needed to select the correct code

Steps to **assess** the waste

4. determine the chemical composition of the waste
5. identify if the substances in the waste are 'hazardous substances' or 'Persistent Organic Pollutants'
6. assess the hazardous properties of the waste
7. assign the classification code and describe the classification code

This procedure is a general guide, it applies in most circumstances and must be used with the supporting appendices. If you're unsure seek advice from a competent person.

Step 1: Check if the waste needs to be classified

You need to ensure the material is waste, and needs to be classified.

Nearly all household, commercial and industrial wastes do need to be classified. This includes waste from domestic households.

The material does not need to be classified if it's either:

- not waste, or
- a waste that is excluded from classification

See box 2.1 for wastes excluded from classification entirely, or excluded where they are covered by separate legislation.

If the waste you're trying to classify is listed in Box 2.1, check domestic legislation to see how these wastes are regulated in each country. This is particularly important if the waste is radioactive or excluded by Article 2(2) of the Waste Directive.

See the Legal definition of waste guidance - Publications - GOV.UK for additional guidance on what is waste and the listed exclusions for England, Wales and Northern Ireland.

If the material is waste, and needs to be classified, proceed to step 2.

Box 2.1: Text from Article 2 of the Waste Directive - Exclusions from the Scope

'1: The following shall be excluded from the scope of this Directive:

a) gaseous effluents emitted into the atmosphere;
b) land (in situ) including unexcavated contaminated soil and buildings permanently connected with land;
c) uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated;
d) radioactive waste;
e) decommissioned explosives;
f) faecal matter, if not covered by paragraph 2(b), straw and other natural non-hazardous agricultural or forestry material used in farming, forestry or for the production of energy from such biomass through processes or methods which do not harm the environment or endanger human health.

2: The following shall be excluded from the scope of this Directive to the extent that they are covered by other Community legislation:

a) waste waters;
b) animal by-products including processed products covered by Regulation (EC) No 1774/2002, except those which are destined for incineration, landfilling or use in a biogas or composting plant;
c) carcasses of animals that have died other than by being slaughtered, including animals killed to eradicate epizootic diseases, and that are disposed of in accordance with Regulation (EC) No 1774/2002;
d) waste resulting from prospecting, extraction, treatment and storage of mineral resources and the working of quarries covered by Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries' (see note below).

'3: Without prejudice to obligations under other relevant Community legislation, sediments relocated inside surface waters for the purpose of managing waters and waterways or of preventing floods or mitigating the effects of floods and droughts or land reclamation shall be excluded from the scope of this Directive if it is proved that the sediments are non-hazardous.'

Note: The Mining Waste Directive (2006/21/EC) uses the definition of hazardous waste. References in this document to 'directive waste' includes waste within the scope of the Mining Waste Directive.

Step 2: identify the code or codes that may apply to the waste

The second step is to identify how the waste is classified in the List of Waste (LoW).

This classification identifies what assessment is needed before a LoW code can be assigned to the waste.

List of Waste (LoW) is a catalogue of all wastes divided into 20 chapters. The chapters must be used in the correct order of precedence.

The chapters contain both the classification codes and the descriptions of each code (together referred to as an 'entry' in the list)

You need to read **Appendix A** which:

- contains a copy of the List of Waste (includes the code, it's description, entry type and whether there is a worked example available)
- explains how to use the list
- provides information on the different types of entry and how each is assessed

This will help you identify the most appropriate code(s). Some codes are linked so it's common to identify more than one code at this stage.

Once you've done this you proceed to step 3.

Step 3: identify the assessment needed to select the correct code(s)

You now need to work out if an assessment is needed and how it affects the classification of the waste.

The assessment needed depends on the type of code(s) identified. Codes are divided into four types of entry:

- wastes that may be hazardous or non-hazardous, known as 'mirror hazardous' and 'mirror non-hazardous' entries
- wastes that are always hazardous, known as 'absolute hazardous' entries
- wastes that are always non-hazardous, known as 'absolute non-hazardous' entries.

The information provided in this guidance is suitable for most wastes. In a few cases the list of wastes contains complex linkages between several entries of different types – you should seek further advice about these. You must consider all relevant linked entries in order of precedence - see **Appendix A** for further information.

'mirror hazardous' or 'mirror non-hazardous' entries

If the waste is classified under 'mirror hazardous' or 'mirror non-hazardous' entries you will need to continue with the assessment of hazardous properties in steps 4 to 7. This will be used to

- identify which code applies, and
- complete the hazardous waste consignment note.

Waste holders have a duty to determine if a "mirror entry" waste is hazardous or non-hazardous. A list of waste code cannot be assigned until steps 4 to 7 have been completed.

Appendix A also gives additional advice on how mirror entries that refer generally to hazardous substances or only to one specific hazardous substance are assessed.

'absolute hazardous' entry

If a waste is classified as an 'absolute hazardous' entry, you must use that code. The waste is hazardous waste and further assessment cannot change the classification. Steps 4 to 7 are not used for classification purposes.

You must assess your waste to determine which hazardous properties it displays to complete a hazardous waste consignment note. Follow steps 4 to 7 for hazardous property assessment

There are exceptions where 'absolute hazardous' entries are linked to other entries and additional consideration may be needed. The other entries may need to be considered to determine if they are more appropriate to the waste.

You can find additional advice in **Appendix A** on how unusual entries of this type, for example those that relate to the presence or absence of hazardous components, are applied.

'absolute non-hazardous' entries

If a waste is classified as an 'absolute non-hazardous' entry, in most cases it is non-hazardous without any further assessment and you can proceed to Step 7.

There are exceptions where these 'absolute non-hazardous' entries are linked to other entries and additional consideration may be needed. The other entries may need to be considered to determine if they are more appropriate to the waste.

In **Appendix A** additional advice is given on how certain atypical entries of this type are applied, for example entries that relate to the presence or absence of hazardous components.

Step 4: determine the chemical composition of the waste

To assess whether the waste has a hazardous property you first need to know its composition.

You can get information on the composition of a waste:

- from the manufacturers safety data sheet if the waste is a manufactured product whose composition has not changed - if the composition has been altered during storage or use you should not rely fully on this information
- when the waste is from a well understood industrial process and the composition of the wastes produced are well understood.
- by sampling and analysing the waste to determine its composition – you must read **Appendix D** before undertaking any sampling, to ensure that sampling is appropriate, representative and reliable

Chemical analyses (particularly for inorganic substances) do not always identify the specific components but may only identify the individual anions and cations. In such cases, the waste holder may need to determine what precise substances are likely to be present either by further analysis or by applying knowledge of the process / activity that produced the waste. If there is any doubt, the worst case substance should be considered to be present. See step 5 for further information on 'worst case' substances.

Once you've determined the composition proceed to step 5.

What to do if you do not know the composition of the waste

You should make all reasonable efforts to determine the composition of the waste.

This information is required to both:

- classify mirror entry wastes
- complete a consignment note for hazardous waste prior to the waste being removed from the premises of production

Where the composition of a mirror entry waste is not known and genuinely cannot be determined the mirror entry waste must be classified under the 'mirror hazardous' entry.

Although direct testing methods are available for some hazardous properties (for example flammability) in step 6, they are not available for all properties. So direct testing cannot be used to classify a waste of unknown composition as non-hazardous.

Step 5: identify if the substances in the waste are 'hazardous substances' or 'Persistent Organic Pollutants'

Once you have determined the chemical composition you need to check if any of those chemicals are

- 'hazardous substances', or
- persistent organic pollutants (POPs)

Appendix B explains how to identify if a substance is a 'hazardous substance' and the hazard statement codes assigned to it.

Box 2.2 lists the POPs that are used for waste classification and have to be considered in step 6.

Box 2.2 Persistant Organic Pollutants used for waste classification

polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF),

DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane),

chlordane,

hexachlorocyclohexanes (including lindane),

dieldrin,

endrin,

heptachlor,

hexaclorobenzene,

chlordecone,

aldrine,

pentachlorobenzene,

mirex,

toxaphene

hexabromobiphenyl

polychlorinated biphenyls (PCB's)

Once you have determined if any of the substances in the waste are hazardous substances or POPs proceed to step 6.

If the composition of the waste is known and none of the substances in the waste are hazardous substances or POPs (listed in Box 2.2) then the waste does not possess any hazardous properties. Proceed to step 7.

'Worst case' substance

Where the holder has some knowledge of the components (for example 'lead' and 'chromium'), but does not know which specific substances, are present they must identify the 'worst case' substance(s) (for example 'lead chromate') for each component for use in Step 6.

The worst case substance should be determined separately for each hazardous property and is the substance, or combination of substances, that may reasonably exist in the waste and that is most likely to result in each hazardous property applying.

The worst case substance can be different for each hazardous property. For example, if chemical substance A has a carcinogenic hazard statement code and chemical substance B has a mutagenic hazard statement code both substances would have to be considered (one for each of the two hazardous properties).

The term 'reasonable' indicates that substances that cannot exist within the waste because, for example, of their physical and chemical properties can be excluded.

Step 6: Assess the hazardous properties of the waste

In step 6 you must consider all hazardous properties. These are numbered HP 1 to HP 15.

There are three methods to work out if a waste displays hazardous properties. These are:

- calculation - referring to a concentration limit for a hazard statement code (s),
- testing to prove whether a particular hazardous property is present or not (typically used for the physical properties – explosive, oxidising, and flammable), or
- the safety data sheet if the waste is a manufactured product whose composition has not changed, for that specific product.

At this point you should know what substances are present in the waste (or have assumed the worst case substances) and what hazard statement codes they have. These hazard statement codes determine what hazardous properties you need to consider. Table 2.1 shows which hazardous properties are associated with each hazard statement code and where appropriate a concentration limit. See Appendix C for instructions on how to assess each hazardous property, based on these hazard statement codes.

If the waste is classified under a 'mirror hazardous' and 'mirror non-hazardous' entry you must also consider POPs at this stage. Appendix C16 lists the POPs you must consider, and the concentration limit that applies to each.

Products are often labelled with hazard pictograms (see Table 2.2). If a pictogram is present a hazardous property is likely to apply. The absence of a pictogram does not mean that there are no hazardous properties.

See chapter 3 for examples of assessing hazardous properties for construction and demolition waste containing coal tar or asbestos, waste soil, waste oil and wastes containing oil**.**

Mirror entries referring to a specific hazardous substance or property

Some mirror entries in the LoW refer to a specific hazardous substance or a specific hazardous property.

For these entries assessing the hazardous properties must be done in two stages.

The first step (used for classification) is to assess the waste to determine if it displays:

- a hazardous property due to the specific substance named in the entry, or
- the specific hazardous property named in the entry

or contains POPs at or above the concentration limit

If the waste does display a hazardous property or contains POPs, then as the second step you must consider all the hazardous properties and hazardous substances. This is used to complete the consignment note.

Step 7: assign the classification code and describe the hazardous properties

At this stage the types of entries identified in steps 2 and 3 are important.

If you have identified entries with a different order of precedence (see Appendix A) you must consider the entries in that order of precedence. You can only consider an entry with a lower order of precedence if no appropriate entry exists at the higher level.

If the waste is classified under an 'absolute hazardous' entry:

- you must use the classification code provided
- the waste is hazardous waste
- hazardous property assessment is not used for classification purposes
- the composition and hazardous properties identified in steps 4 to 6 are used only to complete the consignment note

Key Point : 'absolute hazardous' wastes with no hazardous properties

A waste that falls under an absolute hazardous entry (eg any non-edible oil) is always hazardous. That entry must be used.

If that waste has no hazardous properties the absolute hazardous entry still applies. The law does not allow another entry to be applied to that waste.

If the waste was classified under 'mirror hazardous' and 'mirror non-hazardous' entries that refer generally to hazardous substances, then:

- the 'mirror hazardous' code must be assigned if the waste displays a hazardous property or contains POPs above the specified concentration limits
- the waste is hazardous waste, and
- the composition, hazardous properties, and POPs identified in steps 4 to 6 are also used to complete the consignment note

- when the waste does not display a hazardous property, and does not contain POPs, the 'mirror non-hazardous' code can be assigned

If the waste was classified under 'mirror hazardous' and 'mirror non-hazardous' entries that refer to a specific hazardous substance or hazardous property, then:

- the 'mirror hazardous' code must be assigned if the waste displays a hazardous property as a result of that specific substance, displays that specific property, or contains POPs above the specified concentration limits
- the waste is hazardous waste, and
- the composition, all hazardous properties, and POPs identified in steps 4 to 6 are then used to complete the consignment note
- when the waste does not display a hazardous property as a result of the specific substance, does not display the specific hazardous property, and does not contain POPs, the 'mirror non-hazardous' code can be assigned

If the waste was classified under an 'absolute non-hazardous' entry, noting the additional advice given in step 3 and appendix A, you must use the absolute non-hazardous code. The waste should be managed in line with Duty of Care Regulations and other applicable legislation. If a waste classified as 'absolute non-hazardous' displays a hazardous property you must include this on the waste transfer note. If you believe an 'absolute non-hazardous' waste may display a hazardous property, use steps 4 to 6 to assess this.

Table 2.1 Hazardous properties and hazard statement codes

Hazard statement	Description	Hazard Class and Category In the MCL to the GB CLP		Threshold[2]	Hazardous Property
H200	Unstable explosives	Unst. Expl	n/a	See Appendix C1	HP 1
H201	Explosive; mass explosion hazard.	Expl.	1.1	See Appendix C1	HP 1
H202	Explosive, severe projection hazard	Expl.	1.2	See Appendix C1	HP 1
H203	Explosive; fire, blast or projection hazard	Expl.	1.3	See Appendix C1	HP 1
H204	Fire or projection hazard.	Expl.	1.4	See Appendix C1	HP 1
H205	May mass explode in fire.	Expl.	1.5	See Appendix C15	HP 15
H220	Extremely flammable gas.	Flam. gas	1	See Appendix C3	HP 3
H221	Flammable gas.	Flam. gas	2	See Appendix C3	HP 3
H222	Extremely flammable aerosol.	n/a	n/a	See Appendix C3	HP 3
H223	Flammable aerosol.	n/a	n/a	See Appendix C3	HP 3
H224	Extremely flammable liquid and vapour.	Flam. Liq.	1	See Appendix C3	HP 3
H225	Highly flammable liquid and vapour.	Flam. Liq.	2	See Appendix C3	HP 3
H226	Flammable liquid and vapour.	Flam. Liq.	3	See Appendix C3	HP 3
H228	Flammable solid.	Flam. Sol.	1	See Appendix C3	HP 3
H230	May react explosively even in the absence of air	Chem. Unst. Gas	A	n/a	n/a
H231	May react explosively even in the absence of air at elevated pressure and/or temperature	Chem. Unst. Gas	B	n/a	n/a
H240	Heating may cause an explosion.	Self-React.	A	See Appendices C1 & C3	HP 1 HP 3
		Org. Perox.	A		
H241	Heating may cause a fire or explosion.	Self-React.	B	See Appendices C1 & C3	HP1 HP 3
		Org. Perox.	B		

Hazard statement	Description	Hazard Class and Category In the MCL to the GB CLP		Threshold[2]	Hazardous Property
H242	Heating may cause a fire.	Self-React.	C, D, E, F	See Appendix C3	HP 3
		Org. Perox.	C, D, E, F		
H250	Catches fire spontaneously if exposed to air.	Pyr. Liq.	1	See Appendix C3	HP 3
		Pyr. Sol.	1		
H251	Self-heating: may catch fire.	Self-heat.	1	See Appendix C3	HP 3
H252	Self-heating in large quantities; may catch fire.	Self-heat.	2	See Appendix C3	HP 3
H260	In contact with water releases flammable gases which may ignite spontaneously.	Water-react.	1	See Appendix C3	HP 3
H261	In contact with water releases flammable gases.	Water-react.	2	See Appendix C3	HP 3
H270	May cause or intensify fire; oxidiser.	Ox. Gas	1	See Appendix C2	HP 2
H271	May cause fire or explosion; strong oxidiser.	Ox. Sol.	1	See Appendix C2	HP 2
H272	May intensify fire; oxidiser.	Ox. Sol	2, 3	See Appendix C2	HP 2
H280	Contains gas under pressure; may explode if heated.	n/a	n/a	n/a	n/a
H281	Contains refrigerated gas; may cause cryogenic burns or injury.	n/a	n/a	n/a	n/a
H290	May be corrosive to metals.	Met. Corr.	1	n/a	n/a
H300	Fatal if swallowed.	Acute Tox.	1	Sum (0.1%)	HP 6
		Acute Tox.	2	Sum (0.25%)	HP 6
H301	Toxic if swallowed.	Acute Tox.	3	Sum (5%)	HP 6
H302	Harmful if swallowed.	Acute Tox.	4	Sum (25%)	HP 6
H304	May be fatal if swallowed and enters airways.	Asp. Tox.	1	Sum (10%)	HP 5

Hazard statement	Description	Hazard Class and Category In the MCL to the GB CLP		Threshold[2]	Hazardous Property
H310	Fatal in contact with skin.	Acute Tox.	1	Sum (0.25%)	HP 6
		Acute Tox.	2	Sum (2.5%)	HP 6
H311	Toxic in contact with skin.	Acute Tox.	3	Sum (15%)	HP 6
H312	Harmful in contact with skin.	Acute Tox.	4	Sum (55%)	HP 6
H314	Causes severe skin burns and eye damage.	Skin Corr.	1A	Sum (1%)	HP 4 & 8
		Skin Corr.	1B, 1C	Sum (5%)	HP 8
H315	Causes skin irritation.	Skin Irrit.	2	See Appendix C4	HP 4
H317	May cause an allergic skin reaction.	Skin Sens.	1	Ind. 10%	HP 13
H318	Causes serious eye damage.	Eye Dam.	1	Sum (10%)	HP 4
H319	Causes serious eye irritation.	Eye Irrit.	2	See Appendix C4	HP 4
H330	Fatal if inhaled.	Acute Tox.	1	Sum (0.1%)	HP 6
		Acute Tox.	2	Sum (0.5%)	HP 6
H331	Toxic if inhaled.	Acute Tox.	3	Sum (3.5%)	HP 6
H332	Harmful if inhaled.	Acute Tox.	4	Sum (22.5%)	HP 6
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.	Resp. Sens.	1	Ind. 10%	HP 13
H335	May cause respiratory irritation.	STOT SE	3	Ind. 20%	HP5
H336	May cause drowsiness or dizziness.	STOT SE	3	n/a	n/a
H340	May cause genetic defects	Muta.	1A, 1B	Ind. 0.1%	HP 11
H341	Suspected of causing genetic defects	Muta.	2	Ind. 1%	HP 11
H350	May cause cancer	Carc.	1A, 1B	Ind. 0.1%	HP 7

Hazard statement	Description	Hazard Class and Category In the MCL to the GB CLP		Threshold[2]	Hazardous Property
H351	Suspected of causing cancer	Carc.	2	Ind. 1.0%	HP 7
H360(1)	May damage fertility or the unborn child	Repr.	1A, 1B	Ind. 0.3%	HP 10
H361(1)	Suspected of damaging fertility or the unborn child	Repr.	2	Ind. 3%	HP 10
H362	May cause harm to breast-fed children.	Lact.	n/a	n/a	n/a
H370	Causes damage to organs	STOT SE	1	Ind. 1%	HP 5
H371	May cause damage to organs	STOT SE	2	Ind. 10%	HP 5
H372	Causes damage to organs	STOT RE	1	Ind. 1%	HP 5
H373	May cause damage to organs	STOT RE	2	Ind. 10%	HP 5
H400	Very toxic to aquatic life.	Aquatic Acute	1	See Appendix C14	HP 14
H410	Very toxic to aquatic life with long lasting effects.	Aquatic Chronic	1	See Appendix C14	HP 14
H411	Toxic to aquatic life with long lasting effects.	Aquatic Chronic	2	See Appendix C14	HP 14
H412	Harmful to aquatic life with long lasting effects.	Aquatic Chronic	3	See Appendix C14	HP 14
H413	May cause long lasting harmful effects to aquatic life.	Aquatic Chronic	4	See Appendix C14	HP 14
H420	Harms public health and the environment by destroying ozone in the upper atmosphere	Ozone	1	See Appendix C14	HP 14
EUH 001(3)	Explosive when dry.	n/a	n/a	See Appendix C15	HP 15
EUH 006(3)	Explosive with or without contact with air.	n/a	n/a	n/a	n/a
EUH 014(3)	Reacts violently with water.	n/a	n/a	n/a	n/a
EUH 018(3)	In use may form flammable/explosive vapour-air mixture.	n/a	n/a	n/a	n/a
EUH 019(3)	May form explosive peroxides.	n/a	n/a	See Appendix C15	HP 15
EUH 029(3)	Contact with water liberates toxic gas.	n/a	n/a	See Appendix C12	HP 12

Hazard statement	Description	Hazard Class and Category In the MCL to the GB CLP		Threshold[2]	Hazardous Property
EUH 031[(3)]	Contact with acids liberates toxic gas.	n/a	n/a	See Appendix C12	HP 12
EUH 032[(3)]	Contact with acids liberates very toxic gas.	n/a	n/a	See Appendix C12	HP 12
EUH 044[(3)]	Risk of explosion if heated under confinement.	n/a	n/a	See Appendix C15	HP 15
(EUH 059)	Replaced by H420	See H420	See H420	See H420	HP 14
EUH 066[(3)]	Repeated exposure may cause skin dryness or cracking.	n/a	n/a	n/a	n/a
EUH 070[(3)]	Toxic by eye contact.	n/a	n/a	n/a	n/a
EUH 071[(3)]	Corrosive to the respiratory tract.	n/a	n/a	n/a	n/a

Notes:

1: H260 and H260 may be accompanied by the letter D, d, F, f, or a combination thereof. The letters do not alter the hazardous waste assessment.

2: Thresholds indicate either

- Ind. X%, where '*Ind.*' means that the concentration of the individual hazardous substance is compared to the threshold
- Sum (X%), where '*Sum*' means that the concentration of all hazardous substances with that hazard statement (and where relevant, hazard category) are added together to compare to the threshold.
- Reference to Appendix C, means refer to appendix C of this document for additional information. This be because:
  - (i) A test of the waste is required
  - (ii) A calculation is required, or
  - (iii) The concentration of substances with more than one hazard statement are added together to compare to a threshold

3: 'EUH' hazard statements are additional hazard statements listed in the Labelling section of MCL to the GB CLP. They are only assigned to a substance that already has another hazard statement code. A waste that contains a substance with an additional hazard statement code has additional handling risks that need to be identified, even if they are not considered for waste classification purposes.

Physical Hazards (HP1, HP2 and HP3) and concentration effects - The hazard class, category and statement codes assigned to a substance normally relate to the substance in its pure (100%) form. If a substance is not pure or is present as a component of a mixture the same physical hazards may not apply. As an example, ethanol is classified as Flam. Liq. 2: H225, which indicates that at 100% concentration it will have a flashpoint less than 23°C . However, an aqueous waste containing 4% w/w ethanol, will have a flashpoint greater than 60°C, and so will not display hazardous property HP 3 "Flammable". Where liquid wastes are concerned a flashpoint determination is probably appropriate to identify whether the waste is flammable or not.

Table 2.2 | Hazard pictograms, hazard classes, and hazardous properties

Pictogram	Physical hazard classes	Hazardous properties
	Unstable explosives	HP1 Explosive
	Explosives, divisions 1.1, 1.2, 1.3, 1.4	
	Self-reactive substances and mixtures, types A, B	
	Organic peroxides, types A, B	
	Oxidizing gases, category 1	HP 2 Oxidising
	Oxidizing liquids, categories 1, 2, 3	
	Oxidizing solids, categories 1, 2,	
	Flammable gases, category 1	HP 3 Flammable
	Flammable aerosols, categories 1, 2	
	Flammable liquids, categories 1, 2, 3	
	Flammable solids, categories 1, 2	
	Self-reactive substances and mixtures, types B, C, D, E, F	
	Pyrophoric liquids, category 1	
	Pyrophoric solids, category 1	
	Self-heating substances and mixtures, categories 1, 2	
	Substances and mixtures, which in contact with water, emit flammable gases, categories 1, 2, 3	
	Organic peroxides, types B, C, D, E, F	
No pictogram	Explosive, division 1.5	HP 15
	Explosive, division 1.6	Not applicable
	Flammable gas, category 2	HP 3 Flammable
	Self-reactive substances and mixtures, type G	Not applicable
	Organic peroxides, type G	Not applicable
	Compressed gases	No hazardous property
	Liquefied gases	
	Refrigerated liquefied gases	
	Dissolved gases	

Pictogram	Human health hazard classes	Hazardous properties
	Skin corrosion, category 1A	HP 4 Irritant HP 8 Corrosive
	Skin corrosion, categories 1B and 1C	HP 8 Corrosive
	Serious eye damage, category 1	HP 4 Irritant
	Corrosive to metals	Not applicable
	Acute toxicity (oral, dermal, inhalation), categories 1, 2, 3	HP 6 Acute Toxicity
	Respiratory sensitization, category 1	HP 13 Sensitising
	Germ cell mutagenicity, categories 1A, 1B, 2	HP 11 Mutagenic
	Carcinogenicity, categories 1A, 1B, 2	HP 7 Carcinogenic
	Reproductive toxicity, categories 1A, 1B, 2	HP 10 Toxic for reproduction
	Specific target organ toxicity following single exposure, categories 1, 2	HP 5 Specific Target Organ Toxicity / Aspiration Toxicity
	Specific target organ toxicity following repeated exposure, categories 1, 2	
	Aspiration hazard, categories 1, 2	
	Acute toxicity (oral, dermal, inhalation), category 4	HP 6 Acute Toxicity
	Skin irritation, categories 2, 3	HP 4 Irritant
	Eye irritation, category 2	
	Skin sensitization, category 1	HP 13 Sensitising
	Specific target organ toxicity following single exposure, cat. 3 • Respiratory tract irritation • Narcotic effects	HP 5 Specific Target Organ Toxicity / Aspiration Toxicity
No pictogram	Acute toxicity (oral, dermal, inhalation), category 5	Not applicable
	Reproductive toxicity – effects on or via lactation	Not applicable
Not subject to chemical labelling requirements	Not applicable	HP 9 Infectious

Pictogram	Environmental hazard classes	Hazardous properties
	Hazardous to the aquatic environment – acute aquatic hazard, category 1	HP 14 Ecotoxic
	Hazardous to the aquatic environment – long-term aquatic hazard, category 1, 2	
	Hazardous to the ozone layer	HP 14 Ecotoxic
No pictogram	Hazardous to the aquatic environment – acute aquatic hazard, categories 2, 3.	HP 14 Ecotoxic
	Hazardous to the aquatic environment – long-term aquatic hazard, categories 3, 4	HP 14 Ecotoxic

Further guidance on assessment

This chapter provides further guidance and examples to show how waste classification and assessment is applied to

1. Construction and demolition wastes containing asbestos
2. Waste containing coal tar
3. Waste soils
4. Waste oils and other wastes containing or contaminated with oil
   (a) Waste oils
   (b) and other wastes containing or contaminated with oil

1. Construction and demolition wastes containing asbestos

Asbestos is a naturally occurring silicate mineral and exists in a number of chemical types – for example **chrysotile** ('white'), **amosite** ('brown') and **crocidolite** ('blue') – either in a bonded or fibrous form. The fibres are very fine, less than 3 microns in diameter and respirable into the lung passageways where they can lodge indefinitely and penetrate tissue.

All forms of asbestos are classified the same way in the Mandatory Classification List (MCL) under the GB CLP Regulation:

- Carc. Cat 1A; H350, and
- STOT RE1; H372**

The assessment of asbestos containing waste considers both the presence of asbestos as

- fibres that are free and dispersed, and
- identifiable pieces of asbestos containing material

If the waste contains fibres that are free and dispersed then the waste will be hazardous if the waste as a whole contains 0.1% or more asbestos.

If the waste contains any identifiable pieces of suspected asbestos containing material they must be assessed as set out below. This would also apply to any dispersed fibres produced by deliberately breaking up such identifiable pieces.

Where the waste contains identifiable pieces of asbestos containing material (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then these pieces must be assessed separately. The waste is hazardous if the concentration of asbestos in the piece of asbestos containing material is 0.1% or more. The waste is regarded as a mixed waste and classified accordingly (see example 1 for advice on how to apply list of waste codes to mixed waste). The following codes should be assigned to the asbestos waste as appropriate:

- 17 06 05* Construction material containing asbestos MH
- 17 06 01* Insulation material containing asbestos MH

17 06 05* would normally be used in preference to 17 06 01* for the asbestos in asbestos contaminated soil and stones.

2. Waste containing coal tar

This example provides guidance on the classification of road asphalt waste containing coal tar (AWCCT) and other construction and demolition wastes containing coal tar and related materials.

This does not apply to wastes where coal tar is known not to be present.

•

Coal tar and many coal tar distillates are potentially carcinogenic hazardous substances. If the concentration of such materials is at or above 0.1% the waste would possess the hazardous property HP 7 carcinogenic.

Coal tar is complex mix of hydrocarbon compounds which have to be added to together to determine the concentration of coal tar. Therefore the 0.1% concentration must be applied to all fractions of the coal tar. Assessments based on PAH's alone are not consistent with the legislation and cannot be used to classify a waste as non-hazardous.

However, if the concentration of coal tar is known, the MCL under the GB CLP uses benzo[a]pyrene (BaP) as a marker compound for carcinogenicity for certain coal tar entries. Where the concentration of BaP is less than 0.005% of the concentration of the coal tar (rather than in the waste as a whole), the coal tar is not carcinogenic and does not need to be considered for HP7.

'Black top' (road surface) waste

The following applies only to Asphalt material classified in the List of Wastes as

- 17 03 01* bituminous mixtures containing coal tar
- 17 03 02 bituminous mixtures other than those mentioned in 17 03 01

Where the concentration of benzo[a]pyrene is at or above 50 ppm (mg/kg) in the black top alone (excluding other material) then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material to be hazardous and thus coded 17 03 01*.

Any sampling of black top would need to ensure that layers with different concentrations of benzo[a]pyrene are identified and sampled.

3. Waste soil

This example provides guidance on the classification of waste soil. It does not apply if the soil is not waste. See examples 1,2 and 4(b) for further advice on asbestos, coal tar and oil contamination.

The List of Waste contains two entries for soil excavated from contaminated sites:

17 05 03*	soil and stones containing hazardous substances	MH
17 05 04	soil and stones other than those mentioned in 17 05 03	MN

As these two entries are "mirrors" an assessment is required to determine which code is appropriate and therefore whether the waste is hazardous or non-hazardous.

In this example the following process has been followed (the necessary steps in any instance would have to reflect on the site specific circumstances):

- a desk survey has been carried out which has identified past uses of the site – in this case it is assumed that it was used for a variety of industrial processes including chemical metal plating
- a ground sampling plan was developed including both surface and sub-surface sampling. This included a preliminary sampling exercise to inform a more expansive sampling plan
- following analysis of the samples an environmental / human health risk assessment identified areas of the site that require remediation or soil removal
- waste soil was classified as one or subpopulations based on the characteristics of their contamination (e.g. "hotspots"). Each subpopulation was assessed separately for hazardous waste purposes
- subpopulations were excavated and stockpiled separately ensuring that only the minimum amount of incidental less contaminated material was removed. The incidental material was not considered in the assessment. Mixing of hazardous waste with other material is prohibited, and producers have a duty to separate mixed waste.
- all information relating to the site investigation was retained and passed to subsequent holders of waste.

The assessment of such waste requires multiple samples (See Appendix D for further information). To simplify presentation of this example, only one is included here.

This example follows, and should be applied in accordance with, the waste classification and assessment methodology set out in Chapter 2 of this document. Notes refer to text within the steps below.

Key point: Landfill WAC analysis (specifically leaching test results) must **not** be used for waste classification and hazardous waste assessment purposes.

This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Assessment

Table 3.3 provides the following information:

- the determinands that samples were analysed for (which should reflect contamination at the site), and their reporting units
- the analytical results obtained
- the worst case compound used for the assessment (see explanatory notes at the end of this example) (note the general compound entry for Arsenic in the MCL under the GB CLP should not be used for worst case)
- the concentration of the worst case compound calculated from the analytical results (see explanatory text in (see explanatory notes at the end of this example)
- the hazard statement codes assigned to this worst case compound, and the hazardous properties associated with them (see explanatory notes at the end of this example)

Assess the hazardous properties of the waste

From identification of the hazardous substances and their properties in Table 3.3 the following hazardous properties need to be considered;

- HP 3 Flammable
- HP 4 / HP 8: Irritant and Corrosive
- HP 5 Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity
- HP 6 Acute Toxicity
- HP 7 Carcinogenic
- HP 10 Toxic for Reproduction
- HP 11 Mutagenic
- HP 12 Produces Toxic gases in contact with water, air or acid
- HP 13 Sensitising
- HP 14 Ecotoxic

HP 3 Flammable : components of concern : TPH

- HP 3 (first and fourth indents) can be discounted as this is a solid waste without a free draining liquid phase.
- Advice from the laboratory indicated that testing for flammability was not appropriate due to the low level of TPH. The test would produce a negative result.
- The waste does not display these hazardous properties.
- If there was any uncertainty a test would be required.

Table 3.3 | **Results and elements used for subsequent assessment**

Determinand	Units	Result	"Worst Case" compound	% conc. of worst case	Hazard Class[2] and Category	Hazard Statement	Related Hazardous Property
Cyanide (total)	mg/kg	320	sodium cyanide.	0.06%	Acute Tox. 2 * Acute Tox. 1 Acute Tox. 2 * Aquatic Acute 1 Aquatic Chronic 1	H330[3] H310 H300[3] H400 H410 EUH032	HP6 HP6 HP6 HP14 HP14 HP12
Arsenic	mg/kg	530	diarsenic trioxide	0.07%	Carc. 1A Acute Tox. 2 * Skin Corr. 1B Aquatic Acute 1 Aquatic Chronic 1	H350 H300[3] H314 H400 H410	HP7 HP6 HP8 HP14 HP14
Cadmium	mg/kg	782	cadmium carbonate	0.08% (Note 1)	Acute Tox. 4 * Acute Tox. 4 * Acute Tox. 4 * Aquatic Acute 1 Aquatic Chronic 1 Carc. 1B	H332[3] H312[3] H302[3] H400 H410 H350	HP6 HP6 HP6 HP14 HP14 HP 7
Copper	mg/kg	400	copper(I) oxide	0.05%	Acute Tox. 4 * Eye Dam. 1 Acute Tox. 4 Aquatic Acute 1 Aquatic Chronic 1	H302 H318 H332 H400 H410	HP6 HP4 HP6 HP14 HP14
Lead	mg/kg	1620	lead sulphate	0.16% (Note 1)	Repr. 1A Acute Tox. 4 * Acute Tox. 4 * STOT RE 2 * Aquatic Acute 1 Aquatic Chronic 1 (Carc. 2)	H360Df H332[3] H302[3] H373**[3] H400 H410 (H351)[4]	HP10 HP6 HP6 HP5 HP14 HP14 HP7
Nickel	mg/kg	297	nickel carbonate	0.06%	Carc. 1A Muta. 2 Repr. 1B STOT RE 1 Acute Tox. 4 * Acute Tox. 4 * Skin Irrit. 2 Resp. Sens. 1 Skin Sens. 1 Aquatic Acute 1	H350i H341 H360D*** H372** H332[3] H302[3] H315 H334 H317 H400	HP7 HP11 HP10 HP5 HP6 HP6 HP4 HP13 HP13 HP14
Zinc	mg/kg	1446	zinc oxide	0.18%	Aquatic Acute 1 Aquatic Chronic 1	H400 H410	HP14 HP14
Total Petroleum Hydrocarbons (TPH)	mg/kg	12500		1.25%	Asp. Tox 1 STOT RE2 Muta. 1B Carc. 1B Repr. 2 Aquatic Chronic 2 (Flammable?)	H304 H373 H340 H350 H361d H411 (?)	HP5 HP5 HP11 HP7 HP10 HP14 HP 3
Benzo[a]pyrene (BaP)	mg/kg	0.23					
pH		8.7					

Supporting Notes for Table 3.3:

1. Asbestos, Antimony, Barium, Hexavalent Chromium, Mercury, Molybdenum, PCBs, Selenium, PCB's and other Persistent Organic Pollutants were analysed for but were not detected in this sample.
2. The classification presented here are based on the MCL under the GB CLP. With the exception of note 4 below, and to simplify this example, we have not attempted identify any additional properties of the compounds listed. This would need to be done, as explained in Appendix B, to classify a waste soil.
3. Acute Tox. And STOT hazard classes marked with a '*' are minimum classifications. The actual classification may be more severe and needs to be determined. For illustrative purposes, to simplify this example, we have not done so here.
4. Inorganic lead compounds are classified as carcinogenic by IARC. The carcinogenic classification of these compounds needs to be determined in accordance with Appendix B. H351 have been used here for illustrative purposes only.
5. Lead sulphate and sodium cyanide are classified under MCL group entries.
6. The entries from cadmium and lead are also qualified by Note 1, which enables the use of metal cation concentration for the assessment.

Analytical results and use of moisture in adjusting concentrations

The laboratory may report results as "dry weight" or similar. The hazardous waste classification uses concentrations of substances in the waste. Dry weight need be converted to actual concentrations. Check with the laboratory before doing so, as laboratories may report moisture in different ways.

Chemical Speciation and worst case compounds

Waste classification and assessment of hazardous waste normally needs the hazardous substances present to be identified. In this example the initial analysis has identified certain cations and an anion but does not identify the precise compounds that are present. At this point there are two options:

- further analysis using other techniques (for example X-Ray Diffraction, XRD) to identity the compounds present. This can be expensive and needs minimum levels of substances for detection purposes, or
- use the initial analysis, knowledge of the properties of the soil in the particular case that may affect speciation. This includes information on the history of the site and likely contaminants associated with its use to determine the worst case compounds that could plausibly be associated with the waste soil at this site

Other data sources may provide further information on the types of contamination associated with certain industries, processes or materials. Compounds that are not consistent with site history and the analysis, or that have chemical properties that mean they cannot exist in the waste, can in some circumstances be discounted.

Due to the site/process specific variability of worst case compounds, 'generic' worst case compounds (and electronic tools and models that employ them) should not be used without first establishing that they are applicable to the specific waste in question. The worst case for Arsenic, for example, will normally be a Mandatory Classification under the GB CLP for specific oxide rather than the Manadatory group entry for those not specified elsewhere in the MCL.

As noted above we have chosen worst case compounds specific to this particular example and these should not be used for other contaminated soils without first establishing that they are applicable.

Concentration of worst case compound

An example of how a compound concentration is calculated is provided here for zinc oxide:

(i) Analysis indicates that 1446 mg/kg of zinc (0.14%) is present in the waste soil

(ii) The actual worst case zinc compound in the soil is suspected (in this case) to be zinc oxide. (ZnO)

(iii) The atomic weight of zinc is 65.4, and for oxygen is 16

(iv) The concentration of zinc oxide in the soil is therefore

$$\frac{(65.4 + 16)}{65.4} \times 1446 = 1800.0 \text{ mg/kg } (0.18\%)$$

Where the compound is assigned Note 1 in the MCL under the GB CLP the metal cation concentration can be used directly, without determining the concentration of the compound.

HP 4 Irritant / HP 8 Corrosive: components of concern: diarsenic trioxide, copper (1) oxide and nickel carbonate.

These are additive hazardous properties. The concentrations of different compounds with certain hazard statement codes are added together as explained in Appendices C4 and C8.

The assessment below indicates that hazardous properties HP 4 Irritant and HP 8 Corrosive do not apply to this waste when known components were concerned.

Although much of the composition of the waste remains unknown, as the pH is <11.5, the acid/alkali reserve and in vitro tests are not considered.

Hazards	Hazard Statement Code	Hazardous Waste Concentration limit Limits	Substances to be considered	Conc.	Total	Assessment
HP8	Skin Corr. 1B H314	≥5% The concentrations of substances with H314 are additive	diarsenic trioxide	0.07% (below cut-off)	0.07%	Hazard does not apply
HP4	Skin Irrit. 2 H315	≥20% The concentrations of substances with H315 and H319 are additive.	nickel carbonate	0.06% (below cut-off)	0.06%	Hazard does not apply
HP4	Eye Dam. 1 H318	≥10% The concentrations of substances with H318 are additive	copper(I) oxide	0.05% (below cut-off)	0.05%	Hazard does not apply

HP 5 Specific Target Organ Toxicity / Aspiration Toxicity : components of concern: nickel carbonate, lead sulphate, TPH

This assessment of STOT uses individual substance concentrations.

- The individual concentration of each H372 substance (nickel carbonate, 0.06%) is less that the 1% concentration limit for HP 5
- The individual concentration of each H373 substance (lead sulphate, 0.16%) is less than the 10% concentration limit for HP 5 (see note 3 in the supporting notes to Table 3.3 above)

Aspiration Toxicity is additive hazardous property. The concentration of different compounds with certain hazard statement codes are added together as explained in Appendix C5.

- The total concentration of H304 substances (TPH, 1.25%) is less than the 10% concentration limit for HP 5.
- The waste does not display the hazardous property HP 5.

HP 6 Acute Toxicity: components of concern: sodium cyanide, nickel carbonate, lead sulphate, cadmium carbonate, copper (I) oxide, diarsenic trioxide

This is an additive hazardous property. The concentration of different compounds with certain hazard statement codes are added together according to the procedures explained in Appendix C6.

See note 3 in the supporting note to table 3.3.

- The cut-off (the level below which a substance can be excluded from the assessment) is however applied to each substance before this addition takes place. Therefore, in this example:Sodium cyanide is below the 0.1% cut off for H300, H310 and H330.
- Diarsenic trioxide is below the 0.1% cut off for H300
- Nickel carbonate is below the 1% cut off for H302 and H332
- Cadmium carbonate is below the 1% cut off for H302, H312 and H332
- Lead sulphate is below the 1% cut off for H302 and H332
- Copper (I) oxide is below the 1% cut of for H302 and H332
- The waste does not display the hazardous property HP 6

HP 7 Carcinogenic: components of concern: nickel carbonate, lead sulphate, diarsenic trioxide, cadmium carbonate, TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit.

- Diarsenic trioxide at 0.07% is below the 0.1% concentration limit for HP 7 (H350)
- Nickel carbonate at 0.06% is below the 0.1% concentration limit for HP 7(H350)
- Cadmium carbonate is subject to Note 1, which means the concentration of cadmium alone is used. The concentration of cadmium at 0.08% is below the 0.1% concentration limit for HP 7 (H350).
- Lead sulphate is also subject to Note 1. The concentration of lead at 0.16% is below the 1% concentration limit for HP 7 (H351). Read note 4 to table 3.3.
- The laboratory has confirmed that the hydrocarbon profile is inconsistent with the oil being diesel or weathered diesel. TPH at 1.25% is present above the 0.1% concentration limit for HP 7 (and HP 11) (H350 and H340). So were considered further using marker compounds.

  If the concentration of Benzo-a-pyrene (BaP) is less than 0.01% of the concentration of TPH, the oil is not carcinogenic or mutagenic. The TPH concentration is 12500 mg/kg so the BaP concentration limit is 1.25 mg/kg (0.01% of the TPH). The BaP concentration is less than this, at 0.23 mg/kg, so the oil is not carcinogenic or mutagenic.
- The waste does not display the hazardous property HP 7 Carcinogenic.

Note on Oil contamination and TPH:

- In most circumstances the oil contaminating soil and stones should be assessed as an 'unknown oil' as set out in Example 3.
- Oils may contain a range of hydrocarbons, so the presence of Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils.
- Therefore contaminating oil must not be assessed as diesel, unless it is **known** that this is the case (for example: if there is a documented site record of a spill of diesel relating to the specific hotspot where the sample was taken, or the laboratory analysis produces a hydrocarbon profile consistent with diesel or weathered diesel being the contaminating oil).

HP 10 Toxic for reproduction; components of concern: Lead, Nickel carbonate, and TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit.

- Lead at 0.16% is below the 0.3% concentration limit for HP 10 (H360)
- Nickel carbonate at 0.06% is below the 0.3% concentration limit for HP10(H360)
- The TPH concentration is below the 3% concentration limit for HP 10 (H361).
- The waste does not display the hazardous property HP 10 Toxic for reproduction.

HP 11 Mutagenic : components of concern : Nickel carbonate, TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit concentrations.

- Nickel carbonate at 0.06% is below the 1% concentration limit for HP 11 (H341)
- See HP 7 for information on TPH
- The waste does not display the hazardous property HP 11 Mutagenic.

HP 12 Produces toxic gases in contact with water, air or acid: components of concern : sodium cyanide

- The concentration of sodium cyanide (EUH032) is less than the 0.2% concentration limit calculated in Appendix C12
- The waste does not display the hazardous property HP12 Produces toxic gases in contact with water, air or acid.

HP 13 Sensitising : components of concern : Nickel carbonate

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit concentrations.

- Nickel carbonate at 0.06% is below the 10% concentration limit for HP 13 (H317 and H334)
- The waste does not display the hazardous property HP 13 Sensitising.

HP 14 Ecotoxic: Components of concern: Sodium cyanide, Diarsenic trioxide, Cadmium carbonate, Copper (I)oxide, Lead sulphate, Nickel carbonate, Zinc Oxide, and TPH

This follows the calculation method using hazard statements as set out in Appendix C14 of WM3. The risk phrase method could be used as an alternative.

Step 1 – The waste is not a manufactured product so this does not apply.

Step 5 : the waste contains 7 metal compounds with H400 and H410 and TPH with H411 hazard statements.

Applying the generic cut-off values (Table 14.2) only Lead Sulphate, Zinc Oxide and TPH need to be considered further.

Substance	Concentration	Hazard Statements
Lead Sulphate	0.16% (Note 1)	H400, H410
Zinc Oxide	0.18%	H400, H410
TPH	1.25%	H411

Step 6 – Applying equations 2 to 4 in order equation 3 indicates that the waste possesses hazardous property HP 14 (see below).

- Equation 2 (0.16% +0.18%) = 0.34% is less than 25%
- Equation 3 (100 x 0.16%) + (100 x 0.18%) + (10 x 1.25%) = 46.5% which is greater than 25%
- As Equation 3 has shown the waste to be Ecotoxic Equation 4 is not required

Summary

The concentration limit value was exceeded for the hazardous property HP 14

Ecotoxic. The waste is therefore classified under the EWC code 17 05 03*, and is a

hazardous waste.

Note: If landfill is identified as the disposal route for this waste then further analysis may be required to ensure that the material meets the waste acceptance criteria (WAC) for hazardous landfill.

4. Waste oils and other wastes containing or contaminated with oil

This example applies to waste oils and any waste containing or contaminated with oil.
It does not apply to edible oils (e.g. 20 01 25), or to pure biodiesel (i.e. biodiesel that is known not to be blended or contaminated with conventional fuel). Biodiesel means vegetable oil or animal fat based diesel fuel consisting of long chain alkyl esters**.**

Introduction

The term 'Oil' covers many substances or mixtures including the broad use of mineral based fuels and lubricants, food or animal feeds and a range of other types. This example is focused upon mineral and hydrocarbon oils derived from petroleum resources. It is divided into two separate sections:

- Waste mineral oils (predominately oils, liquid fuels and lubricants, including synthetic oils and waste oil separator contents).
- Wastes, other than waste oils, that contain or are contaminated with oil (i.e. where the oil phase is not the predominant substance).

You must use this procedure for two groups set out above. You must not use the procedure set out for other wastes.

Oils are complex mixtures of hydrocarbons. However many of these complex mixtures are classified as a hazardous substance in their own right. Assessment of waste oil must therefore be based on the concentration of the oil substances as a whole. Individual hydrocarbon components are not considered separately.

4(a) Waste mineral oils

All waste oils such as fuel oil, diesel, biodiesel, or lubricating oils, etc are legally classified as a hazardous waste, under absolute hazardous entries in the List of wastes. The only two exceptions to this rule are edible oil and in certain circumstances some biodiesel (see scope)

This rule applies to all types of oil regardless of composition, hazardous properties and source. **This means that even a waste oil possessing no hazardous properties must legally be classified as a hazardous waste.**

Waste oil entries can be found in the following chapters of the List of Wastes:

- Chapter 13 Oil Wastes and Wastes of Liquid Fuels (includes all entries)
- Sub-chapters 05 01 wastes from petroleum refining (entries referring to oil only)
- Sub-chapter 12 01 wastes from shaping and physical and mechanical surface treatment of metals and plastics (entries referring to oil only)
- The following specific wastes: 080319* disperse oil, 190207* oil and concentrates from separation, 190810* grease and oil mixture from oil/water separation other than those mentioned in 190809, and 200126* oil and fat other than those mentioned in 200125

Assessment of the hazardous properties of waste oil

The hazardous properties (if any) of the oil must be described on the consignment note to accompany its movement.

Often the most accessible and complete source of information on the chemical properties of a specific oil is a Safety Data Sheet. However you should check that these are UK REACH compliant, and are therefore based on the legal classification of the relevant petroleum group in a harmonised entry in the Classification and Labelling Inventory. Marker compounds are not considered in these circumstances.

If you do not have, and cannot obtain, a Safety Data Sheet then you should use the classification for that petroleum group. Note: mandatory entries for oils in the MCL under the GB CLP are typically

incomplete, in that Flammable, Toxic for Reproduction and Ecotoxic properties have not being considered. You will need to consider these in classifying the waste. Marker compounds applicable to the group may be considered in these circumstances. See section 3.3 of this example.

Waste oils are generally considered to display the following hazardous properties:

- HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity
- HP 7 Carcinogenic
- HP 14 Ecotoxic

Certain oils may also possess other hazardous properties, for example unleaded petrol (a mixture of gasoline and various additives) is typically HP 3, HP 4, HP 5, HP 7, HP 10, HP 11 and HP 14.

It is important when deciding on the waste's hazardous properties that you consider the chemical changes that could have occurred within the oil once it has been used and become waste.

4(b): other wastes containing or contaminated with oil

This example explains how to identify if wastes contaminated with oil display hazardous properties due to the presence of oil. Waste oils themselves are covered in 4(a).

This section considers only the oils contaminating a waste. Where the waste contains other hazardous substances, for example metal compounds or coal tar, these must also be considered. For hazardous properties that add concentrations of different hazardous substances together (for example HP 4, HP 5, and HP 14) the additive procedures from Appendix C must be applied in conjunction with the information below.

The assessment of waste is made according to the procedure set out in chapter 2 of this document. This section provides advice on the assessment of hazardous properties, and would for example determine whether a waste classified under a hazardous/non-hazardous mirror entry in the List of Wastes was hazardous or not due to the presence of oil contamination.

Figure 3.4 is provided to guide you through the criteria, and must be used in conjunction with the supporting text.

Is the identity of the contaminating oil known or can it be identified?

The simplest scenario is where the identity of the contaminating oil is known, **or** can be identified. If the oil is known the manufacturer's or supplier's UK REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment. Some examples are provided in Table 3.4

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Appendix B explains how to identify the classification of hazardous substances. All properties of the oil must be considered. Ecotoxic, Flammable, Mutagenic and Toxic for Reproduction may not be listed in the oil entries.

Diesel Range Organics (DRO) may be present in many oils. Their presence cannot be assumed to mean that diesel is the contaminating oil. However if the analysing laboratory reports that the hydrocarbon profile of the oil as a whole is consistent with diesel, or weathered diesel, then the oil should be considered to be diesel.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Table 3.4 | Example classifications of products from some petroleum groups

Petroleum Group							
Petrol (Gasoline)		**Diesel**		**Heavy/Residual Fuel Oils**		**Crude Oils**	
Flam. Liq 1	H224	Flam. Liq. 3	H226	Muta. 1B	H340	Flam. Liq, 2	H225
Skin Irrit.2	H315	Skin Irrit. 2	H315	Carc. 1B	H350	Carc. 1B	H350
Muta. 1B	H340	Acute Tox. 4	H332	Acute Tox. 4	H332	Eye Irrit. 2	H319
Carc. 1B	H350	Carc. 2	H351	Repr. 2	H361d	Asp.Tox. 1	H304
Repr. 2	H361d	Asp.Tox. 1	H304	STOT RE 2	H373	STOT RE2	H373
STOT SE3	H336	STOT RE 2	H373	Aquatic Chronic 2	H411	STOT SE3	H336
Asp. Tox.1	H304	Aquatic Chronic 2	H411			Aquatic Chronic 2	H411
Aquatic Chronic 2	H411						

If the identity of the oil is unknown and cannot be determined

This is likely to be the case with many wastes, and in particular with contaminated soil and stones. It is important however that all reasonable efforts are made to identify the oil.

For contaminated land specific consideration must be given to the following before proceeding;

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as, waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

Contaminating oil, other than diesel, should be assumed to display the following hazard statements associated with the hazardous properties indicated (unless the actual classification can be determined):

- (HP 3 Flammable)
- H304 & H373 (HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity),
- H340 (HP 11 Mutagenic)
- H350 (HP 7 Carcinogenic)
- H361d (HP 10 Toxic for Reproduction)
- H411 (or R51-53)(HP 14 Ecotoxic)

The assessment of the waste is based on the presence of oil. It considers each of these properties in turn using the Total Petroleum Hydrocarbons (TPH) (C_6 to C_{40}) concentration. The bullets below compare the concentration of TPH to the concentration limit concentrations set out in Appendix C for each hazardous property:

(i) If the concentration of TPH is ≥ 10% the waste will be HP 5* Specific Target Organ Toxicity (STOT)/Aspiration Toxicity

(ii) If the concentration of TPH is ≥ 3% the waste will be HP 10 toxic for reproduction.

(iii) If the concentration of TPH is ≥ 2.5% the waste will be HP 14* Ecotoxic.

(iv) If the concentration of TPH is ≥ 0.1% the waste will be HP 7 Carcinogenic **and** HP 11 Mutagenic unless the concentration of benzo-a-pyrene is <0.01% of the concentration of the TPH (this is explained in the following section)

Note '*': HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity and HP 14 Ecotoxic are additive properties. Where other hazardous substances, with hazard statement codes associated with those properties, are present the additive procedures in Appendices C5 and C14 must be followed.