Our Ref C4438/24/E/6787
27th August 2024

Jacob Smith
No.1, Taylor Fold,
Grange Moor,
Wakefield,
West Yorkshire
WF4 4FR

**For the attention of Jacob Smith**

Dear Jacob,

Ref: Plot 4 (No.1) Taylor Fold, Grange Moor – Validation of Soil and Gas.

Further to the most recent consultation issued by Kirklees Council, additional testing and gas monitoring has subsequently been completed to address the points raised by Environmental Health.

Numerous reports have been issued to Kirklees Council to discharge planning condition 9, which is in relation to validation for soil and ground gas. The following points were subsequently raised by Kirkless due to some ambiguities in relation to the soil validation reports and also the requirement for gas protection measures:

*(a) The plan* (in the Phase 4 Validation report) *does not show three trial pits and these do not appear to corroborate with the pictures in the letter submitted. We also have concerns that TP01 is in the boundary of Plot 5 (see application 2021/91364). Furthermore, we would expect a minimum of three samples to be sent for chemical analysis in this instance.*

*(b) We note that the report included the following statement, 'the builder and architect have confirmed that the service trenches have been backfilled with 20mm clean stone'. This does not confirm, to a high degree of confidence, that the service trenches have been electrical services to be laid in trenches of inert material. We require further evidence to confirm the validity of this statement.*

*(c) The report does not refer to the installation of any ground gas protection measures. Ground gas protection measures are required at Plot 4. As the information fails to evidence the installation of the agreed ground gas protection measures, it is unclear how we can accept the report as we do not consider the site suitable for the intended end-use until all agreed remediation measures have been implemented. Without further evidence of the installation of ground gas measures, it remains unclear whether the property has the necessary ground gas protection elements installed to protect the end-user.*

*(d) Given the heterogeneous nature of the made ground across the whole of the site relating to previous permission 2016/94041, and the previous results indicating the presence of combustible materials etc. We would expect combustion testing to take place to confirm that the soils placed are not combustible.*

The above points were included in Kirklees Council Consultation Response WK/202220173, dated 6th September 2022 in relation to planning reference 2022/91991.

In relation to point **a)**, having reviewed the site plan within the Phase 4 report J4080/17/E/V, dated 31.05.2022, the plan is simply wrong and mislabeled. Having subsequently visited the site myself, and having cross-referenced the photographs included within the Phase 4 report, the locations of TP01 and TP02 were mis-positioned on the site plan. by the RGS engineer The plan has been updated to show the correct locations of the trial pits, and the plan also includes the positions of all subsequent trial pit locations. It is noted that the report only included two contamination tests were completed and therefore a third contamination test was requested. This has been completed and is discussed below.

With regards to detail **b)**, the client has sourced photographs obtained during the groundworks phase to demonstrate how utilities have been installed. RGS are satisfied that the utilities have been installed in a clean inert material; see appended photographs.

Point **c)** has been discussed with Natalie Heaney (Environmental Health) on the phone and via email (last email dated 13th May 2024). Continuous gas monitoring and spot monitoring has been undertaken to re-evaluate the gas risk for the individual plot and assess the function of the measures installed. The results are presented and discussed below.

As per detail **d)**, combustibility testing has been undertaken on the bulk fill material below the clean cover system.

## Gas Protection Measures

It is understood that gas protection measures have been installed at the site, albeit a radon barrier (Visqueen Bloc 600) was installed rather than a barrier suitable for carbon dioxide and methane. Moreover, the opportunity to validate the installation of said measures has now expired as floors have been installed. As such, following discussions with the local authority, it was determined that the next course of action would be to complete internal gas monitoring within the new property to assess the potential gas risks now that the development is complete and occupied.

## Gas Monitoring – Spot Monitoring

As part of the monitoring process, the sub-floor void was monitored in order to determine whether bulk gases were accumulating beneath the properties. In each instance, an RGS engineer entered the sub-floor void with a ground gas monitor. A period of monitoring was undertaken, the results of which are summarised below:

**Table 1: Gas Monitoring**

| Location | Date | $CH_4$ (%) | $CO_2$ (%) | $O_2$ (%) | Flow (l/h) | Barometric Pressure (mb) | Comments |
|---|---|---|---|---|---|---|---|
| Plot 1 | 04.07.24 | 0.0 | 0.1 | 20.1 | 0.1 | 991 | Falling pressure |
| | 11.07.24 | 0.0 | 0.5 | 20.0 | 0.1 | 1012 | Steady pressure |

This work was undertaken using a Geotechnical Instruments (UK) Ltd. GA5000 (serial No G503524) which was last calibrated in April 2024.

## Gas Monitoring – Continuous Monitoring

Continuous gas monitoring was undertaken between the 20th June and 11th of July 2024. Throughout this period, the barometric pressure ranged between 991mb and 1018mb. The pressure trends for Leeds[1] reveal that a period of falling pressure was recorded on the 24th of June and 3rd of July 2024. In particular, the pressure dropped by approximately 15mb on the 24th of June. As such, a worst case condition is considered to have been captured during the monitoring period. It should be appreciated that the client was informed that all windows had to be closed throughout the monitoring period. Weekly visits were conducted by RGS and on each occasion, all windows were closed.

A MultiRAE Lite was placed within a room and the door closed; see appended plans and photographs for the position of the monitors. The monitor was placed in the front room (study/gym) from the 20th of June and switched to the downstairs toilet on the 4th July. The monitor was set up to detect concentrations of LEL (methane) and $CO_2$ at minute intervals. Full records can be issued upon request, but a summary of the results is issued below:

**Table 2: Continuous Gas Monitoring – Max and Min Values**

| Location | Value | $CH_4$ (ppm) | $CO_2$ (ppm) | Comments |
|---|---|---|---|---|
| Front Room | Max | 0.0 | 500 | Equivalent of 0.05% $CO_2$ |
| | Min | 0.0 | 200 | Equivalent of 0.02% $CO_2$ |
| Downstairs Toilet | Max | 0.0 | 400 | Equivalent of 0.04% $CO_2$ |
| | Min | 0.0 | 200 | Equivalent of 0.02% $CO_2$ |

## Discussion – Ground Gas

In view of Table 1 above, it is apparent that ground gases are not rising and accumulating in significant concentrations within the sub-floor voids. With reference to Table 2, the continuous gas monitoring has only detected up to 0.05% carbon dioxide within the buildings, which is anticipated to represent natural background levels.

As such, it considered that there is a low risk to end users and no further action is required.

## Garden Areas – Soil Contamination Testing

Two contamination tests were completed as part of the Phase 4 validation report. However, a third test was requested by Kirklees Council. A sample of topsoil was collected on the 11th July 2024; TP01 is identified on the appended plan.

[1] Sources: Weather Online; Leeds Bradford Airport Pressure Trend [*online resource from https://www.weatheronline.co.uk/weather/maps/city?LANG*]

With respect to the results it should be appreciated that the soil organic matter (SOM) content for the samples tested was found to range between 4.9% and 17.0%. On this basis, it is considered that the screening values associated with 6% SOM should be adopted. These values have been derived in such a way as to adhere to the principles within the revised CLEA model and include the most current release of the SGVs. A list of subscribers is provided within the website[2] and these include many local authorities.

A comparison of the results of the testing, together with the data given above, can be found appended to this letter. These results indicate the following:

**Table 3: Summary of Contaminated Areas**

| Location | Depth (m) | Contaminants found to be exceeding SSVs (Residential with plant uptake) |
|---|---|---|
| Sample 1 (TP01 May 2022) | - | None. |
| Sample 2 (TP01 May 2022) | - | None. |
| TP01 July 2024 | 0.0 – 0.2 | PAHs (benzo(g,h,i)perylene) |

Concentrations of chromium$^{VI}$, free cyanide and select PAHs were below the detection limits for the tests. Detectable levels of all other contaminants were recorded, but these fell below the associated Atrisk Soil Screening Values. In addition, no asbestos was detected within the soils samples tested.

It should be appreciated that the soil screening values for PAHs and TPHs (where appropriate) represents vapour saturation limits. The inhalation of vapour pathway contributes less than 10% of total exposure, which is unlikely to significantly affect the combined assessment criterion[3]. In view of this, the ATRISK soil SSVs notes that the users may wish to consider using a combined assessment criterion if free product is not observed, the values for which are also provided on the summary of contamination analysis. It is therefore considered that the criteria for no free product should be adopted for the PAHs and TPHs at this site. The results of the contaminants found to exceed these screening values are tabulated below:

**Table 4: Summary of Areas Contaminated by PAHs & TPHs**

| Location | Depth (m) | Contaminants found to be exceeding SSVs (Residential with Plant Uptake) |
|---|---|---|
| Sample 1 (TP01 May 2022) | - | None |
| Sample 2 (TP01 May 2022) | - | None |
| TP01 July 2024 | 0.0 – 0.2 | None |

On the basis of the above information, the results of the investigation have concluded that the soils are suitable for the intended residential end use.

[2] http://www.atrisksoil.co.uk/pages/general/subscribers.asp
[3] Ref: ATRISK soil, SSVs derived using CLEA v1.071 for 6% SOM, Residential with home grown produce land use, 23.06.17.

In addition to the above, it should be appreciated that calorific testing was completed on the bulk fill material beneath the clean cover system. Select samples were subject to calorific testing:

- TP01 (July 2022) 0.8m - Calorific Value 1.8MJ/kg
- TP02 (July 2022) 0.7m - Calorific Value 2.0MJ/kg

Consideration of ICRCL Guidance Note 61/84[4] indicates that the calorific value (CV) of a material *seems to have been adopted largely because it is available and not because it is best suited.* The guidance goes on to state that *in general, however, it seems likely that materials whose CV's exceed 10MJ/kg are almost certainly combustible, while those with values below 2MJ/kg are unlikely to burn.*

In view of the above, the bulk material beneath the clean cover system is deemed suitable and is unlikely to spontaneously combust.

## Conclusions

It is considered that the site is at a low risk with regards to soil contamination and ground gas. Moreover, the points raised by Kirklees have been addressed and therefore it is determined that condition 9 can be discharged.

We trust that this information is of interest, clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

For and on behalf of Rogers Geotechnical Services Ltd,
Yours Faithfully

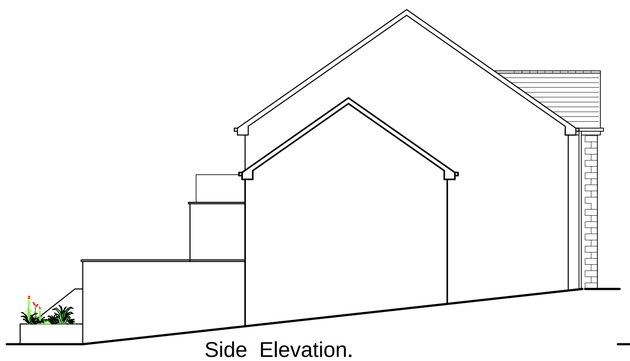
**Rob Palmer** MSC FGS ACIEH
Engineering Director

Appended

Site Plan.
Photos of Sub-floor Void.
Photos of Utility Installation.
Photos of Continuous Gas Monitoring.
Contamination Results.
Soil Screening Values Sheet.
Calibration Certificates for Gas Monitoring Equipment.

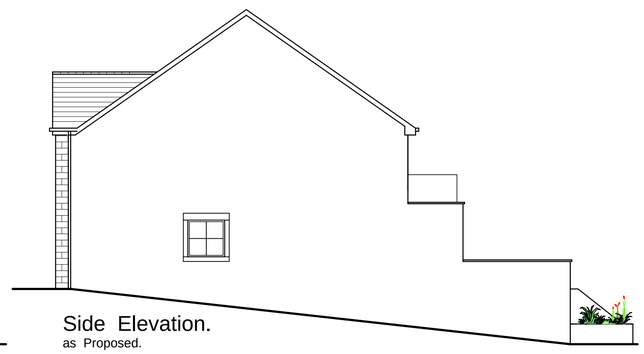
[4] ICRCL Guidance Note 61/84, second edition, July 1986, *Notes on fire hazards of contaminated land.*

Front Elevation.
as Proposed.

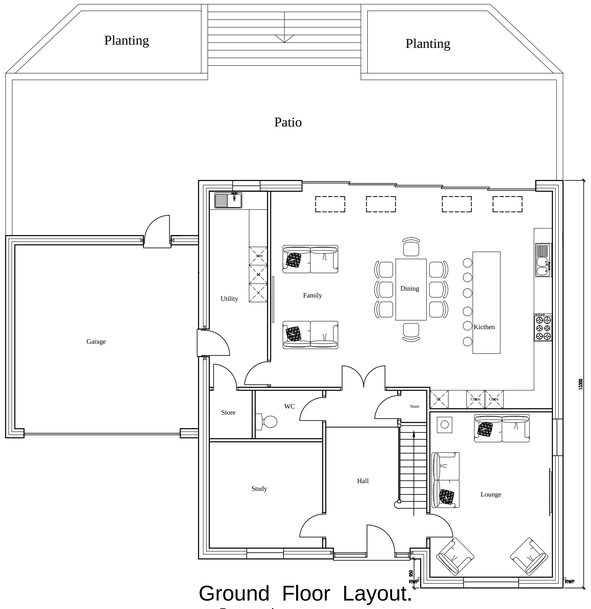


Side Elevation.
as Proposed.

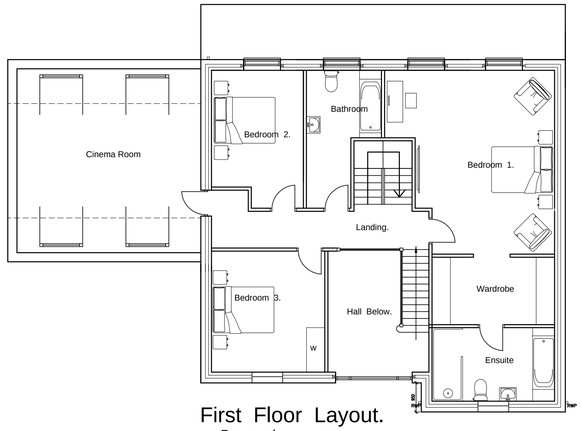
Rear Elevation.
as Proposed.



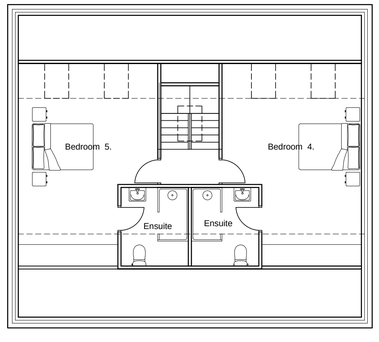
Side Elevation.
as Proposed.




Ground Floor Layout.
as Proposed.




First Floor Layout.
as Proposed.




Second Floor Layout.
as Proposed.

| REVISION | DATE | DESCRIPTION |
|---|---|---|
| | | |

NOTE TO CLIENT : BRICK & BLOCK ON SECTION FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT COUNT BRICKS & BLOCKS

Note to Client : These works will be subject to CDM Legislation
Note to client : If CIL applies,
Client must complete CIL form 6 commencement notice and send to council. Then within 6 months of finishing client must fill in form 7 part 2 and send to council
WARNING failure to do this may lead to CIL charges even if claimed exemption.

**Note to CONTRACTOR**

Check all dimensions prior to commencing works or ordering any materials Do not Scale

On no account are any works whatsoever including foundations to be undertaken outside the boundary of the site without the express permission of the adjoing owner

**Note to CLIENT**

It is your responsibility to check with the Statutory Authorities where all the services, particularly those outside the property are located, and to advise the Contractor accordingly, prior to accepting his quotation for the works Note, this may have both cost and safety issues

| APPROVAL | DATE | DRAWING | AUTHORITY | REFERENCE NO |
|---|---|---|---|---|
| Building Regulations | | | | |
| Planning Approval | | | | |
| Planning Submission | | | | |


Unit 2, The Office Campus, Paragon Business Park, Red Hall Court, Wakefield, WF1 2UY

CHARTERED ARCHITECTS NEIL BOWEN R.I.B.A.


Project Proposed alterations to plot 4 Liley Lane, Grange moor, Huddersfield for Mr Smith

01924 380873

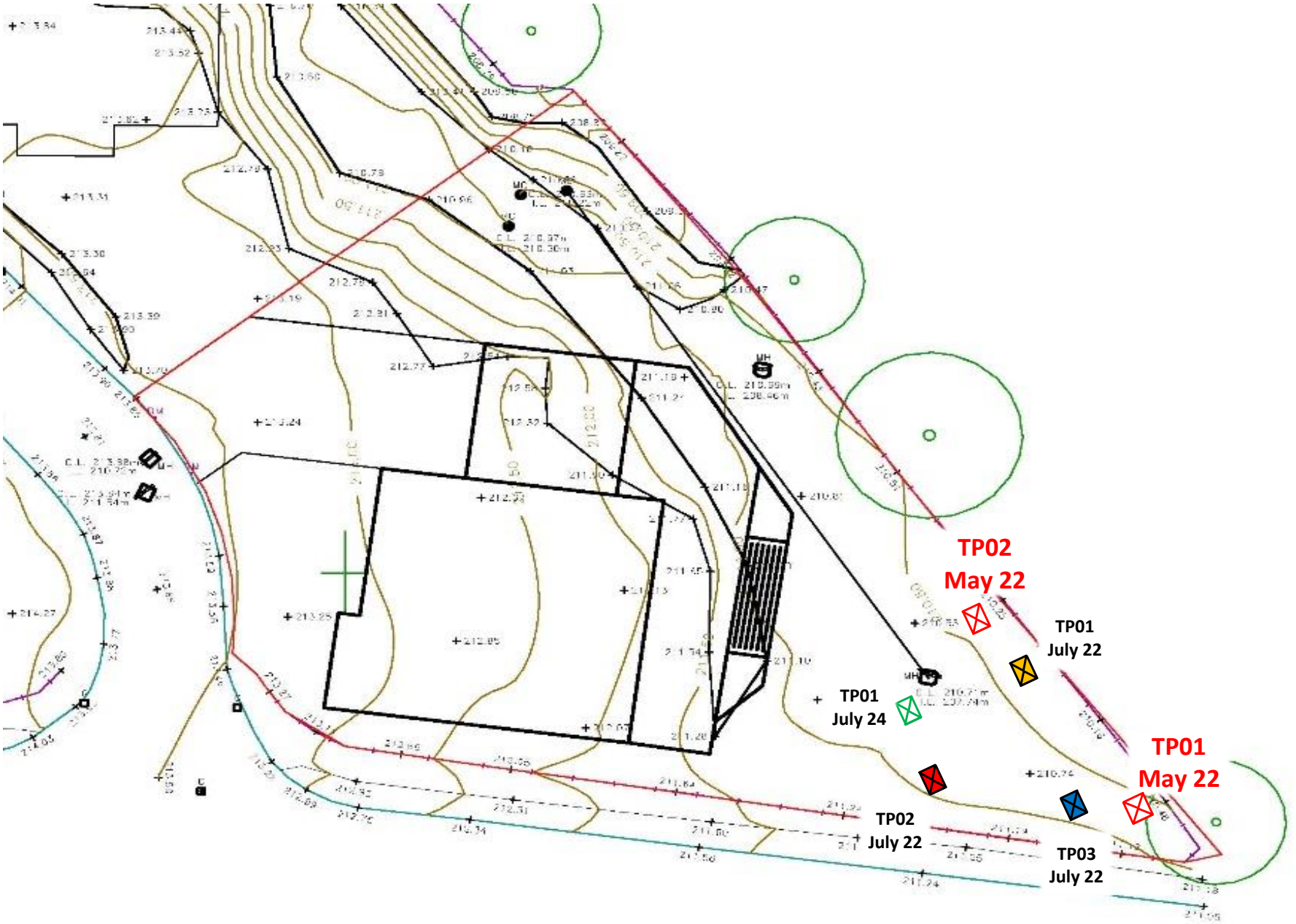
Date 06/03/2020

Drawing Plans and elevations

Drg No

A1

| F | Scale |
|---|---|
| 2219 | |
| R | 1:100 |
| 1 | |




**Notes:**

Investigation positions approximated from site operative's notes.

RGS Environmental Geotechnical Specialists

**Rogers Geotechnical Services Ltd**

Offices 1 & 2, Barncliffe Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

**Telephone:** 0843 50 66 87
**www.rogersgeotech.co.uk**

**Client:**

Jacob Smith

**Job Number:**

C4438/24/E

**Project Details:**

Plot 4 (No.1) Taylor Fold

**Scale:** Not to scale - reference only

# CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 20-Apr-2024

Certificate Number: G503524_2/35282

Issued by: QED Environmental Systems Inc.

***Customer:*** **QED ENVIRONMENTAL SYSTEMS LIMITED**
QED ENVIRONMENTAL SYSTEMS LTD CYAN PARK - UNIT 3 JIMMY HILL WAY COVENTRY, WEST MIDLA CV2 4QP GB

***Description:***

***Model:*** GA5000

***Serial Number:*** G503524

**Accredited Results:**

**Methane (CH4)**

| Certified Gas (%) | Instrument Reading (%) | Uncertainty (%) |
|---|---|---|
| 5.1 | 5.0 | 0.42 |
| 15.0 | 14.9 | 0.66 |
| 60.0 | 59.7 | 1.03 |

**Carbon Dioxide (CO2)**

| Certified Gas (%) | Instrument Reading (%) | Uncertainty (%) |
|---|---|---|
| 5.0 | 5.0 | 0.43 |
| 15.0 | 15.0 | 0.71 |
| 40.0 | 40.0 | 1.19 |

**Oxygen (O2)**

| Certified Gas (%) | Instrument Reading (%) | Uncertainty (%) |
|---|---|---|
| 20.9 | 21.0 | 0.25 |

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at: 31.2 °C/88.1 °F

O2 readings recorded at: 22.1 °C/71.7 °F

Barometric Pressure: 0987 mbar/29.15 "Hg

Method of Test : The analyzer is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure ISP17.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.

*The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.*



Calibration Instance: 118 IGC Instance: 118

# CERTIFICATION OF CALIBRATION

PJLA Calibration

No. 66916

QED™

Date Of Calibration: 20-Apr-2024

Certificate Number: G503524_2/35282

Issued by: QED Environmental Systems Inc.

**Non Accredited results:**

| Pressure Transducers (inches of water column) | | | | | |
|---|---|---|---|---|---|
| **Transducer** | **Certified (Low)** | **Reading (Low)** | **Certified (High)** | **Reading (High)** | **Accuracy** |
| Relative | 0" | 0" | 40" | 40.33" | 2.0" |

| Barometer (mbar) | |
|---|---|
| **Reference** | **Instrument Reading** |
| 0987 mbar / 29.15 "Hg | 0987 mbar / 29.16 "Hg |

As received gas check readings are only recorded if the instrument is received in a working condition. Where the instrument is received damaged no reading can be taken.

**Date of Issue :** 24 Apr 2024

Approved By Signatory

Linda Ostrowski

Laboratory Inspection





www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

# CALIBRATION CERTIFICATE | PASS

Test Performed On 18/06/2024 11:21:30

Visual Alarm --- Audible Alarm ---

| Product Name | Model Name | Serial Number | Firmware Version |
|---|---|---|---|
| MultiRAE Lite | MultiRAE Lite | M01C036681 | V1.54 |

| Next Cal Due | Next Bump Due |
|---|---|
| 18/07/2024 | --- |

| Location | Assigned User |
|---|---|
| --- | --- |

## Sensor Information

| Sensor | Serial Number | Status | Results | Next Cal Due | Due In |
|---|---|---|---|---|---|
| LEL | SC03110632UB | Enabled | Pass | 18/07/2024 | 6 Days |
| CO2 | SC03610064B6 | Enabled | Pass | 18/07/2024 | 6 Days |

## Fresh Air Calibration | PASS

| Sensor | Gas Result | Concentration | Before Cal | After Cal |
|---|---|---|---|---|
| LEL (%LEL) | Pass | 0.0 | 0.0 | 0.0 |
| CO2 (ppm) | --- | NA | NA | NA |

## Zero Calibration | PASS

| Sensor | Gas Result | Concentration | Before Cal | After Cal |
|---|---|---|---|---|
| LEL (%LEL) | --- | NA | NA | NA |
| CO2 (ppm) | Pass | NA | 8.0 | 1.0 |

## Span Calibration | PASS

| Sensor | Gas Result | Concentration | Before Cal | After Cal |
|---|---|---|---|---|
| LEL (%LEL) | Pass | NA | 62.0 | 57.0 |
| CO2 (ppm) | Pass | NA | 5199.0 | 5000.0 |

## Set Points

| Sensor | Low | High | STEL | TWA |
|---|---|---|---|---|
| LEL (%LEL) | 10.0 | 20.0 | --- | --- |
| CO2 (ppm) | 2000.0 | 5000.0 | 30000.0 | 5000.0 |

Honeywell | Safety Suite Device Configurator

Certificate Generated On 12/07/2024 09:12:45


Photo 1: Continuous gas monitor (top left). Placed on treadmill rest to keep out of reach of children. Door closed.

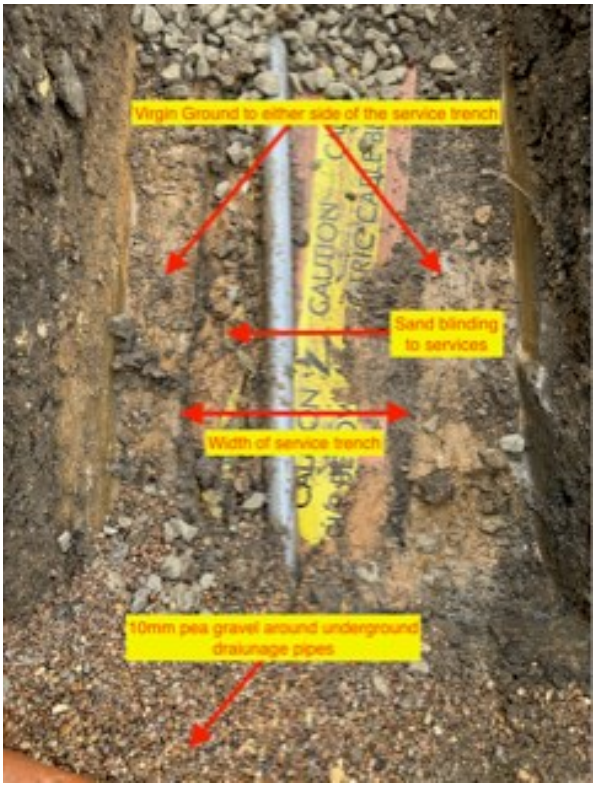

Photo 2: Spot monitor check on 4th July. Moved to downstairs toilet.

Photo 3: Continuous gas monitor (top centre). Placed on floor near toilet. Door closed and locked.

Photo 4: Sub-floor void.

Photo 5: Air-bricks in walls of the sub-floor void.

Photo 6: Sub-floor void. Distinct draught.





Client photos; utility installation in gravel surround.

Client photos; utility installation in gravel surround.

| | | | |
|---|---|---|---|
| RGS | Rogers Geotechnical Services Ltd | Project Name: **Plot 4, Taylor Fold** | Project Number: **C4438/24/E** |

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | | | |
|---|---|---|---|
| **Report No.:** | 22-37811-1 | | |
| **Initial Date of Issue:** | 06-Oct-2022 | | |
| **Client** | Rogers Geotechnical Services Ltd | | |
| **Client Address:** | Offices 1&2, Barncliffe Business Park<br>Near Bank<br>Shelley<br>Huddersfield<br>West Yorkshire<br>HD8 8LU | | |
| **Contact(s):** | Harry Letch | | |
| **Project** | J4080_17_E Springfield Mills | | |
| **Quotation No.:** | Q22-29026 | **Date Received:** | 04-Oct-2022 |
| **Order No.:** | | **Date Instructed:** | 04-Oct-2022 |
| **No. of Samples:** | 2 | | |
| **Turnaround (Wkdays):** | 5 | **Results Due:** | 10-Oct-2022 |
| **Date Approved:** | 06-Oct-2022 | | |
| **Approved By:** | | | |
| **Details:** | Stuart Henderson, Technical Manager | | |

# Results - Soil

**Project: J4080_17_E Springfield Mills**

| **Client: Rogers Geotechnical Services Ltd** | | **Chemtest Job No.:** | | | 22-37811 | 22-37811 |
|---|---|---|---|---|---|---|
| Quotation No.: Q22-29026 | | **Chemtest Sample ID.:** | | | 1517946 | 1517947 |
| Order No.: | | Client Sample Ref.: | | | D1 | D1 |
| | | Sample Location: | | | TP01 | TP02 |
| | | Sample Type: | | | SOIL | SOIL |
| | | Top Depth (m): | | | 0.80 | 0.70 |
| | | Date Sampled: | | | 30-Sep-2022 | 30-Sep-2022 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| Moisture | N | 2030 | % | 0.020 | 16 | 11 |
| Calorific Value | N | 2140 | MJ/kg | 0.10 | 1.8 | 2.0 |

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2140 | Calorific Value | Calorific Value | Bomb Calorimeter |

## Report Information

**Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

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

**Sample Retention and Disposal**

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

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

Rogers Geotechnical Services Ltd
Offices 1&2 Barncliffe Business Pk
Near Bank, Shelley
Huddersfield
West Yorkshire
HD8 8LU

**t:** 01484 604354

**e:** harry.letch@rogersgeotech.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

**t:** 01923 225404
**f:** 01923 237404
**e:** reception@i2analytical.com

# Analytical Report Number : 24-030895

| | | | |
|---|---|---|---|
| **Project / Site name:** | Taylor Fold | **Samples received on:** | 16/07/2024 |
| **Your job number:** | J4080 24 E | **Samples instructed on/ Analysis started on:** | 16/07/2024 |
| **Your order number:** | | **Analysis completed by:** | 22/07/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 22/07/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:** _____

Anna Goc
PL Head of Reporting Team
**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: 24-030895**
**Project / Site name: Taylor Fold**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 257946 |
| **Sample Reference** | | | | TP01 |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | 0.00 |
| **Date Sampled** | | | | 12/07/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 19 |
| Total mass of sample received | kg | 0.1 | NONE | 0.8 |

**Asbestos**

| | | | | |
|---|---|---|---|---|
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | IZJ |

**General Inorganics**

| | | | | |
|---|---|---|---|---|
| pH (L099) | pH Units | N/A | MCERTS | 7.8 |
| Free Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 43 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 21.5 |
| Organic Matter (automated) | % | 0.1 | MCERTS | 4.9 |

**Speciated PAHs**

| | | | | |
|---|---|---|---|---|
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | 0.06 |
| Fluorene | mg/kg | 0.05 | MCERTS | 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.78 |
| Anthracene | mg/kg | 0.05 | MCERTS | 0.15 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 1 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.92 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | 0.48 |
| Chrysene | mg/kg | 0.05 | MCERTS | 0.52 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | 0.72 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | 0.19 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | 0.5 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.24 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | 0.06 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | 0.28 |

**Total PAH**

| | | | | |
|---|---|---|---|---|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | 6 |

**Heavy Metals / Metalloids**

| | | | | |
|---|---|---|---|---|
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 15 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 26 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 25 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 56 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | 1.1 |
| Vanadium (aqua regia extractable) | mg/kg | 1 | MCERTS | 28 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 77 |

**Analytical Report Number: 24-030895**
**Project / Site name: Taylor Fold**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 257946 |
| **Sample Reference** | | | | TP01 |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | 0.00 |
| **Date Sampled** | | | | 12/07/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| **Petroleum Hydrocarbons** | | | | |
| TPH (EC10 - EC40) EH_CU_1D_TOTAL | mg/kg | 10 | MCERTS | 21 |

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

**Analytical Report Number : 24-030895**
**Project / Site name: Taylor Fold**

* 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 * |
|---|---|---|---|---|
| 257946 | TP01 | None Supplied | 0 | Brown loam and clay with gravel and vegetation |

**Analytical Report Number : 24-030895**
**Project / Site name: Taylor Fold**

**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 |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Organic matter (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method) | In-house method | L009B | D | MCERTS |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 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. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil | Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS | In-house method | L076B/L088 | D/W | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080 | W | MCERTS |
| Free cyanide in soil | Determination of free cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080 | W | MCERTS |

**Analytical Report Number : 24-030895**
**Project / Site name: Taylor Fold**

**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 |
|---|---|---|---|---|---|
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099 | 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).**
**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.**

## Information in Support of Analytical Results

### List of HWOL Acronyms and Operators

| Acronym | Descriptions |
|---|---|
| HS | Headspace Analysis |
| MS | Mass spectrometry |
| FID | Flame Ionisation Detector |
| GC | Gas Chromatography |
| EH | Extractable Hydrocarbons (i.e. everything extracted by the solvent(s)) |
| CU | Clean-up - e.g. by Florisil®, silica gel |
| 1D | GC - Single coil/column gas chromatography |
| 2D | GC-GC - Double coil/column gas chromatography |
| Total | Aliphatics & Aromatics |
| AL | Aliphatics |
| AR | Aromatics |
| #1 | EH_2D_Total but with humics mathematically subtracted |
| #2 | EH_2D_Total but with fatty acids mathematically subtracted |
| _ | Operator - underscore to separate acronyms (exception for +) |
| + | Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total |

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

# Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

| Rogers Geotechnical Services Ltd | | Soil Screening Value (SSV) Comparison Sheet |
|---|---|---|
| Job Number | J4080/17/E/V | A = WS Atkins PLC, Atrisk Soil Screening Values.<br>A+ = Values updated June 2017.<br>A* = Atrisk's SSV is lower than Chemtest's detectable limit for this compound.<br>B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report.<br>C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter.<br>D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a |
| Job Name | Plot 4 Liley Lane Grange Moor | |
| Date | 2022 & 2024 | |
| Client | Brittanica Construction | |

**KEY**
- Exceeds SSV
- Exceeds 2017, Below 2015
- Below limit of detection (LOD)

**KEY**
- Exceeds SSV
- Exceeds 2017, Below 20
- Below limit of detection

| Determinand | Units | Ref | LOD | Residential With Plant Uptake 6% | | Sample Location | Sample 1 | Sample 2 | | TP01 (2024) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Atrisk 2015 (No Free Product | Atrisk 2017 | Depth Top | 0 | 0 | | 0 | | | | |
| | | | | | | Depth Base | | | | 0.2 | | | | |
| Cadmium | mg/kg | C | 0.10 | | 22.1 | | 0.13 | 0.32 | | < 0.2 | | | | |
| Chromium (Hexavalent) | mg/kg | B/C | 0.5 | 20.5 | 3.62 | | < 0.50 | < 0.50 | | < 1.8 | | | | |
| Copper | mg/kg | A+ | 0.50 | | 4790 | | 12 | 17 | | 25 | | | | |
| Mercury | mg/kg | A/D | 0.10 | | 15.8 | | 0.05 | 0.05 | | < 0.3 | | | | |
| Nickel | mg/kg | A+ | 0.50 | | 136 | | 7.1 | 9.8 | | 14 | | | | |
| Lead | mg/kg | C | 0.50 | | 200 | | 25 | 35 | | 56 | | | | |
| Zinc | mg/kg | A+ | 0.50 | | 20300 | | 32 | 53 | | 77 | | | | |
| Vanadium | mg/kg | A+ | 5.0 | | 138 | | 12 | 17 | | 28 | | | | |
| Arsenic | mg/kg | C | 1.0 | | 37 | | 6.9 | 9.8 | | 15 | | | | |
| Selenium | mg/kg | A | 0.20 | | 375 | | 0.56 | 0.82 | | 1.1 | | | | |
| Cyanide (Free) | mg/kg | A | 0.50 | | 34 | | < 0.50 | < 0.50 | | < 1.0 | | | | |
| Total Phenols | mg/kg | A | 0.1 | | 1200 | | < 0.10 | < 0.10 | | | | | | |
| Naphthalene | mg/kg | A+ | 0.10 | 0 | 12.2 | | < 0.10 | < 0.10 | | < 0.10 | | | | |
| Acenaphthylene | mg/kg | | 0.10 | | | | < 0.10 | < 0.10 | | < 0.10 | | | | |
| Acenaphthene | mg/kg | A+ | 0.10 | 0 | 2760 | | < 0.10 | < 0.10 | | < 0.10 | | | | |
| Fluorene | mg/kg | A+ | 0.10 | 0 | 2610 | | < 0.10 | < 0.10 | | < 0.10 | | | | |
| Phenanthrene | mg/kg | | 0.10 | | | | < 0.10 | < 0.10 | | 0.78 | | | | |
| Anthracene | mg/kg | A+ | 0.10 | 0 | 26200 | | < 0.10 | < 0.10 | | 0.15 | | | | |
| Fluoranthene | mg/kg | A+ | 0.10 | | 2980 | | 0.76 | 0.74 | | 1 | | | | |
| Pyrene | mg/kg | A+ | 0.10 | | 2120 | | 0.74 | 0.77 | | 0.92 | | | | |
| Benzo[a]anthracene | mg/kg | A | 0.10 | 0 | 8.54 | | < 0.10 | 0.60 | | 0.48 | | | | |
| Chrysene | mg/kg | A | 0.10 | 927 | 2.64 | | < 0.10 | 0.90 | | 0.52 | | | | |
| Benzo[b]fluoranthene | mg/kg | A | 0.10 | 9.86 | 7.29 | | < 0.10 | < 0.10 | | 0.72 | | | | |
| Benzo[k]fluoranthene | mg/kg | A | 0.10 | 100 | 4.12 | | < 0.10 | < 0.10 | | 0.19 | | | | |
| Benzo[a]pyrene | mg/kg | B/C | 0.10 | 5 | 0.998 | | < 0.10 | < 0.10 | | 0.5 | | | | |
| Indeno(1,2,3-c,d)Pyrene | mg/kg | A* | 0.10 | 9.75 | 0.368 | | < 0.10 | < 0.10 | | 0.24 | | | | |
| Dibenz(a,h)Anthracene | mg/kg | A | 0.10 | 4.95 | 2.05 | | < 0.10 | < 0.10 | | 0.06 | | | | |
| Benzo[g,h,i]perylene | mg/kg | A | 0.10 | 103 | 0.112 | | < 0.10 | < 0.10 | | 0.28 | | | | |
| Total Of 16 PAH's | mg/kg | | 2.0 | | | | < 2.0 | 3.0 | | | | | | |
| Aliphatic TPH >C5-C6 | mg/kg | A+ | 1.0 | 0 | 369 | | < 1.0 | < 1.0 | | | | | | |

# Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

| Rogers Geotechnical Services Ltd | | Soil Screening Value (SSV) Comparison Sheet |
|---|---|---|
| Job Number | J4080/17/E/V | A = WS Atkins PLC, Atrisk Soil Screening Values.<br>A+ = Values updated June 2017.<br>A* = Atrisk's SSV is lower than Chemtest's detectable limit for this compound.<br>B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report.<br>C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter.<br>D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a |
| Job Name | Plot 4 Liley Lane Grange Moor | KEY<br>Exceeds SSV<br>Exceeds 2017, Below 2015<br>Below limit of detection (LOD) |
| Date | 2022 & 2024 | |
| Client | Brittanica Construction | |

KEY
Exceeds SSV
Exceeds 2017, Below 20
Below limit of detection

| Determinand | Units | Ref | LOD | Residential With Plant Uptake 6% | | Sample Location | Sample 1 | Sample 2 | | TP01 (2024) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Depth Top | 0 | 0 | | 0 | | | | |
| | | | | | | Depth Base | | | | 0.2 | | | | |
| Aliphatic TPH >C6-C8 | mg/kg | A+ | 1.0 | 1240 | 768 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C8-C10 | mg/kg | A+ | 1.0 | 0 | 204 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C10-C12 | mg/kg | A+ | 1.0 | 1180 | 297 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C12-C16 | mg/kg | A+ | 1.0 | 4130 | 125 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C16-C21 | mg/kg | A+ | 1.0 | | 210100 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C21-C35 | mg/kg | A+ | 1.0 | | 210100 | | < 1.0 | < 1.0 | | | | | | |
| Aliphatic TPH >C35-C44 | mg/kg | | 1.0 | | | | < 1.0 | < 1.0 | | | | | | |
| Total Aliphatic Hydrocarbons | mg/kg | | 5.0 | | | | < 5.0 | < 5.0 | | | | | | |
| Aromatic TPH >C5-C7 | mg/kg | A+ | 1.0 | | 0.871 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C7-C8 | mg/kg | A+ | 1.0 | 0 | 780 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C8-C10 | mg/kg | A+ | 1.0 | 0 | 232 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C10-C12 | mg/kg | A+ | 1.0 | 0 | 468 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C12-C16 | mg/kg | A+ | 1.0 | 830 | 830 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C16-C21 | mg/kg | A+ | 1.0 | | 1040 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C21-C35 | mg/kg | A+ | 1.0 | | 1710 | | < 1.0 | < 1.0 | | | | | | |
| Aromatic TPH >C35-C44 | mg/kg | | 1.0 | | | | < 1.0 | < 1.0 | | | | | | |
| Total Aromatic Hydrocarbons | mg/kg | | 5.0 | | | | < 5.0 | < 5.0 | | | | | | |
| Total Petroleum Hydrocarbons | mg/kg | | 10.0 | | | | < 10 | < 10 | | | | | | |
| pH | | | N/A | | | | **7.0** | 7.1 | | **7.8** | | | | |
| Sulphate (2:1 Water Soluble) as SO4 | g/l | | 0.010 | | | | **0.043** | **0.018** | | 0.021 | | | | |
| ACM Type | | | N/A | | | | - | - | | | | | | |
| Asbestos Identification | % | | 0.001 | | | | No Asbestos Detected | No Asbestos Detected | | No Asbestos Detected | | | | |
| ACM Detection Stage | | | N/A | | | | | | | | | | | |
| Moisture | % | | 0.020 | | | | 14 | 17 | | 19 | | | | |
| Soil Colour | | | N/A | | | | Black | Brown | | | | | | |
| Other Material | | | N/A | | | | None | Roots | | | | | | |
| Soil Texture | | | N/A | | | | Loam | Loam | | | | | | |
| Sulphate (Total) | % | | 0.010 | | | | 0.31 | 0.140 | | | | | | |
| Organic Matter | % | | 0.40 | | | | **17.0** | **4.8** | | 4.9 | | | | |