Elemental GI Ltd

Our Ref: E23180/STLR

Date: 3rd October 2023

**BY EMAIL:**
Adam Maine
Development Manager
GEDA Construction
9 High Street, Kegworth
Derbyshire
DE74 2DA

**For the attention of Mr. A. Maine**

Dear Adam,

**E23180: Summary of Recent Supplementary Environmental Investigation Works at Site off Fleet Road, Holbeach ('Phase 2' Area)**

Elemental GI Ltd were appointed by GEDA Construction of (hereafter referred to as 'the Client') to undertake selected supplementary / targeted assessment and ground investigation works at the above referenced site (hereafter referred to as 'the site'). This included the following:

- Review of ground gas monitoring records and classification;
- Supplementary testing / delineation of previously identified hotspots;
- Review and commentary on remedial options with regards to proposed future site levels for residential end-use.

This letter has been prepared on the understanding that the site is to undergo redevelopment to support residential housing. We have been supplied with a copy of the proposed layout plan (ref. 5366/KP/22/003 Rev. T4), and extracts of this plan are enclosed (Proposed Site Layout Plan (Drawing 001)).

This report has been prepared in accordance with our notes concerning the terms and conditions of these works and of our engagement, which are presented at the end of this report.

Should the development proposals alter, then the recommendations in this report may be subject to change. Whilst it may be utilised by others for reference purposes at the Client's discretion, it has not been prepared for any other purposes (e.g. waste classification etc.) and therefore additional works may be required by third parties dependent upon their own requirements / works.

Background

The subject site is situated to the south of Fleet Road, Holbeach (approx. grid ref. 537409, 324813) and currently supports a irregularly-shaped area of open ground. The subject site forms the second phase of the Client's development, with land immediately adjacent to the west supporting a nearly-completed residential development known as 'Phase 1'.

We have been supplied with copies of the following report by the Client for this site:

- Ground Engineering Ltd: Updated Ground Investigation Report, Phase 2 – Land off Fleet Road, Holbeach, Lincolnshire (Ref. C15929A dated September 2023).

The above referenced reports present detailed information relating to the site and to previous investigations and assessments. These reports have not been reproduced herein and should be referred to in full, and this letter must not be referred to in isolation.

Site Setting and Previous Works

The third party report (referenced above) provides a record of the site's geo-environmental setting. Relevant extracts are presented below.

*"The geological map for the area, sheet 144 at 1:50,000 scale, shows the site to be underlain by a thick succession of Terrington Beds, more recently identified as Tidal Flat Deposits. These silt and fine sand soils are indicated to rest on the solid geology of the Ampthill Clay Formation at depth. Fleet Road to the north of the site is indicated to be the location of the 'probable Saxon coastline'. Previous work in the vicinity has found a Marine Sand and in turn glacial Boulder Clay or 'Till' beneath the surface layer of Tidal Flat Deposits. Marine Sand was found to at least 15m depth on the adjacent Phase 1 area."*

*"Superficial Tidal Flat Deposits are recorded beneath the site, which are classified by the EA as an 'Unproductive' stratum. The underlying solid geology Ampthill Clay Formation is also classified by the EA as an 'Unproductive' stratum. The Marine Sand is likely to be classified as a 'Secondary' Aquifer. There are no groundwater abstractions within 250m of the site. The site is not within a source protection zone. Surface water drains are recorded along the southern and eastern field boundaries of the site. The site is within a Zone 2 and Zone 3 floodplain, and has a low risk of flooding. The site is within a SSSI impact zone, an environmentally sensitive area. Groundwater seepages were recorded as shallow as 0.90m below ground level during the investigation."*

The third party completed 2 No. 'deep' boreholes (designated BH1 and BH2) to a depth of 15m, alongside the excavation of 9 No. hand-dug / augered trial pits (designated HA1 to HA9) to a maximum depth of 1.10m. Gas and groundwater monitoring wells were installed in the boreholes and the consultant completed 4 No. return visits to site (between the 17th April and 14th June 2023) to monitor the gas and groundwater within these wells.

Reference should be made to the above referenced report for a full description and summary of their observations, works and findings.

Conceptual Site Model

The third party submitted 9 No. samples from soils at the site for laboratory analysis for a range of determinands including heavy metals and poly-aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH). They concluded the following with regards to the test results:

*"The results of the laboratory analysis indicate that the made ground and topsoil contained elevated concentrations of arsenic, benzo[a]pyrene and lead, which exceeded the residential with home grown produce and residential without home grown produce soil screening values. None of the elevated concentrations of arsenic, benzo[a]pyrene and lead exceeded the associated soil screening value for a commercial/industrial end use. All of the elevated concentrations were from samples in HA1, HA2 and HA3, along the eastern edge of the site close to the boundary ditch, and were considered related to spreading of sediment on the field from periodic clearing of the ditch*

*Levels of all remaining elements and compounds were within the associated soil screening values for both residential and commercial/industrial end uses."*

An independent review of the third party's test results was undertaken as part of the supplementary works discussed herein.

Arsenic exceedances were noted to range from 41mg/kg to 54mg/kg, which are below some 'POS' screening values. Lead was noted to have ranged from 340mg/kg to 400mg/kg, which was also below some 'POS' screening values.

The PAHs were also reviewed. For benzo(a)pyrene two-thirds of the initial exceedances were noted to be below the 'POS1' thresholds, but one was above it (but still below 'POS2'). Dibenzo(a,h)anthracene as also noted to have recorded 2 No. exceedances, and one of these is above POS1 and the other is above POS2.

The third party report suggested that these exceedances had come from the spreading of sediments after the adjacent ditch was dredged, which is considered to sound plausible. In this scenario the ditch and nearby 'spread sediments' would be considered as the 'source' within the site's conceptual site model. Pathways have been identified including the direct contact with these soils, the ingestion of the soils (alongside the ingestion of home-grown vegetables and soils attached to home-grown vegetables) and the inhalation of dusts.

On the basis of the above, feasible potential pollutant linkages have therefore been identified at the site relating to the exceedances of heavy metals and PAH compounds (variably) around sampling locations HA1, HA2 and HA3.

Further Sampling Works

It was agreed with the Client that additional sampling and delineation of the provisionally identified 'hotspots' HA1, HA2 and HA3 (considered potentially as separate hotspots or as one large hotspot extending across; and potentially beyond; all 3 No. locations) was prudent.

Engineers from Elemental GI Ltd attended the site on the 19th September 2023 to complete the excavation of 9 No. delineation positions (DP01 to DP07, DP04a and DP06a) around and within / beneath the locations of the provisionally identified 'hotspots' HA1, HA2 and HA3. An Exploratory Hole Layout Plan (Drawing 003) showing these positions and a General Photographic Record (Drawings 004a and 004b) are enclosed.

The previously identified exceedances at locations HA1, HA2 and HA3 were recorded within topsoil to depths of between 0.10m and 0.20m below existing ground level (begl). Our 9 No. delineation positions were therefore excavated to depths of up to 0.50m begl so that the profile, appearance and thickness of the topsoil could be inspected and recorded. Samples were taken from each location for laboratory analysis.

The soils inspected at each location were highly consistent, generally comprising grass / vegetation overlying a brown sandy silty topsoil with rootlets. This was generally underlain by a brown sandy silt / silty sand. It was noted that the topsoil was generally shallower than was recorded in the third party report, typically only extending to around 0.20m begl.

No visual or olfactory evidence of contamination was noted in the exploratory holes during the Recent supplementary investigation works.

Chemical Laboratory Analysis – Summary

A copy of the laboratory testing certificates is enclosed. Table 1.0 (below) presents a summary of the data from these testing works:

**Table 1.0: Testing Summary (Supplementary Soil Samples)**

| Analyte | Concentrations Detected (mg/kg) | Screening Values (mg/kg)[a] | | | No. of Samples | No. of Exceedances |
|---|---|---|---|---|---|---|
| | | Residential with Gardens | POS1 | POS2 | | |
| Arsenic | 7.0 - 10.0 | 37.0 | 79. 0 | 170. 0 | 12 | 0 |
| Lead | 18.0 - 21.0 | 200.0 | 630. 0 | 1300. 0 | 12 | 0 |
| Benzo(a)pyrene | <0.04* | 2.2 | 5.7 | 11.0 | 12 | 0 |
| Dibenzo(a,h)anthracene | <0.04* | 0.24 | 0.57 | 1.1 | 12 | 0 |

[a] Third party UK screening values e.g. CIEH, CL:AIRE, Elemental GI Ltd and LQM 'S4UL' values for a residential end-use with private gardens or POS end uses (as noted in 'row 1')(licence S4UL3849);
* Contaminants all recorded below laboratory limits of detection; and
N/A = Not Applicable, ND = Not Detected, D = Detected, DL = Detection Limits

The results of our recent testing was viewed cautiously, as the concentrations recorded were significantly lower than those reported by the third party in the same areas of the site. Arsenic concentrations were around 50% of those reported by the third party in HA1-HA3, and lead concentrations were around 5% of those reported by the third party in HA1-HA3. However, it is also noted that the concentrations recorded following our recent works are highly similar to those reported by the third party for sampling locations outside of HA1-HA3.

It is not considered likely that the third-party encountered random / sporadic / anomalous concentrations of lead and arsenic in the soils as our own recent sampling / tests would have been expected to report similar concentrations, or at least marginally elevated concentrations. A review of the third-party logs also fails to indicate any observations of potentially contaminative inclusions and / or visual / olfactory evidence of potential contaminants (e.g. clinker, sheens etc.).

On the basis of the above it is considered most likely at this stage that some sort of sampling error by the third-party may have occurred which imparted / cross-contaminated the soil samples. For example, any residue of soils from previous sampling on other sites may have cross-contaminated the samples taken at the subject site in locations HA1-HA3.

Furthermore, it is assumed that the third-party numbered their exploratory holes sequentially, meaning that HA1-HA3 would have been completed 'first', which may explain why other soil samples form subsequent locations did not find similar contamination.

The position of the recent delineation pits is shown within the enclosed Exploratory Hole Layout Plan.

Environmental Assessment

The third party testing recorded exceedances of heavy metals and PAH compounds (variably) around sampling locations HA1, HA2 and HA3. Further more comprehensive testing by ourselves has not encountered similar results. At this stage it is considered that soils on site in these areas are not contaminated.

On the basis of the above, remedial works would not be recommended at this stage, subject to the approval of your Local Planning Authority and warranty provider.

Ground Gas Classification

The third party noted the following with regards to the site's ground gas conceptual site model:

*"According to the environmental database there are no landfills recorded within 250m of the site. The site is generally underlain by a thin layer of made ground, covering variable Tidal Flat Deposits and in turn Marine Sand at depth."*

The monitoring undertaken by the third party was reported as follows:

*"The results of soil gas monitoring of the installations within BH1 and BH2 during the return visits in April to June 2023, found up to 4.5% methane and up to 16.3% carbon dioxide, with locally reduced atmospheric oxygen levels. The in-situ measurements recorded flow rates of less than 0.1l/hr. The results are tabulated following the borehole records. These in-situ measurements indicate a gas screening value (GSV) of 0.0045l/h for methane, and 0.0163l/h for carbon dioxide.*

*These GSVs fall within Characteristic Situation CS1 as defined by BS8485:2015+A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings', however with methane concentrations exceeding 1.0% volume on all four visits (BH1), and carbon dioxide exceeding 5.0% volume on the last two visits (BH2), it is recommended that Characteristic Situation CS2 is adopted. Based on these levels, gas protectionary measures are required for the proposed dwellings on this site. It is recommended that at least two additional gas monitoring visits are undertaken, preferably with at least one visit during a period of low and falling atmospheric pressure, to further characterise the gas regime on the site.*

*These results indicate a low hazard potential, and that gas protection measures such as reinforced floor slabs and ventilation protection measures should be adopted, with further details provided in BS8485:2015."*

A copy of the third party's ground gas records is presented within their report, which should be referred to in full.

A review of the third party's gas monitoring data and conclusions / classification has been undertaken. It is noted that 4 No. visits have been undertaken. Whilst 6 No. visits would usually be required it is noted that the 'CS2' classification recommended by them is likely to provide a high level of protection to future end-users / structures, and the absence of recorded gas flow rates would mean that gas concentrations could rise considerably further before an upgrade to 'CS3' was warranted.

It is recommended that a ground gas verification plan is prepared for the plots at 'Phase 2' which will confirm the details of the required protection measures alongside the proposals for verification. Please send us copies of the design details (inc. floor slab cross-sections, membrane specifications and fitter appointment / selection details) so that this may be drafted in advance of construction works.

Discussion and Recommendations

Further works have been recommended in this report, including the following main recommendations:

- Provision of design details, membrane specification and fitter details so that a ground gas verification plan may be prepared.

Copies of this letter report should be presented to the regulators (Council and NHBC (or similar) as necessary) to seek their approval and ensure that they are kept informed on site works before further works are undertaken.

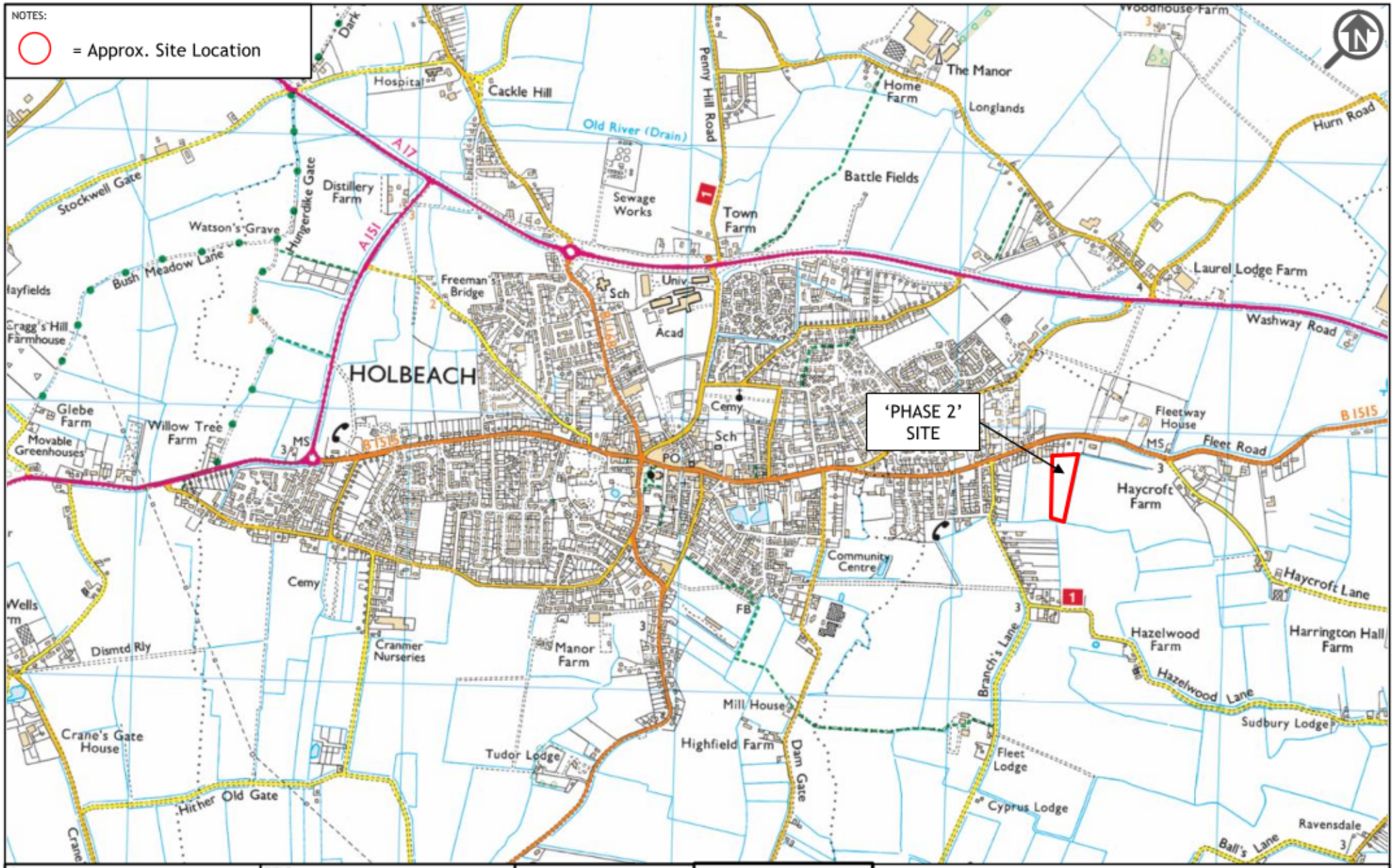
Yours sincerely,

James Regan
**Managing Director**

Enc. Terms and Conditions
Proposed Site Layout Plan (Drawing 001)
Site Location Plan (Drawing 002)
Exploratory Hole Layout Plan (Drawing 003)
General Site Photographs (Drawings 004a and 004b)
Laboratory Testing Certificates




| CLIENT: | TITLE: | DATE: | SCALE@SIZE: | |
|---|---|---|---|---|
| GEDA | Proposed Site Layout Plan | Sep. 2023 | NOT TO SCALE | Elemental GI Ltd |
| | | DRAWING No: E23180_001 | DESIGN/DRAWN: JR | |

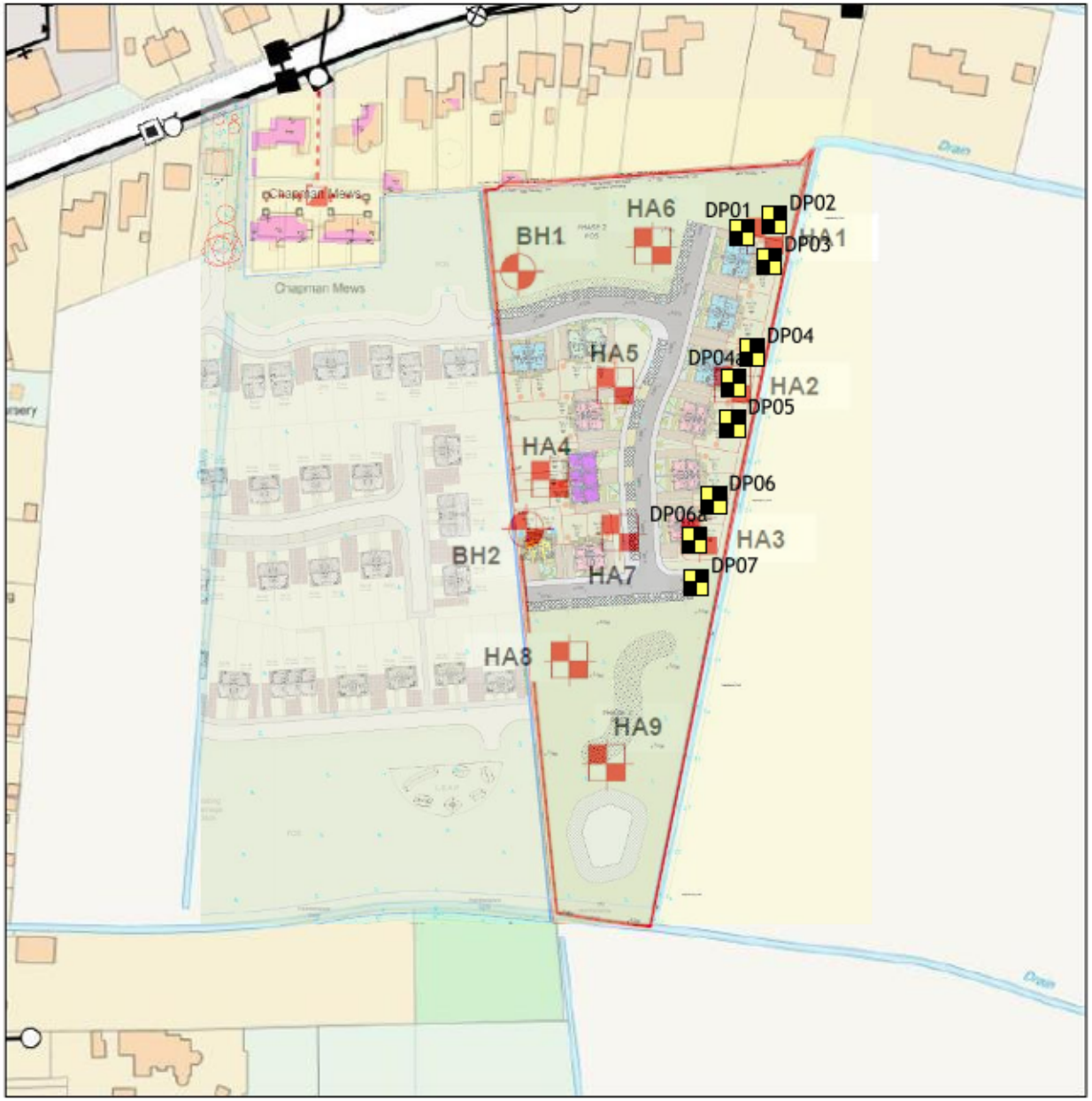



| CLIENT: | TITLE: | DATE: | SCALE@SIZE: |
|---|---|---|---|
| GEDA | Site Location Plan | Sep. 2023 | NOT TO SCALE |
| | | DRAWING No: E23180_002 | DESIGN/DRAWN: JR |

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NOTES:

- Approx. Site Boundary
- Approx. Location of Third-Party Boreholes
- Approx. Location of Third-Part Trial Pits
- Approx. Location of Delineation Trial Pits




| CLIENT: | TITLE: | DATE: | SCALE@SIZE: |
|---|---|---|---|
| GEDA | Exploratory Hole Layout Plan | Sep. 2023 | NOT TO SCALE |
| | | DRAWING No: E23180_003 | DESIGN/DRAWN: JR |

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Photo 1 - View of Site from Centre Looking North



Photo 2 - View of Site from Centre Looking South



Photo 3 - Excavation of Position DP01



Photo 4 - Close-Up View of Position DP01

| CLIENT: | TITLE: | DATE: | SCALE@SIZE: | |
|---|---|---|---|---|
| GEDA | General Site Photographs | Sep. 2023 | NOT TO SCALE | Elemental GI Ltd |
| | | DRAWING No: E23180_004a | DESIGN/DRAWN: JR | |



Photo 5 - Excavation of Position DP03



Photo 6 - Close-Up View of Position DP03



Photo 7 - Excavation of Position DP07



Photo 8 - Close-Up View of Position DP07

| CLIENT: | TITLE: | DATE: | SCALE@SIZE: | |
|---|---|---|---|---|
| GEDA | General Site Photographs | Sep. 2023 | NOT TO SCALE | Elemental GI Ltd |
| | | DRAWING No: E23180_004b | DESIGN/DRAWN: JR | |

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

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 23/09339
**Issue Number:** 1 **Date:** 27 September, 2023

**Client:** Elemental GI Ltd

**Project Manager:** James Regan
**Project Name:** HOLBEACH
**Project Ref:** E23180
**Order No:** E23180
**Date Samples Received:** 21/09/23
**Date Instructions Received:** 21/09/23
**Date Analysis Completed:** 27/09/23

**Approved by:**



Richard Wong
Client Manager

Envirolab Job Number: 23/09339

Client Project Name: HOLBEACH

Client Project Ref: E23180

| Lab Sample ID | 23/09339/1 | 23/09339/2 | 23/09339/3 | 23/09339/4 | 23/09339/5 | 23/09339/6 | 23/09339/7 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DP1 | DP2 | DP3 | DP4 | DP5 | DP6 | DP7 | | | |
| Depth to Top | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | | | |
| Depth To Bottom | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4A | 4AE | 4AE | 4A | 4AE | 4AE | 4AE | | | |
| % Stones >10mm$_A$ | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | % w/w | 0.1 | A-T-044 |
| Arsenic$_D^{M\#}$ | 8 | 9 | 9 | 8 | 7 | 9 | 8 | mg/kg | 1 | A-T-024s |
| Lead$_D^{M\#}$ | 18 | 20 | 19 | 18 | 18 | 19 | 19 | mg/kg | 1 | A-T-024s |

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**Envirolab Job Number: 23/09339**

**Client Project Name: HOLBEACH**

**Client Project Ref: E23180**

| Lab Sample ID | 23/09339/1 | 23/09339/2 | 23/09339/3 | 23/09339/4 | 23/09339/5 | 23/09339/6 | 23/09339/7 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DP1 | DP2 | DP3 | DP4 | DP5 | DP6 | DP7 | | | |
| Depth to Top | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | | | |
| Depth To Bottom | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4A | 4AE | 4AE | 4A | 4AE | 4AE | 4AE | | | |
| **PAH-16MS** | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <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 | <0.01 | <0.01 | <0.01 | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A$ | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A$ | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | mg/kg | 0.01 | A-T-019s |

Envirolab Job Number: 23/09339

Client Project Name: HOLBEACH

Client Project Ref: E23180

| Lab Sample ID | 23/09339/8 | 23/09339/9 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DP04A | DP06A | | | | | | | | |
| Depth to Top | 0.10 | 0.10 | | | | | | | | |
| Depth To Bottom | 0.20 | 0.20 | | | | | | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | | | | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | | | | | | | | |
| Sample Matrix Code | 4AE | 4AE | | | | | | | | |
| % Stones >10mm$_A$ | <0.1 | <0.1 | | | | | | % w/w | 0.1 | A-T-044 |
| Arsenic$_D^{M\#}$ | 8 | 8 | | | | | | mg/kg | 1 | A-T-024s |
| Lead$_D^{M\#}$ | 20 | 20 | | | | | | mg/kg | 1 | A-T-024s |

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**Envirolab Job Number: 23/09339**

**Client Project Name: HOLBEACH**

**Client Project Ref: E23180**

| Lab Sample ID | 23/09339/8 | 23/09339/9 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DP04A | DP06A | | | | | | | | |
| Depth to Top | 0.10 | 0.10 | | | | | | | | |
| Depth To Bottom | 0.20 | 0.20 | | | | | | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | | | | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | | | | | | | | |
| Sample Matrix Code | 4AE | 4AE | | | | | | | | |
| **PAH-16MS** | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | <0.02 | | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | <0.05 | | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | <0.06 | | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A$ | <0.04 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | <0.08 | | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | <0.07 | | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A$ | <0.08 | <0.08 | | | | | | mg/kg | 0.01 | A-T-019s |

## 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 within the same delivery, will be disposed of **six weeks** after the 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 our scope of accreditation.
The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
A deviating sample 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.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| N/A | Not applicable |

**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.

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**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 by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ 25ºC / 11550µS/cm @ 20ºC fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

# 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:** Elemental GI Ltd, 38 Silverburn Drive, Oakwood, Derby, Derby, UK, DE21 2JJ

**Project No:** 23/09339

**Date Received:** 21/09/2023 (am)

**Project:** HOLBEACH

**Cool Box Temperatures (°C):** 12.9

**Clients Project No:** E23180

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: 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 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 23/09339/1 | 23/09339/2 | 23/09339/3 | 23/09339/4 | 23/09339/5 | 23/09339/6 | 23/09339/7 | 23/09339/8 | 23/09339/9 |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | |
| Client Sample ID/Depth | DP1 0.10-0.20m | DP2 0.10-0.20m | DP3 0.10-0.20m | DP4 0.10-0.20m | DP5 0.10-0.20m | DP6 0.10-0.20m | DP7 0.10-0.20m | DP04A 0.10-0.20m | DP06A 0.10-0.20m |
| Date Sampled | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 | 19/09/23 |
| A-T-019s | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 |
| A-T-024s | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 |
| A-T-044 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 | 27/09/2023 |

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:** 23/09470
**Issue Number:** 1 **Date:** 03 October, 2023

**Client:** Elemental GI Ltd

**Project Manager:** James Regan
**Project Name:** Holbeach
**Project Ref:** E23180
**Order No:** E23180
**Date Samples Received:** 25/09/23
**Date Instructions Received:** 25/09/23
**Date Analysis Completed:** 03/10/23

**Approved by:**



Richard Wong
Client Manager

Envirolab Job Number: 23/09470

Client Project Name: Holbeach

Client Project Ref: E23180

| Lab Sample ID | 23/09470/1 | 23/09470/2 | 23/09470/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | HA-1 | HA-2 | HA-3 | | | | | | | |
| Depth to Top | 0.40 | 0.40 | 0.40 | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | | | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | | | | | | | |
| Sample Matrix Code | 4AE | 4AE | 4AE | | | | | | | |
| % Stones >10mm$_A$ | <0.1 | <0.1 | <0.1 | | | | | % w/w | 0.1 | A-T-044 |
| Arsenic$_D^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Lead$_D^{M\#}$ | 19 | 20 | 21 | | | | | mg/kg | 1 | A-T-024s |

**Envirolab Job Number: 23/09470**

**Client Project Name: Holbeach**

**Client Project Ref: E23180**

| Lab Sample ID | 23/09470/1 | 23/09470/2 | 23/09470/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | HA-1 | HA-2 | HA-3 | | | | | | | |
| Depth to Top | 0.40 | 0.40 | 0.40 | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 19-Sep-23 | 19-Sep-23 | 19-Sep-23 | | | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | | | | | | | |
| Sample Matrix Code | 4AE | 4AE | 4AE | | | | | | | |
| **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$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <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$_A^{M\#}$ | <0.06 | <0.06 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | <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$_A^{M\#}$ | <0.03 | <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$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A$ | <0.08 | <0.08 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

## 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 within the same delivery, will be disposed of **six weeks** after the 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 our scope of accreditation.
The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
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| NAD | No Asbestos Detected |
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**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.
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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.

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
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| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
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**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
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Results greater than 12900µS/cm @ 25ºC / 11550µS/cm @ 20ºC fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

# 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:** Elemental GI Ltd, 38 Silverburn Drive, Oakwood, Derby, Derby, UK, DE21 2JJ

**Project No:** 23/09470

**Date Received:** 25/09/2023 (am)

**Project:** Holbeach

**Cool Box Temperatures (°C):** 16.8

**Clients Project No:** E23180

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: 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 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 23/09470/1 | 23/09470/2 | 23/09470/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | HA-1 0.40m | HA-2 0.40m | HA-3 0.40m |
| Date Sampled | 19/09/23 | 19/09/23 | 19/09/23 |
| A-T-019s | 03/10/2023 | 03/10/2023 | 03/10/2023 |
| A-T-024s | 29/09/2023 | 29/09/2023 | 29/09/2023 |
| A-T-044 | 29/09/2023 | 29/09/2023 | 29/09/2023 |

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**

**Terms and Conditions**

Users of any / all of our reports, letters etc. must always ensure that they are reading the latest version / revision before undertaking any works and / or making any assessments, designs, decisions or related ventures.

This letter report has been prepared on the understanding that a 'full' Phase II Geo-Environmental Report is not required by the Client at this stage and therefore it has not been prepared in pursuit of planning approvals etc.

We have obtained and reviewed information relating to the site, but this may not be complete, and liability cannot be accepted for information not available to Elemental GI Ltd at the time of writing this letter. This letter has been written in consideration of construction / development proposals (or similar) as described at the start of this letter. If any of these proposals change (e.g. layout), then this letter may be subject to change.

This letter has been prepared for the sole use and reliance of the Client. No other third party may rely upon or reproduce the content of this letter without our prior written approval. If any unauthorised third party comes into possession of this letter, they rely upon it entirely at their own risk and the authors do not owe them any warranty, duty of care or skill.

Our letter, including the conclusions and recommendations, are considered reasonable based on the findings of the various assessments. However, these cannot be guaranteed to gain regulatory approval and therefore the Client should submit it to them (as necessary) for their comments and approval prior to undertaking any irrecoverable works associated with the subject site.

The findings and recommendations made in this letter are based on published information (as presented in the accompanying appendices). Elemental GI Ltd cannot accept responsibility for the reliability and authenticity of published information or reports prepared by third parties. Whilst we have endeavoured to assess and investigate the site in accordance with the scope of these works, it always remains possible that ground conditions will vary between and beneath locations. This may include ground type, strength and groundwater conditions. There may therefore be conditions prevailing on site which have not been revealed by this assessment and which have not been taken into account by this letter. Responsibility cannot be accepted for any conditions not revealed by this investigation and assessment. It should be noted that groundwater levels etc. may vary due to seasonal and other effects. Whilst it may be utilised by others for reference purposes at the Client's discretion, it has not been prepared for any other purposes (e.g. waste classification, drainage excavations etc.) and therefore additional works may be required by third parties dependent upon their own requirements / works. Any works which are proposed at greater depths than reported herein may require confirmatory investigation works as necessary.

The conclusions and recommendations presented herein are considered reasonable based on the assessments of the site undertaken by Elemental GI Ltd. However, these cannot be guaranteed to gain regulatory approval and therefore copies of this letter should be sent to the appropriate regulatory authorities and / or other organisations (as appropriate) by the Client for their comments and approval prior to undertaking any irrecoverable works associated with the site.

The possibility of significant variation in ground conditions existing between / beneath test locations / depths cannot be discounted and must be considered within the design proposals for the subject site. All soakaway designs should be approved by the relevant statutory authority prior to implementation and must adhere to the standard design and ground setting requirements, upon which your appointed drainage design engineers should advise you.

Where comments / recommendations have been made relating to specific depths it cannot be guaranteed that ground conditions shall be similar at surrounding / underlying depths, which should be taken into consideration as necessary by other.

With respect to the document to which this sheet is appended, the warranty provided with our works / reports etc. shall only apply once all invoices that we have sent in relation to the same site / project discussed herein (i.e. the site discussed within this document) have been paid by the Client.