



Elemental **GI** Ltd

REPORT: PHASE 2 GEO-ENVIRONMENTAL
INVESTIGATION FOR LAND NORTH OF
STONEGATE, COWBIT

CLIENT: ARK PROPERTY CENTRE

PHASE II GEO-ENVIRONMENTAL INVESTIGATION: LAND NORTH OF STONEGATE, COWBIT

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Semi-Technical Summary

The reader is referred to the terms and conditions which accompany this report, and which are presented at the end of this document.

This semi-technical summary provides a brief overview of the main conditions which have been noted on site. These features / factors (alongside others) are explained fully in the following report and the following should therefore not be referred to in isolation. **No reliance should be placed on the following summary until the whole report has been read in full.**

Ground Conditions / Foundations	The site is underlain by a variable thickness of made ground which is underlain by natural cohesive soils. Groundwater was recorded beneath the site in some areas during the recent investigation. The natural soils are typically very soft or soft and will <u>not</u> be suitable to support the proposed low-rise residential housing on shallow footings. Alternative foundations (e.g. piled foundations) will therefore be required for the proposed development.
Contamination	There are elevated PAHs in made ground across the site, and a hotspot of asbestos in the northern area (around WS01). Gardens and other soft landscaping will need to be capped if the made ground is not removed, and remediation of asbestos impacted materials in the northern area of the site by a specialist will also be necessary. However, subject to delineation and confirmation of site levels etc., it is possible that the asbestos may be localised, and could be managed through encapsulation under hard-dig layers etc. (to be confirmed within a Remedial Method Statement once final design proposals are released). Elevated ground gas has been detected and protection measures may be needed in all new buildings at this stage, subject to the completion of further ground gas monitoring visits.
Other issues	Initial drainage feasibility tests indicate that this site is <u>not</u> likely to be suitable to support soakaways.
Recommendations	▪ Completion of further investigation works (as required by specialist contractors / designers) to confirm deeper ground conditions in relation to alternative foundation strategies; ▪ Production of a Remedial Method Statement (RMS) confirm remediation requirements across the site; ▪ Appointment of specialist remediation contractor to advise on asbestos control measures and to undertake remediation of asbestos contaminated materials; ▪ Verification of appropriate utility construction materials with the relevant providers; and ▪ Where soils are to be removed from site for disposal it is recommended that advice is sought from the appointed contractors to determine any requirements for specific testing etc.

1.0 INTRODUCTION

1.1 Report Status

A Phase I Geo-Environmental Assessment has been undertaken for the site by ourselves. Please see section 1.2 below for further information.

Elemental GI Ltd were appointed by Ark Property Centre (hereafter referred to as 'the Client') to undertake a Phase II Geo-Environmental Investigation for land north of Stonegate, Cowbit (hereafter referred to as 'the site').

This report 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 Ref: 551.LTP.03 and extracts of this plan are presented in the Proposed Site Layout Plan (Drawing 001) in Appendix I.

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.

1.2 Previous Reports

Elemental GI Ltd have prepared the following report for the subject site:

- Elemental GI Ltd: Phase 1 Geo-Environmental Assessment for Land North of Stonegate, Cowbit (Ref. E22208/1/0 dated Jan. 2023).

The above referenced documents have not been reproduced herein and they should be referred to in full alongside this report.

1.2.1 Summary of Previous Reports

Drift deposits were recorded beneath the site on 1:50,000 scale mapping comprising Tidal Flat Deposits (clay and silt). These were recorded to be underlain by Oxford Clay Formation, mudstone. The drift deposits recorded beneath the site are classified as an 'Unproductive Aquifer'. The bedrock geology recorded beneath the site is classified as an 'Unproductive Aquifer'.

The site is not in an area known to be at risk from radon gas, although potential ground gas sources were identified on site.

The site was shown to support open ground with small structures present and a marshland / furze area in the north of the site in the 1880's. The site was also shown to be situated alongside a railway shown to the east of the site. The site underwent changes from 1904 onwards with the absence of the marshland. The removal of the onsite structures was shown from 1969 and the railway nearby is shown to be disused from 1976, after which the site was shown to correspond to its current layout. From 1988 the railway tracks were no longer shown running alongside the site.

Our preliminary human health conceptual site model listed potential sources of contamination at the site including made ground, topsoil / waste stockpiles, derelict machinery and off-site historic industry / made ground. It is understood that the stockpiles noted in our Phase I Report are no longer present at the site and have therefore been removed from the site's conceptual site model.

1.3 The Site

The site is situated to the north of Stone Gate, Cowbit. The site is roughly centred at National Grid Reference 526565, 318088.

1.3.1 Site:

- The site is approximately 0.25ha in area, and forms an irregular shaped but broadly rectangular parcel of land mainly covered by grass / vegetation with mature tree borders / hedgerows along the boundaries with a gravel track running along the centre of the site;
- A drainage ditch is situated alongside the western boundary of the site. This was observed to be 'dry' at the time of our investigation. A drain also runs immediately adjacent to the far northern boundary of the site (partially culverted) which was observed to be holding water at the time of our investigation;
- No obvious overall topographical gradients were noted across the site;
- Large stockpiles containing mixed topsoil and waste materials were noted in the northern end of the site (since removed from site);
- General construction waste including bricks, plastic and concrete were found along the eastern boundary of the site as well as derelict machinery and other stockpiles containing wood (since removed from site);
- A small tyre stockpile and derelict trailers were found along the western boundary of the site (since removed from site); and
- A small compost shed with a vegetation stockpile was observed near the gate in the southern area of the site.

The appendices contained in this report include a Site Location Plan (Drawing 002), Site Features Plan (Drawing 003) and a General Photographic Record (Drawing 004). A Site Investigation Plan is also presented (Drawing 005).

The description of the site provided above is taken following a relatively brief visit and should not be taken as a full and thorough description of all of the site's features, some of which may also have been obscured during our visit in inaccessible areas, hidden by vegetation etc.

1.3.2 Surrounding Area:

The site is set within an area which supports a mix of housing and open fields with some nurseries and small industrial premises also present.

- The site is set within a mixed residential, commercial, industrial and agricultural area;
- Land to the north of the site supports open fields and a plant nursery;
- Land to the east of the site supports a derelict railway station / sidings which is mostly overgrown. A single dilapidated brick structure remains;
- Land to the south of the site supports residential housing and Stonegate (road), beyond which is further residential housing; and
- Land to the west of the site supports residential housing.

2.0 SCOPE OF PHASE II INVESTIGATION

2.1 Potential Areas of Concern

The Phase I Report identified the following potential areas of concern at the site which would merit further inspection / investigation:

- Made Ground,
- Derelict Machinery; and
- Off-Site Historic Industry / Made Ground.

Elemental GI Ltd can confirm that the potential sources / contaminants listed above are reasonable and should remain unchanged.

2.2 Site Investigation Layout

The following exploratory holes have been positioned at the site:

Table 2.1: Site Investigation Layout

Potential Source / Issue	Exploratory Holes
General Site Coverage	ALL HOLES
Marshland / Furze Area	WS01
Made Ground	ALL HOLES
Derelict Machinery	WS02, WS03
Off-Site Industry / Made Ground	ALL HOLES
Infiltration Feasibility Tests	WS03, WS05
Ground Gas Monitoring Wells	WS01, WS06

Whilst all reasonable efforts will be made to ensure sufficient coverage of the site / potential areas of concern, it should be noted that ground conditions may vary between exploratory positions. The reader is referred to the terms, conditions and notes which are presented at the end of this report in relation to its potential limitations.

All arisings shall be inspected following completion of each exploratory hole, and samples will be selected for analysis on the basis of their appearance (including visual or olfactory evidence of contamination). Elemental GI Ltd shall arrange for samples to be delivered to a suitably accredited laboratory for subsequent testing.

Samples shall be tested for a general range of contaminants (in accordance with NHBC Standards Chapter 4.1 'Land Quality - managing ground conditions' and CLR 8 'Potential Contaminants for the Assessment of Land' (withdrawn but used for reference purposes where applicable)). Where appropriate they shall also be analysed for specific / targeted analyses, and at the subject site this shall include:

- Heavy metals;
- Polycyclic aromatic hydrocarbons (PAHs);
- Phenols;
- pH;
- Volatile and Semi-Volatile Organic Compounds (SVOC/VOC);
- Total petroleum hydrocarbons (TPH); and
- Asbestos.

3.0 SITE INVESTIGATION WORKS

3.1 Completion of Works

The recent site investigation works were completed by Elemental GI Ltd in general accordance with BS 5930:2015+A1: 2020.

3.2 Site Investigation Details

The exploratory holes were completed by Elemental GI Ltd at the site as listed in Table 2.1 (above). These were completed to a maximum total depth of 5.00m below existing ground level (begl). Table 3.1 (below) presents a summary of the works completed:

Table 3.1: Site Investigation Summary

Exploratory Hole(s) ID	Maximum Final Depth (m)	Notes
WS01 to WS06	5.00	Window Sampler Drilling Locations

A copy of the exploratory hole records from these works is presented in Appendix VI.

3.3 *In Situ* Soakaway Testing

Following completion of drilling, 2 No. exploratory locations (WS03 and WS05) were selected for initial infiltration feasibility testing. In general accordance with BRE365, the 2 No. test locations were measured before being filled (to the surface) with water and subsequently monitored. Table 3.2 below presents a summary of the findings of these works. Exploratory hole logs are enclosed within Appendix VI.

Table 3.2: Soakaway Testing Summary

Exploratory Hole(s) ID	Infiltration Observations	Comments
WS03	Water level fell from 0.00m to 0.60m in 2.5 hrs.	Water levels fell rapidly until they reached c. 0.58m depth, after which significant / rapid discharge was not recorded.
WS05	Water level fell from 0.00m to 0.68m in 2.0 hrs.	Water levels fell rapidly until they reached c. 0.67m depth, after which significant / rapid discharge was not recorded.

It is noted that at both of the test locations the water levels ‘fell’ promptly until they reached around 0.5m-0.6m depth, after which the rate of discharge reduced suddenly. It is considered likely that the discharge up to these elevations was through granular made ground etc., which provided favourable discharge routes, but the deeper strata / soils provided much reduced infiltration conditions.

At this stage it is considered likely that site soils will not prove suitable for *in situ* drainage options (e.g. soakaways) subject to review by your appointed drainage engineer and regulatory comments, which should be considered cautiously and conservatively within any future drainage strategies.

4.0 GEOTECHNICAL ASSESSMENT

4.1 General Ground Conditions

4.1.1 Made Ground

Made ground was encountered in all areas of the site to a maximum total depth of 1.40m below existing ground level (begl). This generally comprised ashy gravel or reworked topsoil overlying either gravel of brick, concrete etc., or reworked natural soils containing variable amounts of brick, concrete and clinker. Bands of brick and concrete fragments were also noted locally.

4.1.2 Topsoil

Topsoil was not encountered in any of the exploratory holes completed during the recent investigation.

4.1.3 Natural Soils / Bedrock

The natural soils at the subject typically comprised soft brown and / or greyish brown slightly sandy to very sandy clay / silt soils overlying very soft grey and brown clay / silt which was sandy in places and which contained occasional pockets of organic material. These are considered to be representative of the Tidal Flat Deposits.

The shallower soft brown and / or greyish brown slightly sandy to very sandy clay / silt soils typically extended from the base of the made ground to around 2.0m to 3.0m depth, although it was noted that they were absent at position WS05. These soils became softer and sandier with depth at some locations.

The very soft grey and brown clay / silt soils were recorded at all locations, extending to the base of each exploratory hole. These soils contained pockets / inclusions of decayed organic materials at all locations although these were mainly described as being 'rare'. However, more frequent pockets of similar materials were recorded at locations WS01 (pocket from 2.90m to 3.30m begl), WS02 (frequent pockets present from 2.70m begl), WS04 (frequent pockets present from 3.80m depth), WS05 (frequent inclusions present from 2.85m to 3.25m begl) and WS06 (pocket encountered from 0.85m begl). These materials were not described as 'peat' as they resembled semi-decayed (i.e. relatively recent) vegetation materials which were present in a cohesive soil matrix, and which were not forming the main / majority constituent of the soils where encountered.

It is strongly recommended that specialist designers / consultants etc. should be contacted for advice on the presence of pockets of organic materials so that any detailed assessments / tests can be undertaken as necessary to highlight any risks / precautions to construction works.

At location WS05 potentially reworked grey slightly sandy slightly gravelly clay / silt soils were recorded to a depth of 2.50m.

4.1.4 Groundwater and Stability

Water was recorded at the following locations:

- WS01: Water encountered at 2.80m depth during drilling;
- WS04: Water encountered at 3.20m depth during drilling; and
- WS05: Water encountered at 3.00m depth during drilling.

Return visits undertaken to site so far have recorded water ranging from 1.13m to 3.40m bgl in monitoring wells.

Based on the above, it is considered likely that dewatering or other forms of water management are likely to be required for shallow short term excavations at the site.

In general, the exploratory holes which were recently completed as part of our investigation remained stable for the short time which they were left 'open'. However, very poor stability was noted in some exploratory holes at the site following their completion, which should be considered carefully in the context of health and safety and trench support as part of all future construction works (see Exploratory Hole records presented in Appendix VI for further information).

4.2 Geotechnical Laboratory Testing

The geotechnical laboratory testing was carried out in general accordance with BS EN 14688 'Geotechnical Investigation and Testing - Identification and Classification of Soil'. Full details of the test results are presented in Appendix VI.

Table 4.1 (below) presents a summary of the plasticity index (PI) testing completed:

Table 4.1: Summary of Plasticity Testing

Exploratory Hole ID	Depth (m)	Strata*	Modified PI Result (%)
WS01	1.50	Sandy Clay.	17.6 (LOW)
WS03	0.80	Sandy Clay	30.0 (MEDIUM)
WS04	1.00	Sandy Clay	25.0 (MEDIUM)
WS06	2.00	Sandy Clay.	27.0 (MEDIUM)

*Please note that this is a laboratory description as shown on the test certificates and it may not be compliant with BS:5930

Based on the above results, the cohesive soils on site have been assigned an overall medium volume change potential.

4.3 In Situ Testing

Equivalent SPTs (standard penetration tests) were undertaken in all boreholes at appropriate depths at the site. The following results were recorded:

Table 4.2: In Situ SPT 'N' Value Results v Strata Type

Strata	'N' Value Range Reported	Comment
Made Ground	3 to 5	N/A
Shallow Clay / Silt	0 to 9 (average 4.5)	Very Soft to Firm
Deeper Clay / Silt	0 to 4 (average 2.0)	Very Soft to Soft

Table 4.3: In Situ SPT 'N' Value Results v Depth

Depth (m begl)	Range Reported
1.0m	3 to 9
2.0m	0 to 3
3.0m	0 to 3
4.0m	1 to 4
5.0m	1 to 4

In general, it was noted that SPT results typically decreased with depth.

4.4 Geotechnical Assessment

It is understood that the site is to be redeveloped to support a residential end use. The following potential hazards have been identified at the site which may need to be considered by developers and their partners (including groundworkers, designers and other specialist engineers):

- Granular Soils / Groundwater - Granular soils / soils with a high granular content are present beneath some areas of the site. Groundwater / perched water has also been encountered at shallow depths across the site. If water is found during construction then alternative foundation strategies should be considered as groundwater will reduce the bearing capacity of these materials. If present within an influencing depth of foundations and / or encountered during foundation excavations, then Elemental GI Ltd should be contacted for further advice.
- Variable Ground Conditions - Advice should be sought where foundations or other construction features straddle variable soil types (i.e. cohesive / granular). Whilst suitable mesh reinforcement may be sufficient to mitigate against differential settlement in some such situations, an adjustment of the foundation depths for each individual structure so that they sit fully within a singular consistent stratum (soil type) is recommended to further reduce such risks. It is strongly recommended that specialist designers / consultants etc. should be contacted for advice on the presence of pockets of organic materials (and to confirm the description provided

within their own classification / design systems) so that any detailed assessments / tests can be undertaken as necessary to highlight any risks / precautions to construction works.

- Soft Soils - Soft soils have been encountered across the site. These will need to be taken into account as part of any redevelopment.
- Made Ground / Buried Structures - Made ground has been encountered across parts of the site. Foundations will need to be deepened to bear on the undisturbed natural strata where made ground is identified.
- Services / Obstructions - Foundations / layouts may need to compensate for / avoid these features appropriately, or alternatively diversions etc. may be required.

4.5 Foundation Recommendations

Untreated made ground and low strength natural soils are typically considered unsuitable as a bearing stratum and all new foundations should be carried down through them to found on more competent natural strata. Based on the findings of the recent investigation works it is considered likely that piled foundations terminating within suitable natural are likely to be suitable for the proposed low-rise residential end use. It is recommended that all such foundations must be deepened through all made ground and locally soft / loose shallow natural soils to terminate within deeper / competent natural soils. Due to the depth of soft / loose soils recorded during our initial investigation works, alternative foundation options such as piling will therefore be required at this site. It is recommended that advice should be sought from specialist contractors, who are likely to require additional investigation of deeper ground conditions (deep drilling).

Foundations terminating within cohesive soils or within an influencing depth of cohesive soils would usually need to be deepened within the influencing distance of trees due to the recorded medium volume change potential of cohesive soils, although this may not be a significant issue if alternative (piled) foundation options are considered although heave precautions etc. may still need to be considered.

Further caution is recommended with regards to other construction works and features (e.g. service / drainage runs), which may also require consideration of some sort of ground improvement / piling support, which you should discuss with your appointed relevant specialist designers.

5.0 ENVIRONMENTAL ASSESSMENT

5.1 Selection of Screening Values

The current UK screening values for the comparison of soil test data are presented by DEFRA within their 'Category 4 Screening Levels' (C4SLs). This includes screening values for a selected range of end-uses for 6 No. determinands, and is supplemented by the CL:AIRE 'Phase 2 C4SLs', which provide screening values for a further 3 No. determinands. These screening values have been derived using an LLTC and are used as the primary comparison for risks from determinands within soil samples from the site. Where appropriate we have also reviewed and utilised screening values from other authoritative parties (e.g. LQM, CIEH etc.) who have calculated further screening values for additional determinands, although it is noted that these providers typically generate screening values which are based upon health criteria values (HCVs; as opposed to LLTCs) which represent a lower (minimal) risk level and are therefore more conservative.

At this stage screening values which assess the concentrations of determinands in comparison to a residential with plant uptake end-use have been adopted, which is considered to be appropriate for the proposed end-use at the site. However, alternative screening values (e.g. Public Open Space 1 or 2) may also be used where appropriate.

5.2 Environmental Laboratory Testing

Soil samples from the site were retrieved and submitted for laboratory analysis in accordance with Section 2.2 and Table 2.1 of this report.

Laboratory testing certificates are presented in Appendix VII, with Table 5.1 (overleaf) presenting a summary of the test data.

Table 5.1: Laboratory Analysis of Soil Samples

Analyte	Concentrations Detected (mg/kg)	Screening Values (mg/kg)	No. of Samples	No. of Exceedances
Arsenic	5.60 - 19.0	37.0 ^b	7	0
Cadmium	<0.10 - 0.37	11.0 ^b	7	0
Chromium (Total)	13.0 - 53.0	910.0 ^b	7	0
Chromium VI	<0.50*	6.0 ^b	7	0
Lead	11.0 - 170.0	200.0 ^a	7	0
Selenium	0.36 - 1.70	250.0 ^b	7	0
Nickel	13.0 - 32.0	130.0 ^b	7	0
Copper	9.1 - 71.0	2400.0 ^b	7	0
Zinc	29.0 - 200.0	3700.0 ^b	7	0
Mercury	<0.05 - 0.23	1.2 ^b	7	0
Benzo(a)pyrene	<0.1 - 23.0	2.2 ^b	7	3
Dibenzo(a,h)anthracene	<0.1 - 2.5	0.24 ^b	7	3
TPH Aliphatic EC ₅ -EC ₆	<1.0*	27.0 ^b	2	0
TPH Aliphatic EC ₆ -EC ₈	<1.0 - 70.0	74.0 ^b	2	0
TPH Aliphatic EC ₈ -EC ₁₀	<1.0 - 600.0	1100.0 ^b	2	0
PCBs	<0.01*	Varies ^d	1	0
SVOCs	0.5 - 12.0	Varies ^d	1	3
VOCs	<DL	Varies ^d	1	0
pH	7.9 - 8.5	N/A	9	N/A
Asbestos	ND - D	D ^c	3	1

^a DEFRA C4SL values for a Residential end-use with gardens;

^b 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 (licence S4UL3849);

^c Elemental GI Ltd general screening level;

^d See sections below table

* Contaminants all recorded below laboratory limits of detection; and
DL = Detection Limits, N/A = Not Applicable, ND = Not Detected, D = Detected.

Table 5.1 has identified the following exceedances in relation to the selected screening values (residential with private gardens):

- 1 No. exceedance of asbestos comprising:
 - Samples from WS01 of made ground at 0.50m begl;
- 3 No. exceedances of PAHs and SVOCs (including benzo(a)pyrene and dibenzo(a,h)anthracene) including:
 - Samples from WS02 of made ground at 0.40m begl;
 - Samples from WS03 of made ground at 0.05m begl; and
 - Samples from WS05 of made ground at 0.10m begl.

It is noted that the exceedances summarised above were all within samples retrieved from made ground materials. No exceedances from samples retrieved from the underlying natural soils were encountered.

Given the site's history it is possible that currently unidentified areas of contamination or potentially contaminative features may be present which will be encountered during redevelopment. Please contact us for further advice immediately if this happens.

5.3 Sulphate Classification

In accordance with BRE Guidance Special Digest 1 (2005) for soils assuming mobile groundwater conditions and a brownfield site, the characteristic values of water soluble sulphate concentration and pH for soils indicates a Design Sulphate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1. Minimum concrete specification should be in accordance with NHBC Standards, Section 3.1.

Additional testing / classification of deeper soils is likely to be required to confirm the status of these materials in relation to deeper foundations (e.g. piles).

5.4 Statistical Assessment

Statistical assessment of soil test data is only appropriate where a sufficient sample population is present. This requires a minimum number of soil samples from the same averaging zone. The data currently available for the subject site is not considered to be suitable for statistical assessment as the results may not prove reliable. As a conservative alternative the direct comparison of soil test data to the selected screening values (as outlined in the sections above) shall be adopted at this stage.

5.5 Radon and Ground Gas

The site is in an area where less than 1% of homes are estimated to be at or above the Action Level. Therefore, radon protective measures are not required, subject to regulatory approval.

The site's CSM indicated that potential risks were present from ground gas sources comprising [mentioned gas sources here]. An initial ground gas monitoring exercise comprising 3 No. gas monitoring visits was therefore commissioned by the Client to assess potential risks further.

A copy of our gas monitoring records taken to date is presented in Appendix VIII. In summary the following concentrations / flows have been recorded thus far:

- Carbon dioxide (CO₂) recorded up to a maximum of 1.0 % v/v;
- Methane (CH₄) recorded up to a maximum of 1.9 % v/v;
- Oxygen (O₂) recorded to range from 5.5 % v/v and 20.4 % v/v; and
- Flow recorded up to a maximum of 0.0 l/hr.

In accordance with our standard ground gas assessment methodology the site would be indicatively classified as:

- CS2 or Amber 1

At this stage ground gas protection measures may therefore be required for new structures at the site based on the initial gas monitoring results.

The actual ground gas precautions used will depend upon final monitoring results, construction details and regulatory / warranty provider approval. However, for general reference purposes it can be confirmed that CIRIA C665 (one of the main ground gas assessment documents) recommends the following general precautions for this classification:

- Suitable, unobstructed and correctly installed adequate external venting to be present (i.e. in accordance with relevant guidance), such as ‘periscope’ venting;
- All joints and penetrations sealed and with either;
- Reinforced concrete cast *in situ* floor slab (suspended, non-suspended or raft) with suitable membrane and underfloor venting; or
- Beam and block or pre-cast concrete floor with suitable membrane and underfloor venting.

Other assessment / guidance documents (e.g. BS8485) may be used in the final classification / design reports.

6.0 UPDATED CONCEPTUAL SITE MODEL

The initial CSM was formed to set a basis for the assessment and investigation across the subject site. This has been used to provide focus and direction for certain parts of the site investigation works, and the data gathered from these works (including laboratory analyses and visual / olfactory observations) can now be used to update the CSM.

6.1 Human Health CSM

The site was shown to support open ground with small structures present and a marshland / furze area in the north of the site in the 1880's. The site was also shown to be situated alongside a railway shown to the east of the site. The site underwent changes from 1904 onwards with the absence of the marshland. The removal of the onsite structures was shown from 1969 and the railway nearby was shown to be disused from 1976, after which the site was shown to correspond to its current layout. From 1988 the railway tracks were no longer shown running alongside the site.

The site is underlain by variable thicknesses of made ground which is underlain by natural cohesive soils. Groundwater was recorded beneath the site in some areas during the recent investigation and subsequent monitoring.

The laboratory testing of soil samples indicated that the following exceedances are present in relation to the chosen initial screening values:

- 1 No. exceedance of asbestos comprising:
 - Samples from WS01 of made ground at 0.50m begl;
- 3 No. exceedances of PAHs and SVOCs (including benzo(a)pyrene and dibenzo(a,h)anthracene) including:
 - Samples from WS02 of made ground at 0.40m begl;
 - Samples from WS03 of made ground at 0.05m begl; and
 - Samples from WS05 of made ground at 0.10m begl.

In accordance with our standard risk assessment methodology (presented at the end of this report), the following sources, pathways and receptors have been identified at the subject site at this stage (see overleaf):

Table 6.1: Updated Human Health CSM

<i>Investigated Onsite Sources</i>	Pathways	Receptors	Comment / Risk Rating [#]
Made Ground	• Migration in Soils • Groundwater • Ground Gas Migration • Direct Contact • Plant Uptake • Dust Inhalation • Ingestion	• End Users • Groundwater	LOW / MODERATE Contamination recorded during investigation works inc. PAHs and localised asbestos
Construction Waste	• Migration in Soils • Groundwater • Direct Contact • Plant Uptake • Dust Inhalation • Ingestion	• End Users • Groundwater	LOW Testing / Removal Required
Derelict Machinery	• Migration in Soils • Groundwater • Direct Contact • Plant Uptake • Dust Inhalation • Ingestion	• End Users • Groundwater	LOW Testing / Removal Required
<i>Investigated Offsite Sources</i>			
Made Ground (Offsite)	• Migration in Soils • Groundwater • Ground Gas Migration	• End Users • Groundwater	LOW No issues identified
Historical Industry	• Migration in Soils • Groundwater • Ground Gas Migration	• End Users • Groundwater	LOW No issues identified

[#] Risk ratings are described in Table A1 within the 'Standard Risk Assessment - Considerations and Methodology' section at the end of this report.

6.2 Potential Pollutant Linkages:

For an identified / confirmed pollutant linkage to be present, potential sources, pathways and receptors must be present. With reference to the proposed residential end use, feasible potential pollutant linkages have been identified at the site as outlined in table 6.1 above. Remediation works are therefore considered necessary to break these linkages to the satisfaction of the Client and regulatory authorities (and other parties, as appropriate e.g. NHBC).

6.3 Controlled Waters Summary

The site is primarily set upon an 'Unproductive aquifer'. The site is not recorded to be within an Environment Agency Source Protection Zone. There are no abstraction licences recorded within a 500m radius of the site. Abstractions for potable water are not recorded locally. The nearest surface water feature appears to be a small unnamed watercourse which is situated 1m north-west of the site.

As summarised in section 6.1, exceedances have been recorded within soils at the site although these are for relatively immobile compounds (PAHs) within stable materials in made

ground, which are likely to have a very low mobility / leaching potential. Significant risks to controlled waters have therefore not been identified at this stage.

6.4 Model Status and Uncertainty

The potential significant linkages discussed in this section are based on available data reviewed to date.

7.0 RECOMMENDATIONS

A review of the available site information (as discussed herein) has been undertaken to inform the following conclusions and recommendations. However, this report should be submitted to the appropriate regulators (and other stakeholders, as necessary) by the Client prior to the start of any irrecoverable works associated with the site.

7.1 Foundations and Enabling Works

Untreated made ground and low strength natural soils are typically considered unsuitable as a bearing stratum and all new foundations should be carried down through them to found on more competent natural strata. Based on the findings of the recent investigation works it is considered likely that piled foundations terminating within suitable natural are likely to be suitable for the proposed low-rise residential end use. It is recommended that all such foundations must be deepened through all made ground and locally soft / loose shallow natural soils to terminate within deeper / competent natural soils. Due to the depth of soft / loose soils recorded during our initial investigation works, alternative foundation options such as piling will therefore be required at this site. It is recommended that advice should be sought from specialist contractors, who are likely to require additional investigation of deeper ground conditions.

Please see section 4.0 for further information.

7.2 Groundwater

Water ingress was noted at variable depths and positions during the recent site works. Given the variable depth of the water strikes noted, and the absence of water at other nearby locations, it is considered likely that the above observations may be indicative of localised perched water pockets at this stage.

Return visits undertaken to site so far have recorded water ranging from 3.40m to 1.13m bgl in monitoring wells.

At this stage it is considered likely that dewatering (or similar) is likely to be required for excavations across parts of the subject site during construction.

7.3 Road Construction

Literature sources typically suggest that CBR values of less than 2% can be anticipated in the made ground and topsoil and values between 2% and 5% can be anticipated in the underlying natural soils subject to *in situ* testing. All road construction proposals should be agreed with the Local Authority prior to finalising designs, and it is recommended that the soft natural soils encountered at the subject site should be assessed specifically and cautiously with regards to roads, services etc.

7.4 Drainage

Elemental GI Ltd completed initial *in situ* drainage feasibility testing at selected locations at the site during the recent investigation. It was noted that water discharge rates appeared to slow significantly at certain shallow elevations during testing, potentially indicating that natural soils are not capable of supporting *in situ* soakaway devices. It was also noted that the elevation(s) of groundwater recorded in some areas of the site would be likely to significantly reduce the attenuation potential of any water discharged to the ground through soakaways. These comments should be discussed with your appointed drainage engineer, but at this stage it is considered that the soils beneath the site would not be suitable for *in situ* soakaways.

7.5 Radon and Ground Gas

The site is not set within an area which is known to be at risk from radon gas and therefore no precautions are necessary, subject to regulatory approval.

An initial ground gas monitoring programme has been commissioned for the site comprising 3 No. visits. Low oxygen concentrations have been consistently recorded at monitoring well WS01 and elevated methane concentrations have been recorded at the same monitoring well during 1 No. visit.

At this stage it is considered likely that ground gas protection measure would be recommended to a 'CS2' classification level, subject to regulatory approval and completion of final monitoring visits.

7.6 Excavations

In general, the exploratory holes which were recently completed as part of our investigation remained stable for the short time which they were left 'open'. However, very poor stability was noted in some exploratory holes at the site following their completion, which should be considered carefully in the context of health and safety and trench support as part of all future construction works (see Exploratory Hole records presented in Appendix VI for further information). All future excavations should therefore be assumed to be unstable as a conservative and risk-averse measure. The Client and / or site operators should assess risks associated with entry into excavations based upon these observations and should apply suitably safe working practices / support measures (in accordance with current best practice / guidance) to avoid risks to site workers / construction activities.

It is also recommended that the conditions which were encountered at the site should be assessed by the Client and their appointed groundworkers etc. in relation to future excavations of foundations, utility / service trenches etc. Further inspections (i.e. to assess trench stability) should also be undertaken by other stakeholders as required by them to confirm specific ground conditions to their own satisfaction.

7.7 Contamination

The Phase II Conceptual Model and the Qualitative Risk Assessment outlined herein indicate that feasible pollutant linkages have been identified. This relates to elevated concentrations of various PAH compounds in most made ground samples and to a single detection of asbestos in made ground in the northern area of the site (WS01).

Any future construction works within these areas (and especially around WS01) should fully consider the risks from cross-contamination and creation of 'pathways'. Recommendations and guidance should be sought by the Client from specialist remediation contractors who should be appointed to prepare these areas of the site before and during construction works.

7.8 Remediation

Remediation works to protect human health are considered necessary. It is recommended that a remedial method statement (RMS) is produced to guide future remedial works. A hotspot of asbestos contamination has been identified at the site (WS01) and it is considered likely that the removal of some of these materials under controlled conditions will be required as part of the development works. Capping of private gardens / soft landscaping will be required due to the presence of generally elevated PAH compounds in made ground elsewhere on site. Works associated with the disturbance / removal of asbestos will need to be undertaken by a specialist remediation contractor, who should also be able to provide advice on general precautions associated with construction works in relation to the control / suppression of potentially contaminated dusts and other cross-contamination risks.

It may be noted that subject to delineation and confirmation of site levels etc., it is possible that the asbestos may be localised, and could be managed through encapsulation under hard-dig layers etc. (to be confirmed within a Remedial Method Statement once final design proposals are released).

7.9 Topsoil

Topsoil was not encountered during the recent investigation, and importation of additional topsoil is therefore considered likely to be necessary.

As with all schemes / sites, all movements of soils (including their re-use on site, importation and exportation) must be undertaken in full compliance with all relevant licenses / permits / exemptions etc. as applicable (i.e. U1, MMP etc) and with all necessary regulatory permissions. Retrospective implementation of such applications may not be permitted and therefore this should be established by the Client prior to the start of construction works.

Any soils which are brought onto site should be suitably tested and approved by the Local Authority in advance (this may include classification of 'topsoil' against standards such as BS3882: 2015 'Specification for Topsoil').

7.10 Further Works

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

- Completion of further investigation works (as required by specialist contractors / designers) to confirm deeper ground conditions in relation to alternative foundation strategies;
- Production of a Remedial Method Statement (RMS) confirm remediation requirements across the site;
- Appointment of specialist remediation contractor to advise on asbestos control measures and to undertake remediation of asbestos contaminated materials;
- Verification of appropriate utility construction materials with the relevant providers; and
- Where soils are to be removed from site for disposal it is recommended that advice is sought from the appointed contractors to determine any requirements for specific testing etc.

Terms and Conditions

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 report. This report has been written in consideration of construction / development proposals (or similar) as described in Section 1.0 of this report. If any of these proposals change (e.g. layout), then this report may be subject to change.

This report 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 report without our prior written approval. If any unauthorised third party comes into possession of this report, they rely upon it entirely at their own risk and the authors do not owe them any warranty, duty of care or skill.

Our report, including the conclusions and recommendations, are considered reasonable based on the findings of the Phase I assessment. 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 report 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 report. 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 report 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

Elemental GI Ltd - Our Standard Risk Assessment Approach

We have used various guidelines and current legislation in the preparation of this report. This includes (but is not limited to) the following:

- DEFRA / EA document 'Contaminated Land Report 11 (CLR11) Model Procedures for the Management of Land Contamination' (2004) [*withdrawn but used for general reference purposes*];
- NHBC / EA / CIEH document 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008);
- DEFRA 'Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012); and
- Environment Agency 'Land contamination risk management (LCRM)' (2020, last updated April 2021) held at:
 - <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

Construction of Conceptual Site Model

Elemental GI Ltd have based our standard risk assessment methodology upon current legislation and prevailing best practice and available guidance. This includes the assessment of potentially contaminated land in terms of 'significant pollutants' and 'pollutant linkages', using SOURCE-PATHWAY-RECEPTOR scenarios for the site. For a pollutant linkage to exist all three of these elements must be present. These have been clearly defined in the guidance as follows:

- potential source as 'a contaminant which is in, or under the land and which has the potential to cause significant harm or to cause pollution of controlled waters'.
- potential pathway as 'one or more routes or means by, or through, which a receptor is being exposed to, or affected by a contaminant, or could be so exposed or affected'.
- potential receptor as 'a living organism, a group of living organisms, an ecological system or a piece of property which is being or could be, harmed by a contaminant or controlled waters which are being, or could be, polluted by a contaminant'.

Within this report, common pathways including (but not limited to) the following have been considered (amended on a site-specific basis):

- Ingestion of soil;
- Ingestion of site-grown vegetables;
- Ingestion of site-reared livestock / fish;
- Dermal contact with soils;
- Inhalation of vapours;
- Inhalation of soil-derived dust.

Receptors will be considered on a site-specific basis, but will usually include the current / future users of the site itself as well as users of surrounding sites. Other receptors including controlled waters will also be considered and assessed.

Risk Assessment Methodology

Our risk assessment methodology is based upon a phased approach which is created through the construction of the sites conceptual site model, and which takes the following steps (taken from LCRM Guidance):

1. *Identify the hazard - establish contaminant sources.*
2. *Assess the hazard - use a source-pathway-receptor (S-P-R) linkage approach to find out if there is the potential for unacceptable risk.*
3. *Estimate the risk - predict what degree of harm or pollution might result and how likely it is to occur by using the tiered approach to risk assessment.*
4. *Evaluate the risk - decide whether a risk is unacceptable.*

The meaning of the terms are:

- *hazard - a property or situation that in particular circumstances could lead to harm or pollution;*
- *risk - a combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence;*
- *risk assessment - the formal process of identifying, assessing and evaluating the health and environmental risks that may be associated with a hazard;*
- *risk management - the formal process to identify, assess and determine the risks, and to select and take action to mitigate them.*

Our definitions and classification matrix for risk descriptions have been taken from the NHBC document “Guidance for the Safe Development of Housing on Land Affected by Contamination” (Ref. R&D P66, dated 2008)

Table A1: Risk Categorisation (Adapted from Table 1.8 of NHBC, R&D P66 (2008))

Probability (Likelihood)		Consequence			
		Severe	Medium	Mild	Minor
	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Not likely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

The R&D P66 document goes on to provide further descriptions of these risk levels, which are also reproduced below:

Table A2: Risk Level Descriptions (Adapted from Table 1.9 of NHBC, R&D P66 (2008))

Term	Description
Very High Risk	A high probability exists that severe / significant harm could arise to someone or something from the hazard which has been identified. Remedial action is required.
High Risk	Harm is likely to arise to someone or something from the hazard which has been identified. Remedial action is usually required.
Moderate Risk	Harm could potentially arise to someone or something from the hazard which has been identified without remedial action, although it is considered to be relatively <u>unlikely</u> that such harm would be severe.
Low Risk	Harm could theoretically arise to someone or something from the hazard which has been identified without remedial action, although it is considered that any effects would be mild.
Very Low Risk	Harm is not likely to arise to someone or something from the hazard which has been identified.

APPENDIX I

Proposed Site Layout Plan



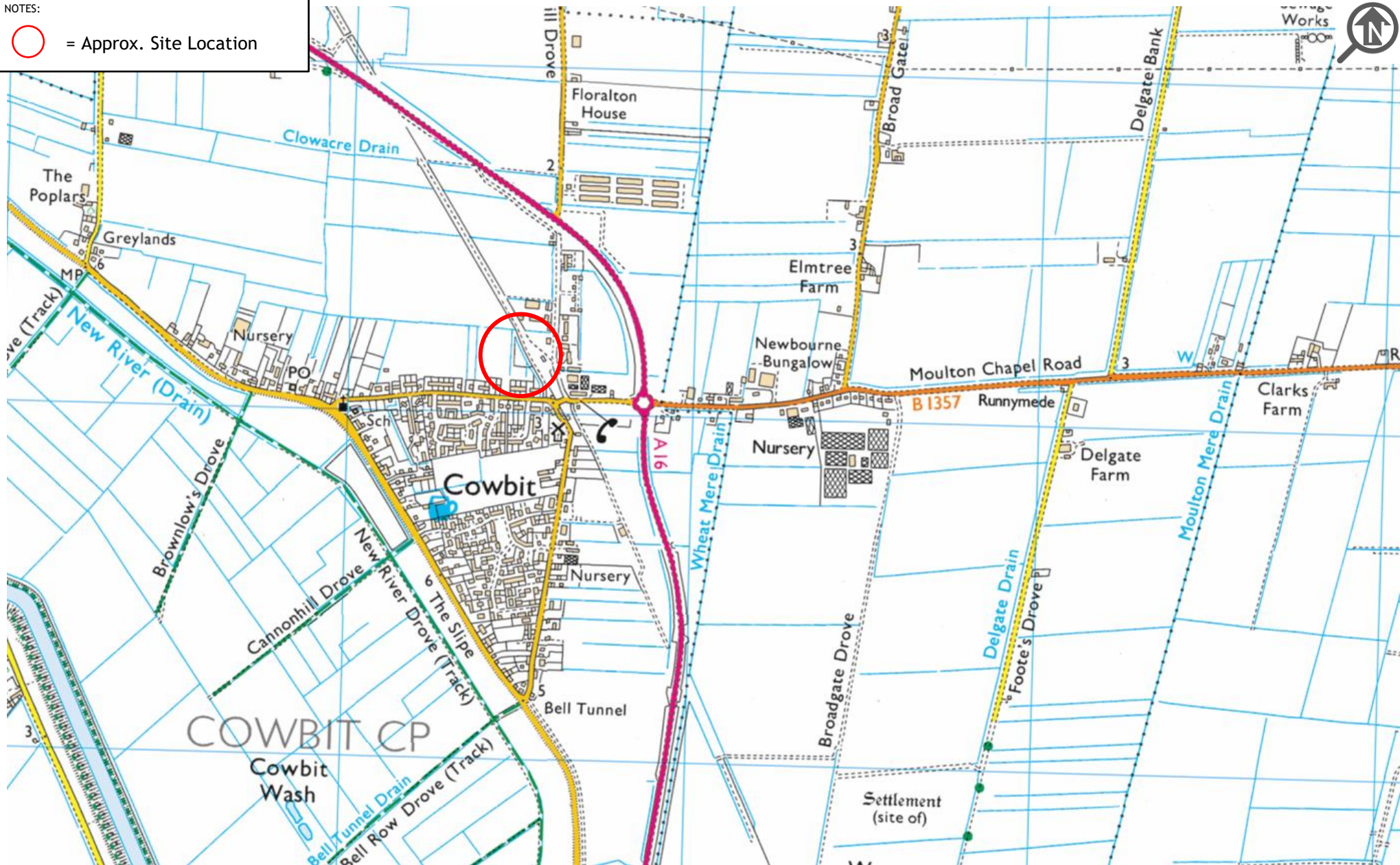
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		DRAWING No: E22208_001	DESIGN/DRAWN: JR	

APPENDIX II

Site Location Plan

NOTES:

 = Approx. Site Location



CLIENT:



TITLE:

Site Location Plan

DATE:

Jan. 2023

SCALE@SIZE:

NOT TO SCALE

DRAWING No:

E22208_002

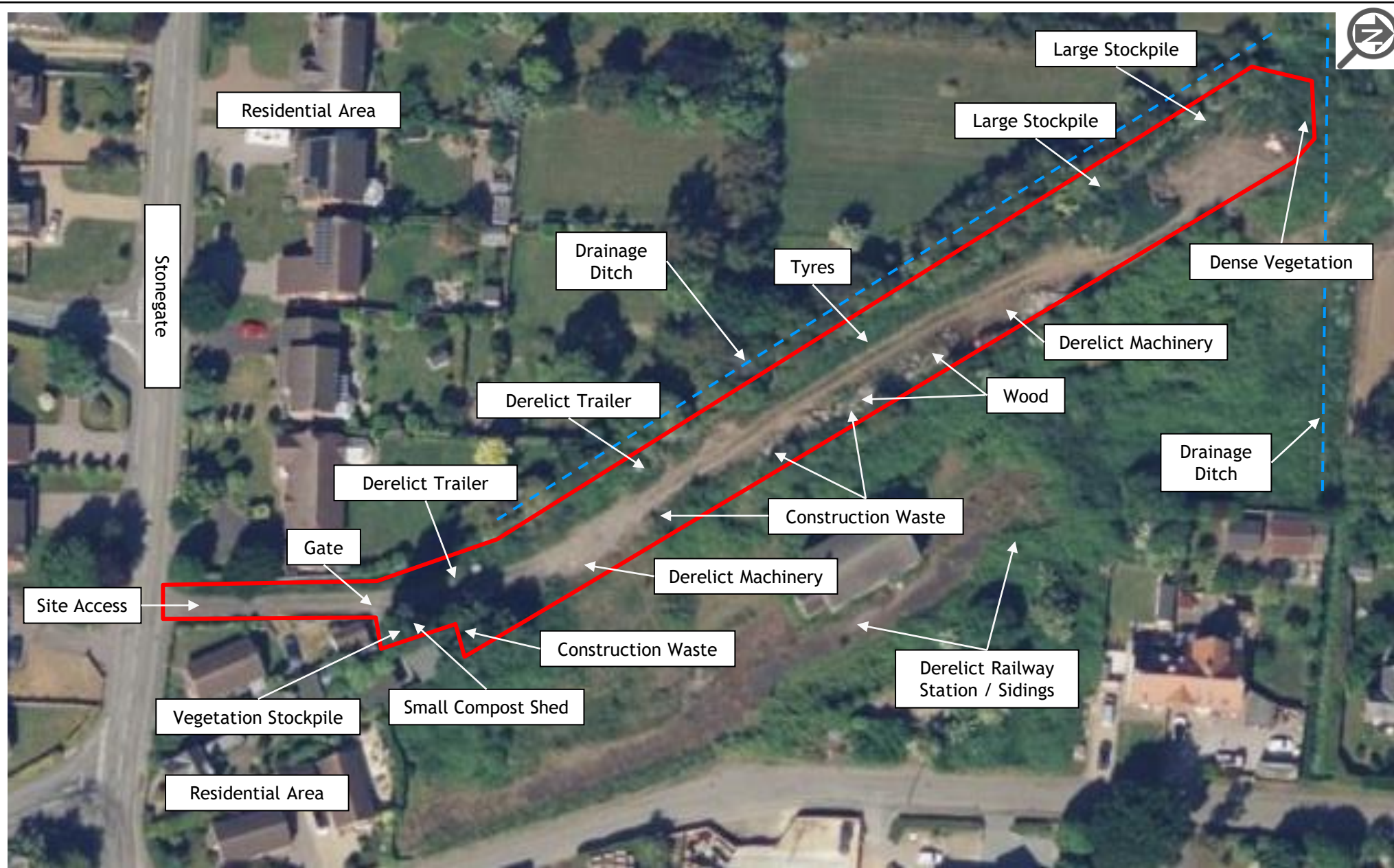
DESIGN/DRAWN:

JR

Elemental GI Ltd

APPENDIX III

Site Features Plan



CLIENT:



TITLE:

Site Features Plan

DATE:

Jan. 2023

DRAWING No:

E22208_003

SCALE@SIZE:

NOT TO SCALE

DESIGN/DRAWN:

JR

Elemental GI Ltd

APPENDIX IV

General Photographic Record



Photo 1 - View of Site Facing Southwards Towards Entrance.



Photo 2 - Construction Waste Stockpile near Site Entrance.



Photo 3 - View of Site Facing Northwards From Site Entrance.



Photo 4 - Stockpiles and Derelict Trailer.

CLIENT:



TITLE:

General Site Photographs

DATE:

Jan. 2023

DRAWING No:

E22208_003a

SCALE@SIZE:

NOT TO SCALE

DESIGN/DRAWN:

JR

Elemental GI Ltd



Photo 5 - Stockpiles and Waste Along Eastern Boundary.



Photo 6 - View of Site Facing Southwards.



Photo 7 - Stockpile in Northern Area of Site.



Photo 8 - Drilling of WS06.

CLIENT:



TITLE:

General Site Photographs

DATE:

Jan. 2023

DRAWING No:

E22208_003b

SCALE@SIZE:

NOT TO SCALE

DESIGN/DRAWN:

JR

Elemental GI Ltd

APPENDIX V

Site Investigation Plan

NOTES:



Approx. Site Boundary



Approx. Location of Boreholes



Approx. Location of Ground Gas Monitoring Wells



Approx. Location of Hand Dug Trial Pits



CLIENT:



TITLE:

Exploratory Hole Layout Plan

DATE:

Jan. 2023

DRAWING No:

E22208_005

SCALE@SIZE:

NOT TO SCALE

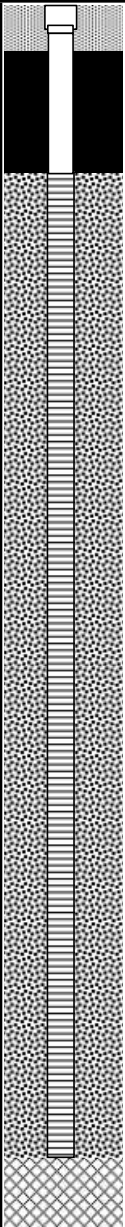
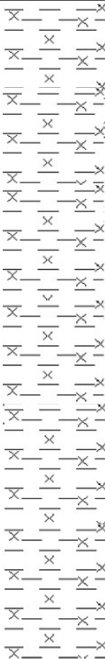
DESIGN/DRAWN:

JR

Elemental GI Ltd

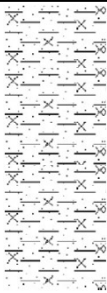
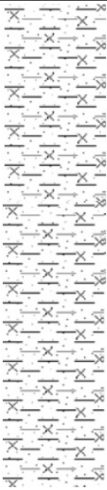
APPENDIX VI

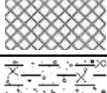
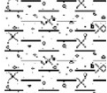
Exploratory Hole Logs

Site:		Land North of Stonegate, Cowbit		Elemental GI Ltd			
Client:		Ark Property Centre					
Contractor: RP Drilling			Project No: E22208		Sheet: 1 of 1	WS01	
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th December 2022		
Field Monitoring and Sampling			Strata			Legend	Well
Depth	Type	Result	Depth	Description			
(m)		(SPT)(HSV)	(m)				
0.10	JT	N = 5	0.25	MADE GROUND (Comprising black ashy slightly silty subangular and fine to coarse gravel of clinker).			
0.50	T		1.00	MADE GROUND (Comprising brown gravelly clay/silt. Gravel is subangular and fine to coarse of brick, concrete and clinker). ... with suspected asbestos containing debris present at 0.50m depth.			
0.60	JT						
1.50	B		HSV @ 1.50m = 15	1.25	MADE GROUND (Comprising brown and black silty sandy subangular to subrounded and fine to coarse gravel of mixed lithology including rare fragments of brick).		
		HSV @ 1.70m = 38	1.40	MADE GROUND (Comprising reworked grey sandy clay/silt with rare subangular and medium to coarse gravel of limestone/concrete).			
		HSV @ 1.90m = 45	2m	Soft brown and greyish brown mottled slightly sandy CLAY/SILT. ... with a very silty/sandy band present between 1.50m and 1.60m depth.			
		HSV @ 2.00m = 28					
		HSV @ 2.50m = 18	2.30	Very soft grey and brown mottled CLAY/SILT with rare decayed roots/organic matter.			
		HSV @ 2.70m = 18	3m	... with a pocket of more frequent organic matter present between 2.90m and 3.30m depth.			
3.00	T	N = 2					
		HSV @ 3.50m = 8					
		HSV @ 3.70m = 10	4m				
		N = 3					
		N = 4	5.00	Borehole completed at 5.00m depth.			
Water Observations: Water encountered at 2.80m depth during drilling.							
Remarks: 1) Borehole terminated on completion of testing at 5.00m depth. 2) Borehole completed as a monitoring well.							
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon. HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm ²)							

Site:		Land North of Stonegate, Cowbit		Elemental GI Ltd	
Client:		Ark Property Centre			
Contractor: RP Drilling			Project No: E22208		Sheet: 1 of 1
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th December 2022
Field Monitoring and Sampling			Strata		Legend Well
Depth	Type	Result	Depth	Description	
(m)		(SPT)(HSV)	(m)		
0.40	JT		0.55	MADE GROUND (Comprising brown slightly silty slightly sandy subangular and fine to coarse gravel of mixed lithology including fragments of concrete and brick).	
			0.80	MADE GROUND (Comprising orange and greyish brown slightly sandy subangular and fine to coarse gravel of concrete and brick).	
1.00	JTB	HSV @ 0.90m = 55 N = 5	1m	Firm greyish brown slightly sandy CLAY/SILT with frequent black organic inclusions.	
		HSV @ 1.50m = 38		... with organic inclusions absent and becoming brown and grey mottled from 1.20m depth.	
		HSV @ 1.75m = 42			
		HSV @ 1.85m = 50			
		HSV @ 1.95m = 42	2m		
		N = 0	2.10	Soft grey and brown mottled CLAY/SILT.	
		HSV @ 2.50m = 2		... becoming grey and brownish grey mottled from 2.40m depth.	
				... with frequent pockets of decayed organic matter present from 2.70m depth.	
3.00	TB	N = 1	3m	... becoming very soft from 3.00m begl.	
		N = 3	4.00	Borehole completed at 4.00m depth.	
			5m		
Water Observations: No water encountered during drilling.					
Remarks: 1) Borehole terminated on completion of testing at 4.00m depth. 2) Borehole collapsed to 2.96m depth after drilling.					
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon. HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm ²)					

Site:	Land North of Stonegate, Cowbit			Elemental GI Ltd		
Client:	Ark Property Centre					
Contractor: RP Drilling		Project No: E22208		Sheet: 1 of 1	WS03	
Equipment: Window Sampler Drilling Rig		Logged by: JR		Date: 12th December 2022		
Field Monitoring and Sampling			Strata		Legend	Well
Depth (m)	Type	Result (SPT)(HSV)	Depth (m)	Description		
0.05	JV		0.10	MADE GROUND (Comprising reworked dark brown sandy silty topsoil with rootlets).		
				MADE GROUND (Comprising brown, light brown and black slightly silty sandy subangular and fine to coarse gravel of limestone, sandstone, siltstone and clinker).		
0.80	T	HSV @ 0.80m = 52	0.65	Firm brown and grey and orangish brown mottled slightly sandy CLAY/SILT.		
1.00	B	HSV @ 0.90m = 38 N = 6	0.95	Soft to firm grey and orangish brown mottled very sandy SILT.		
		HSV @ 1.50m = 16		... becoming very soft and sandy from 1.50m depth.		
		HSV @ 1.75m = 28 HSV @ 1.90m = 15 N = 0	2m	... becoming slightly sandy from 2.40m depth.		
		HSV @ 2.50m = 16	2.80	Very soft to soft grey and orangish brown mottled slightly sandy SILT.		
3.00-4.00	T	N = 1	3m	... becoming predominantly grey and with rare pockets of decayed organic matter present from 3.35m depth.		
		N = 1	4m			
		N = 1	5.00			
				Borehole completed at 5.00m depth.		
Water Observations: No water encountered during drilling.						
Remarks: 1) Borehole terminated on completion of testing at 5.00m depth. 2) Borehole collapsed to 3.00m depth after drilling.						
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon. HSV = Hand Shear Vane (kPa), PP = Pocket Penetrometer (daN/cm ²)						

Site:		Land North of Stonegate, Cowbit		Elemental GI Ltd			
Client:		Ark Property Centre					
Contractor: RP Drilling			Project No: E22208		Sheet: 1 of 1	WS04	
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th December 2022		
Field Monitoring and Sampling			Strata			Legend	Well
Depth	Type	Result	Depth	Description			
(m)		(SPT)(HSV)	(m)				
0.20	JVT		0.10	MADE GROUND (Comprising reworked dark brown sandy silty topsoil with rootlets).			
				MADE GROUND (Comprising brown, orange and grey subangular and fine to coarse gravel of brick, concrete, flint and siltstone with frequent clay/silt pockets).			
1.00	B	HSV @ 0.85m = 26 N = 5	0.80	Soft to firm grey and orangish brown mottled very sandy SILT.			
				... becoming clayey and slightly sandy from 1.40m depth.			
1.70	JT	HSV @ 1.60m = 32		... becoming very soft from 1.80m depth.			
1.90	B	HSV @ 1.80m = 20					
		N = 0	2.00	Very soft to soft brown and grey mottled sandy CLAY/SILT.			
		HSV @ 2.00m = 32		... becoming very soft from 2.40m depth.			
		HSV @ 2.40m = 4		... with rare black pockets and decayed rootlets present from 2.60m depth.			
		HSV @ 2.60m = 10		... with rare pockets of decayed organic matter from 3.50m depth.			
		N = 3	3m	... with frequent pockets of decayed organic matter from 3.80m depth.			
		N = 4	4.00	Borehole completed at 4.00m depth.			
			5m				
Water Observations: Water encountered at 3.20m depth during drilling.							
Remarks: 1) Borehole terminated on completion of testing at 4.00m depth. 2) Borehole collapsed to 3.52m depth after drilling.							
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon. HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm ²)							

Site:		Land North of Stonegate, Cowbit			Elemental GI Ltd			
Client:		Ark Property Centre						
Contractor: RP Drilling			Project No: E22208		Sheet: 1 of 1		WS05	
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th December 2022			
Field Monitoring and Sampling			Strata				Legend	Well
Depth	Type	Result	Depth	Description				
(m)		(SPT)(HSV)	(m)					
0.10	JVT	N = 3		MADE GROUND (Comprising reworked dark brown sandy silty topsoil with rootlets).				
			0.35	MADE GROUND (Comprising grey, yellow and orange subangular and fine to coarse fragments of sandstone, siltstone and brick in a brown clay/silt matrix).				
1.00	JV		0.90	MADE GROUND (Comprising grey and orangish brown mottled very sandy very gravelly clay/silt. Gravel is subangular and fine to medium of mixed lithology including clinker).				
1.50	JTB		1.35	Very soft grey slightly sandy slightly gravelly CLAY/SILT. (Appears reworked)				
		HSV @ 1.65m = 22 HSV @ 1.80m = 12 HSV @ 1.90m = 18 N = 0	2m	... possibly reworked to 2.50m depth.				
3.00	T 	N = 3	3m	... becoming black and with frequent organic inclusions present between 2.85m and 3.25m depth.				
		N = 4	4.00	Borehole completed at 4.00m depth.				
			5m					
Water Observations: Water encountered at 3.00m depth during drilling.								
Remarks: 1) Borehole terminated on completion of testing at 4.00m depth. 2) Borehole collapsed to 3.30m depth after drilling.								
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon. HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm ²)								

Site:		Land North of Stonegate, Cowbit		Elemental GI Ltd			
Client:		Ark Property Centre					
Contractor: RP Drilling			Project No: E22208		Sheet: 1 of 1	WS06	
Equipment: Window Sampler Drilling Rig			Logged by: JR		Date: 12th December 2022		
Field Monitoring and Sampling			Strata			Legend	Well
Depth	Type	Result	Depth	Description			
(m)		(SPT)(HSV)	(m)				
0.40	JVT	N = 9	0.10	MADE GROUND (Comprising reworked dark brown sandy silty topsoil with rootlets).			
				MADE GROUND (Comprising grey, yellow and orange subangular and fine to coarse fragments of sandstone, siltstone and brick in a brown clay/silt matrix).			
1.10	JT		1.05	Firm to stiff grey and brown mottled slightly sandy CLAY.			
2.00	B	HSV @ 1.40m = 72	2m	... with a soft band present between 1.50m and 1.60m depth.			
		HSV @ 1.55m = 48					
		HSV @ 1.70m = 52					
3.00	B	HSV @ 1.90m = 32	3m	... becoming soft from 2.00m depth.			
		N = 3					
		HSV @ 2.20m = 26					
5.00	T	HSV @ 2.50m = 28	4m	Very soft grey CLAY/SILT with frequent black organic inclusions and decayed organic matter.			
		HSV @ 2.75m = 25					
		HSV @ 2.90m = 12					
		N = 0		... with organic matter absent between 3.00m and 3.60m depth.			
		HSV @ 3.50m = 10					
		N = 3					
				... with vegetation/organic matter becoming abundant from 4.85m depth.			
				Borehole completed at 5.00m depth.			
Water Observations:							
No water encountered during drilling.							
Remarks:							
1) Borehole terminated on completion of testing at 5.00m depth.							
2) Borehole completed as a monitoring well.							
Where unaccompanied by in situ tests, strength descriptions of soils are based on Engineer's field description(s) and must not be relied upon.							
HSV = Hand Shear Vane (kPa). PP = Pocket Penetrometer (daN/cm ²)							

APPENDIX VII

Laboratory Testing Data



Final Report

Report No.: 22-48097-1
Initial Date of Issue: 04-Jan-2023
Client Elemental GI Ltd

Project E22208 Station Yard, Cowbit

Quotation No.: Q22-27689

Date Received: 15-Dec-2022

Order No.: E22208/Cowbit

Date Instructed: 15-Dec-2022

No. of Samples: 11

Turnaround (Wkdays): 5

Results Due: 21-Dec-2022

Date Approved: 04-Jan-2023

Approved By:

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565180	1565181	1565182	1565183	1565184	1565185	1565186	1565187	1565188
	Sample Location:				WS01	WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	3.00	0.40	1.00	0.05	1.70	0.10	1.00	0.40
	Date Sampled:				12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022
	Asbestos Lab:				DURHAM		DURHAM				NEW-ASB		
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	Cement		-				-		
Asbestos Identification	U	2192		N/A	Chrysotile		No Asbestos Detected				No Asbestos Detected		
Moisture	N	2030	%	0.020		43	14	20	22	24	7.7	16	23
pH	M	2010		4.0		7.9	8.5	8.3	8.0	8.3	8.3	8.4	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		0.019	0.11	0.038	0.084	0.055	0.062	0.055	
Arsenic	M	2455	mg/kg	0.5			13	5.6	12	7.7	13	15	
Cadmium	M	2455	mg/kg	0.10			0.20	< 0.10	0.37	< 0.10	0.29	0.13	
Chromium	M	2455	mg/kg	0.5			53	13	38	19	16	16	
Copper	M	2455	mg/kg	0.50			23	9.1	43	13	71	38	
Mercury	M	2455	mg/kg	0.05			< 0.05	< 0.05	0.10	< 0.05	0.23	0.09	
Nickel	M	2455	mg/kg	0.50			23	13	18	23	15	17	
Lead	M	2455	mg/kg	0.50			52	11	130	14	170	28	
Selenium	M	2455	mg/kg	0.25			1.7	0.36	1.2	0.60	1.2	0.87	
Zinc	M	2455	mg/kg	0.50			170	29	200	40	88	47	
Chromium (Hexavalent)	N	2490	mg/kg	0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Total Organic Carbon	M	2625	%	0.20		6.0	3.4	1.8	13	1.0	5.8	3.9	
TPH >C6-C10	N	2670	mg/kg	1.0					< 1.0				< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0					70				< 1.0
TPH >C21-C40	N	2670	mg/kg	1.0					600				< 1.0
Total TPH >C6-C40	M	2670	mg/kg	10					670				< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0							< 1.0		
Chloromethane	M	2760	µg/kg	1.0							< 1.0		
Vinyl Chloride	M	2760	µg/kg	1.0							< 1.0		
Bromomethane	M	2760	µg/kg	20							< 20		
Chloroethane	U	2760	µg/kg	2.0							< 2.0		
Trichlorofluoromethane	M	2760	µg/kg	1.0							< 1.0		
1,1-Dichloroethene	M	2760	µg/kg	1.0							< 1.0		
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0							< 1.0		
1,1-Dichloroethane	M	2760	µg/kg	1.0							< 1.0		
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0							< 1.0		
Bromochloromethane	U	2760	µg/kg	5.0							< 5.0		
Trichloromethane	M	2760	µg/kg	1.0							< 1.0		
1,1,1-Trichloroethane	M	2760	µg/kg	1.0							< 1.0		
Tetrachloromethane	M	2760	µg/kg	1.0							< 1.0		
1,1-Dichloropropene	U	2760	µg/kg	1.0							< 1.0		
Benzene	M	2760	µg/kg	1.0							< 1.0		
1,2-Dichloroethane	M	2760	µg/kg	2.0							< 2.0		
Trichloroethene	N	2760	µg/kg	1.0							< 1.0		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565180	1565181	1565182	1565183	1565184	1565185	1565186	1565187	1565188
	Sample Location:				WS01	WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	3.00	0.40	1.00	0.05	1.70	0.10	1.00	0.40
	Date Sampled:				12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022
	Asbestos Lab:				DURHAM		DURHAM				NEW-ASB		
Determinand	Accred.	SOP	Units	LOD									
1,2-Dichloropropane	M	2760	µg/kg	1.0							< 1.0		
Dibromomethane	M	2760	µg/kg	1.0							< 1.0		
Bromodichloromethane	M	2760	µg/kg	5.0							< 5.0		
cis-1,3-Dichloropropene	N	2760	µg/kg	10							< 10		
Toluene	M	2760	µg/kg	1.0							< 1.0		
Trans-1,3-Dichloropropene	N	2760	µg/kg	10							< 10		
1,1,2-Trichloroethane	M	2760	µg/kg	10							< 10		
Tetrachloroethene	M	2760	µg/kg	1.0							< 1.0		
1,3-Dichloropropane	U	2760	µg/kg	2.0							< 2.0		
Dibromochloromethane	U	2760	µg/kg	10							< 10		
1,2-Dibromoethane	M	2760	µg/kg	5.0							< 5.0		
Chlorobenzene	M	2760	µg/kg	1.0							< 1.0		
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0							< 2.0		
Ethylbenzene	M	2760	µg/kg	1.0							< 1.0		
m & p-Xylene	M	2760	µg/kg	1.0							< 1.0		
o-Xylene	M	2760	µg/kg	1.0							< 1.0		
Styrene	M	2760	µg/kg	1.0							< 1.0		
Tribromomethane	U	2760	µg/kg	1.0							< 1.0		
Isopropylbenzene	M	2760	µg/kg	1.0							< 1.0		
Bromobenzene	M	2760	µg/kg	1.0							< 1.0		
1,2,3-Trichloropropane	N	2760	µg/kg	50							< 50		
N-Propylbenzene	U	2760	µg/kg	1.0							< 1.0		
2-Chlorotoluene	M	2760	µg/kg	1.0							< 1.0		
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0							< 1.0		
4-Chlorotoluene	U	2760	µg/kg	1.0							< 1.0		
Tert-Butylbenzene	U	2760	µg/kg	1.0							< 1.0		
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0							< 1.0		
Sec-Butylbenzene	U	2760	µg/kg	1.0							< 1.0		
1,3-Dichlorobenzene	M	2760	µg/kg	1.0							< 1.0		
4-Isopropyltoluene	U	2760	µg/kg	1.0							< 1.0		
1,4-Dichlorobenzene	M	2760	µg/kg	1.0							< 1.0		
N-Butylbenzene	U	2760	µg/kg	1.0							< 1.0		
1,2-Dichlorobenzene	M	2760	µg/kg	1.0							< 1.0		
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50							< 50		
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0							< 1.0		
Hexachlorobutadiene	N	2760	µg/kg	1.0							< 1.0		
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0							< 2.0		
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0							< 1.0		
N-Nitrosodimethylamine	M	2790	mg/kg	0.50							< 0.50		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565180	1565181	1565182	1565183	1565184	1565185	1565186	1565187
	Sample Location:				WS01	WS01	WS02	WS02	WS03	WS04	WS05	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	3.00	0.40	1.00	0.05	1.70	0.10	1.00
	Date Sampled:				12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022
	Asbestos Lab:				DURHAM		DURHAM				NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
Phenol	M	2790	mg/kg	0.50							< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50							< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50							< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50							< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50							< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50							< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50							< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50							< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50							< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50							< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50							< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50							< 0.50	
Isophorone	M	2790	mg/kg	0.50							< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50							< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50							< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50							< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50							< 0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50							< 0.50	
Naphthalene	M	2790	mg/kg	0.50							< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50							< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50							< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50							< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50							< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50							< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50							< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50							< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50							< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50							< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50							< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50							< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50							< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50							< 0.50	
Acenaphthene	M	2790	mg/kg	0.50							< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50							< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50							< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50							< 0.50	
2,4-Dinitrotoluene	M	2790	mg/kg	0.50							< 0.50	
Fluorene	M	2790	mg/kg	0.50							< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50							< 0.50	

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565180	1565181	1565182	1565183	1565184	1565185	1565186	1565187	1565188	1565188
	Sample Location:				WS01	WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	3.00	0.40	1.00	0.05	1.70	0.10	1.00	0.40	0.40
	Date Sampled:				12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022
	Asbestos Lab:				DURHAM		DURHAM				NEW-ASB			
Determinand	Accred.	SOP	Units	LOD										
4-Nitroaniline	M	2790	mg/kg	0.50							< 0.50			
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50							< 0.50			
Azobenzene	M	2790	mg/kg	0.50							< 0.50			
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50							< 0.50			
Hexachlorobenzene	M	2790	mg/kg	0.50							< 0.50			
Pentachlorophenol	N	2790	mg/kg	0.50							< 0.50			
Phenanthrene	M	2790	mg/kg	0.50							3.2			
Anthracene	M	2790	mg/kg	0.50							1.1			
Carbazole	M	2790	mg/kg	0.50							< 0.50			
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50							< 0.50			
Fluoranthene	M	2790	mg/kg	0.50							11			
Pyrene	M	2790	mg/kg	0.50							10			
Butylbenzyl Phthalate	M	2790	mg/kg	0.50							< 0.50			
Benzo[a]anthracene	M	2790	mg/kg	0.50							7.8			
Chrysene	M	2790	mg/kg	0.50							8.2			
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50							< 0.50			
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50							< 0.50			
Benzo[b]fluoranthene	M	2790	mg/kg	0.50							12			
Benzo[k]fluoranthene	M	2790	mg/kg	0.50							4.5			
Benzo[a]pyrene	M	2790	mg/kg	0.50							9.9			
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50							5.8			
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50							1.4			
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50							6.4			
Naphthalene	M	2800	mg/kg	0.10			0.28	< 0.10	0.36	< 0.10	1.7	0.30		
Acenaphthylene	N	2800	mg/kg	0.10			< 0.10	< 0.10	0.30	< 0.10	0.63	< 0.10		
Acenaphthene	M	2800	mg/kg	0.10			0.12	< 0.10	0.25	< 0.10	0.69	< 0.10		
Fluorene	M	2800	mg/kg	0.10			< 0.10	< 0.10	0.24	< 0.10	0.78	< 0.10		
Phenanthrene	M	2800	mg/kg	0.10			1.2	0.12	4.1	< 0.10	11	0.73		
Anthracene	M	2800	mg/kg	0.10			0.33	< 0.10	1.5	< 0.10	3.2	0.26		
Fluoranthene	M	2800	mg/kg	0.10			3.4	0.16	14	0.26	32	1.0		
Pyrene	M	2800	mg/kg	0.10			3.1	0.18	13	0.27	29	0.91		
Benzo[a]anthracene	M	2800	mg/kg	0.10			1.8	< 0.10	8.7	0.17	17	0.46		
Chrysene	M	2800	mg/kg	0.10			2.0	< 0.10	9.1	0.16	17	0.61		
Benzo[b]fluoranthene	M	2800	mg/kg	0.10			2.7	< 0.10	13	0.28	24	0.58		
Benzo[k]fluoranthene	M	2800	mg/kg	0.10			1.2	< 0.10	5.6	0.10	10	0.21		
Benzo[a]pyrene	M	2800	mg/kg	0.10			2.4	< 0.10	13	0.18	23	0.39		
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10			1.6	< 0.10	9.2	0.18	15	0.28		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10			0.28	< 0.10	1.7	< 0.10	2.5	< 0.10		
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10			1.3	< 0.10	7.8	0.15	12	0.23		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565180	1565181	1565182	1565183	1565184	1565185	1565186	1565187	1565188
	Sample Location:				WS01	WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	3.00	0.40	1.00	0.05	1.70	0.10	1.00	0.40
	Date Sampled:				12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022	12-Dec-2022
	Asbestos Lab:				DURHAM		DURHAM				NEW-ASB		
Determinand	Accred.	SOP	Units	LOD									
Total Of 16 PAH's	N	2800	mg/kg	2.0			22	< 2.0	100	< 2.0	200	6.0	
PCB 28	U	2815	mg/kg	0.010								< 0.010	
PCB 52	U	2815	mg/kg	0.010								< 0.010	
PCB 90+101	U	2815	mg/kg	0.010								< 0.010	
PCB 118	U	2815	mg/kg	0.010								< 0.010	
PCB 153	U	2815	mg/kg	0.010								< 0.010	
PCB 138	U	2815	mg/kg	0.010								< 0.010	
PCB 180	U	2815	mg/kg	0.010								< 0.010	
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10								< 0.10	
Total Phenols	M	2920	mg/kg	0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565189	1565190
	Sample Location:				WS06	WS06
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.10	5.00
	Date Sampled:				12-Dec-2022	12-Dec-2022
	Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A		
Asbestos Identification	U	2192		N/A		
Moisture	N	2030	%	0.020	15	50
pH	M	2010		4.0	8.5	8.2
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.054	0.019
Arsenic	M	2455	mg/kg	0.5	19	
Cadmium	M	2455	mg/kg	0.10	< 0.10	
Chromium	M	2455	mg/kg	0.5	33	
Copper	M	2455	mg/kg	0.50	30	
Mercury	M	2455	mg/kg	0.05	0.23	
Nickel	M	2455	mg/kg	0.50	32	
Lead	M	2455	mg/kg	0.50	66	
Selenium	M	2455	mg/kg	0.25	1.1	
Zinc	M	2455	mg/kg	0.50	88	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Total Organic Carbon	M	2625	%	0.20	2.6	4.0
TPH >C6-C10	N	2670	mg/kg	1.0		
TPH >C10-C21	N	2670	mg/kg	1.0		
TPH >C21-C40	N	2670	mg/kg	1.0		
Total TPH >C6-C40	M	2670	mg/kg	10		
Dichlorodifluoromethane	U	2760	µg/kg	1.0		
Chloromethane	M	2760	µg/kg	1.0		
Vinyl Chloride	M	2760	µg/kg	1.0		
Bromomethane	M	2760	µg/kg	20		
Chloroethane	U	2760	µg/kg	2.0		
Trichlorofluoromethane	M	2760	µg/kg	1.0		
1,1-Dichloroethene	M	2760	µg/kg	1.0		
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0		
1,1-Dichloroethane	M	2760	µg/kg	1.0		
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0		
Bromochloromethane	U	2760	µg/kg	5.0		
Trichloromethane	M	2760	µg/kg	1.0		
1,1,1-Trichloroethane	M	2760	µg/kg	1.0		
Tetrachloromethane	M	2760	µg/kg	1.0		
1,1-Dichloropropene	U	2760	µg/kg	1.0		
Benzene	M	2760	µg/kg	1.0		
1,2-Dichloroethane	M	2760	µg/kg	2.0		
Trichloroethene	N	2760	µg/kg	1.0		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565189	1565190
	Sample Location:				WS06	WS06
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.10	5.00
	Date Sampled:				12-Dec-2022	12-Dec-2022
	Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD		
1,2-Dichloropropane	M	2760	µg/kg	1.0		
Dibromomethane	M	2760	µg/kg	1.0		
Bromodichloromethane	M	2760	µg/kg	5.0		
cis-1,3-Dichloropropene	N	2760	µg/kg	10		
Toluene	M	2760	µg/kg	1.0		
Trans-1,3-Dichloropropene	N	2760	µg/kg	10		
1,1,2-Trichloroethane	M	2760	µg/kg	10		
Tetrachloroethene	M	2760	µg/kg	1.0		
1,3-Dichloropropane	U	2760	µg/kg	2.0		
Dibromochloromethane	U	2760	µg/kg	10		
1,2-Dibromoethane	M	2760	µg/kg	5.0		
Chlorobenzene	M	2760	µg/kg	1.0		
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0		
Ethylbenzene	M	2760	µg/kg	1.0		
m & p-Xylene	M	2760	µg/kg	1.0		
o-Xylene	M	2760	µg/kg	1.0		
Styrene	M	2760	µg/kg	1.0		
Tribromomethane	U	2760	µg/kg	1.0		
Isopropylbenzene	M	2760	µg/kg	1.0		
Bromobenzene	M	2760	µg/kg	1.0		
1,2,3-Trichloropropane	N	2760	µg/kg	50		
N-Propylbenzene	U	2760	µg/kg	1.0		
2-Chlorotoluene	M	2760	µg/kg	1.0		
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0		
4-Chlorotoluene	U	2760	µg/kg	1.0		
Tert-Butylbenzene	U	2760	µg/kg	1.0		
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0		
Sec-Butylbenzene	U	2760	µg/kg	1.0		
1,3-Dichlorobenzene	M	2760	µg/kg	1.0		
4-Isopropyltoluene	U	2760	µg/kg	1.0		
1,4-Dichlorobenzene	M	2760	µg/kg	1.0		
N-Butylbenzene	U	2760	µg/kg	1.0		
1,2-Dichlorobenzene	M	2760	µg/kg	1.0		
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50		
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0		
Hexachlorobutadiene	N	2760	µg/kg	1.0		
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0		
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0		
N-Nitrosodimethylamine	M	2790	mg/kg	0.50		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565189	1565190
	Sample Location:				WS06	WS06
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.10	5.00
	Date Sampled:				12-Dec-2022	12-Dec-2022
	Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD		
Phenol	M	2790	mg/kg	0.50		
2-Chlorophenol	M	2790	mg/kg	0.50		
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50		
1,3-Dichlorobenzene	M	2790	mg/kg	0.50		
1,4-Dichlorobenzene	N	2790	mg/kg	0.50		
1,2-Dichlorobenzene	M	2790	mg/kg	0.50		
2-Methylphenol	M	2790	mg/kg	0.50		
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50		
Hexachloroethane	N	2790	mg/kg	0.50		
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50		
4-Methylphenol	M	2790	mg/kg	0.50		
Nitrobenzene	M	2790	mg/kg	0.50		
Isophorone	M	2790	mg/kg	0.50		
2-Nitrophenol	N	2790	mg/kg	0.50		
2,4-Dimethylphenol	N	2790	mg/kg	0.50		
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50		
2,4-Dichlorophenol	M	2790	mg/kg	0.50		
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50		
Naphthalene	M	2790	mg/kg	0.50		
4-Chloroaniline	N	2790	mg/kg	0.50		
Hexachlorobutadiene	M	2790	mg/kg	0.50		
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50		
2-Methylnaphthalene	M	2790	mg/kg	0.50		
4-Nitrophenol	N	2790	mg/kg	0.50		
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50		
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50		
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50		
2-Chloronaphthalene	M	2790	mg/kg	0.50		
2-Nitroaniline	M	2790	mg/kg	0.50		
Acenaphthylene	M	2790	mg/kg	0.50		
Dimethylphthalate	M	2790	mg/kg	0.50		
2,6-Dinitrotoluene	M	2790	mg/kg	0.50		
Acenaphthene	M	2790	mg/kg	0.50		
3-Nitroaniline	N	2790	mg/kg	0.50		
Dibenzofuran	M	2790	mg/kg	0.50		
4-Chlorophenylphenylether	M	2790	mg/kg	0.50		
2,4-Dinitrotoluene	M	2790	mg/kg	0.50		
Fluorene	M	2790	mg/kg	0.50		
Diethyl Phthalate	M	2790	mg/kg	0.50		

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565189	1565190
	Sample Location:				WS06	WS06
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.10	5.00
	Date Sampled:				12-Dec-2022	12-Dec-2022
	Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD		
4-Nitroaniline	M	2790	mg/kg	0.50		
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50		
Azobenzene	M	2790	mg/kg	0.50		
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50		
Hexachlorobenzene	M	2790	mg/kg	0.50		
Pentachlorophenol	N	2790	mg/kg	0.50		
Phenanthrene	M	2790	mg/kg	0.50		
Anthracene	M	2790	mg/kg	0.50		
Carbazole	M	2790	mg/kg	0.50		
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50		
Fluoranthene	M	2790	mg/kg	0.50		
Pyrene	M	2790	mg/kg	0.50		
Butylbenzyl Phthalate	M	2790	mg/kg	0.50		
Benzo[a]anthracene	M	2790	mg/kg	0.50		
Chrysene	M	2790	mg/kg	0.50		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50		
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50		
Benzo[b]fluoranthene	M	2790	mg/kg	0.50		
Benzo[k]fluoranthene	M	2790	mg/kg	0.50		
Benzo[a]pyrene	M	2790	mg/kg	0.50		
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50		
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50		
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50		
Naphthalene	M	2800	mg/kg	0.10	0.23	
Acenaphthylene	N	2800	mg/kg	0.10	0.15	
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	
Fluorene	M	2800	mg/kg	0.10	< 0.10	
Phenanthrene	M	2800	mg/kg	0.10	1.1	
Anthracene	M	2800	mg/kg	0.10	0.44	
Fluoranthene	M	2800	mg/kg	0.10	2.1	
Pyrene	M	2800	mg/kg	0.10	1.6	
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.89	
Chrysene	M	2800	mg/kg	0.10	0.94	
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	0.73	
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.30	
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.55	
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	0.39	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.11	
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	0.34	

Results - Soil

Project: E22208 Station Yard, Cowbit

Client: Elemental GI Ltd	Chemtest Job No.:				22-48097	22-48097
Quotation No.: Q22-27689	Chemtest Sample ID.:				1565189	1565190
	Sample Location:				WS06	WS06
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.10	5.00
	Date Sampled:				12-Dec-2022	12-Dec-2022
	Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD		
Total Of 16 PAH's	N	2800	mg/kg	2.0	9.9	
PCB 28	U	2815	mg/kg	0.010		
PCB 52	U	2815	mg/kg	0.010		
PCB 90+101	U	2815	mg/kg	0.010		
PCB 118	U	2815	mg/kg	0.010		
PCB 153	U	2815	mg/kg	0.010		
PCB 138	U	2815	mg/kg	0.010		
PCB 180	U	2815	mg/kg	0.010		
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10		
Total Phenols	M	2920	mg/kg	0.10	< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
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
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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

Client: Elemental GI LTD

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 02/01/2023

Sampled By: Client - JR

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2532207

Hole No.: WS01

Sample Reference: Not Given

Sample Description: Brown slightly gravelly sandy CLAY

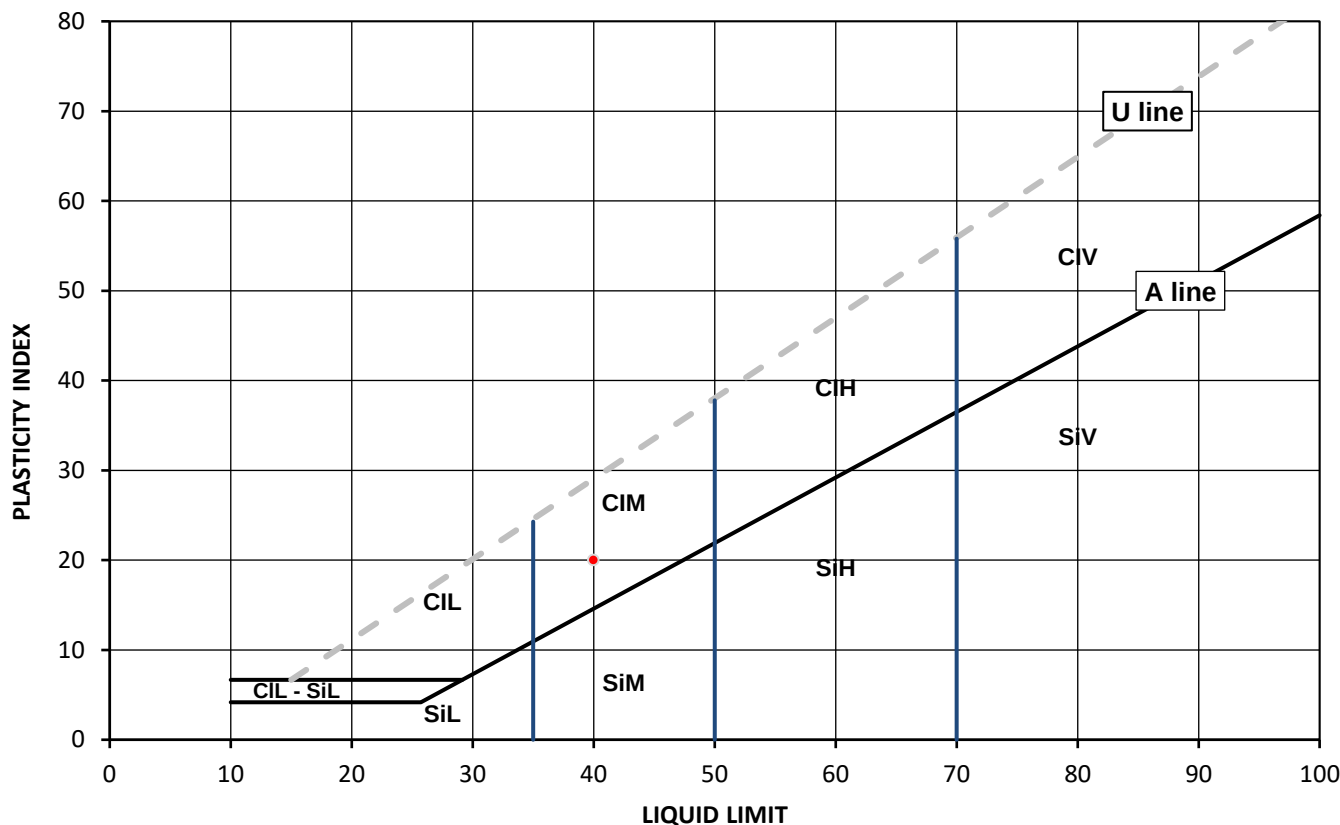
Depth Top [m]: 1.50

Depth Base [m]: Not Given

Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	40	20	20	88



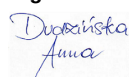
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Client: Elemental GI LTD

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 30/12/2022

Sampled By: Client - JR

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2532208

Hole No.: WS03

Sample Reference: Not Given

Sample Description: Brown slightly sandy CLAY

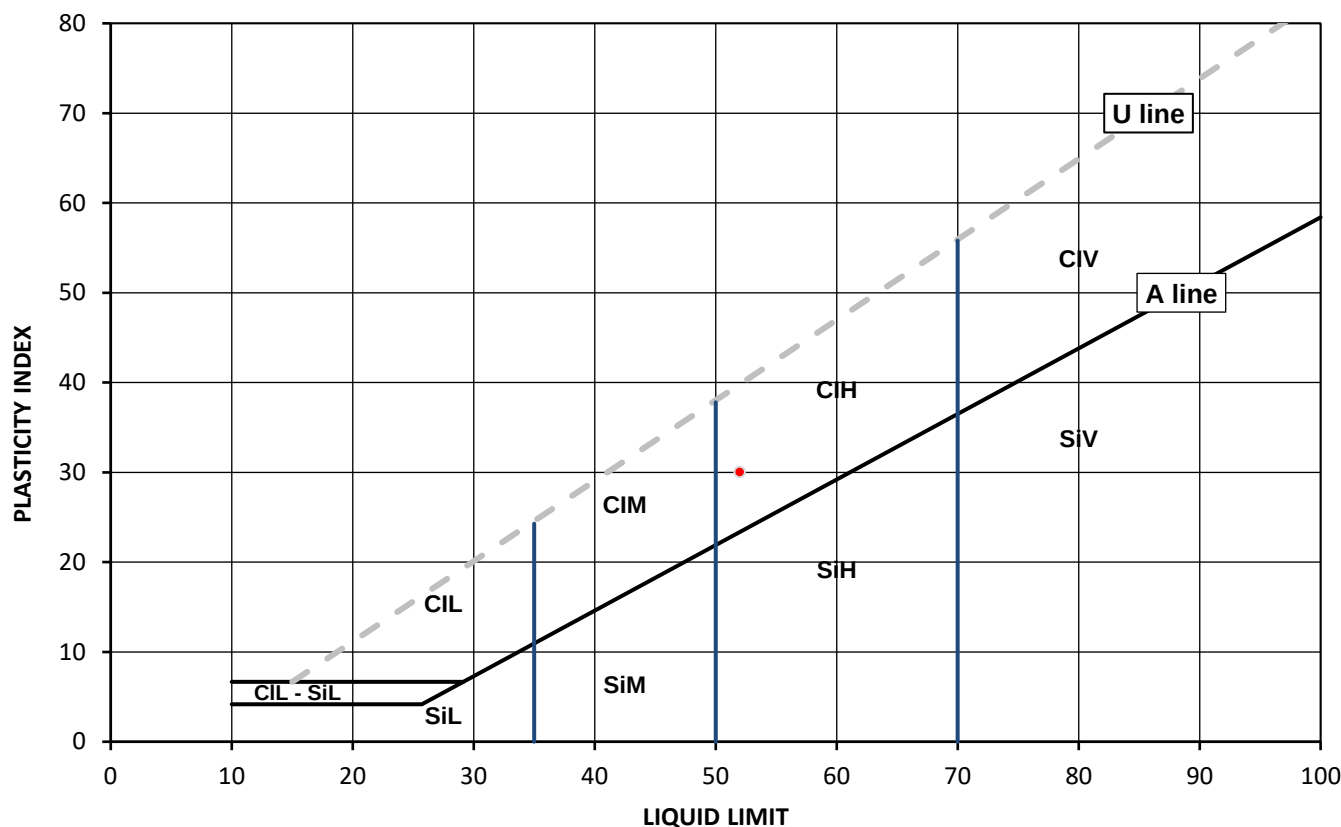
Depth Top [m]: 0.80

Depth Base [m]: Not Given

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	52	22	30	100



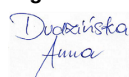
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Client: Elemental GI LTD

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 02/01/2023

Sampled By: Client - JR

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2532209

Hole No.: WS04

Sample Reference: Not Given

Sample Description: Brownish grey slightly sandy CLAY

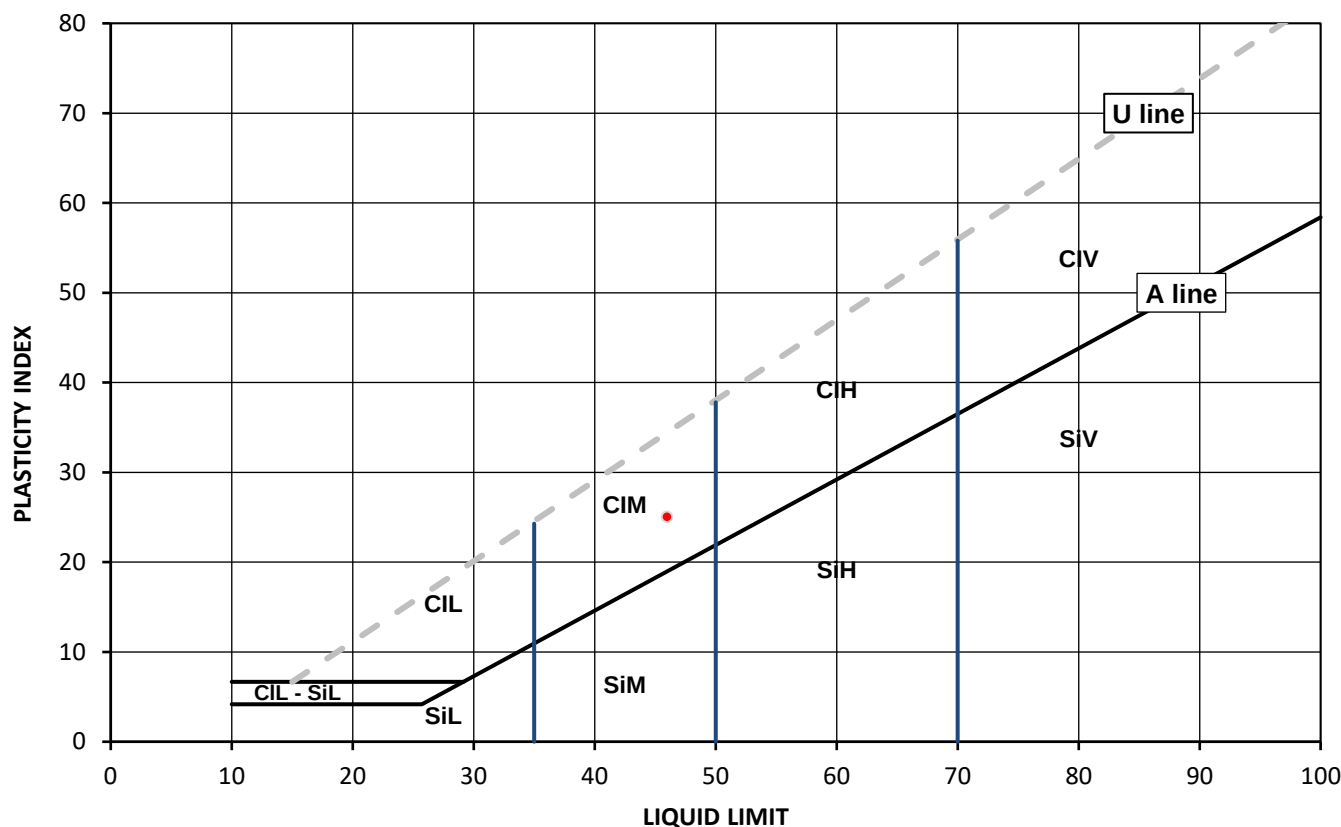
Depth Top [m]: 1.00

Depth Base [m]: Not Given

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	46	21	25	100



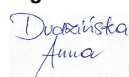
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt		M	Medium		35 to 50
			H	High		50 to 70
			V	Very high		exceeding 70
			O	Organic		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Client: Elemental GI LTD

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 03/01/2023

Sampled By: Client - JR

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2532210

Hole No.: WS06

Sample Reference: Not Given

Sample Description: Dark brown slightly sandy CLAY

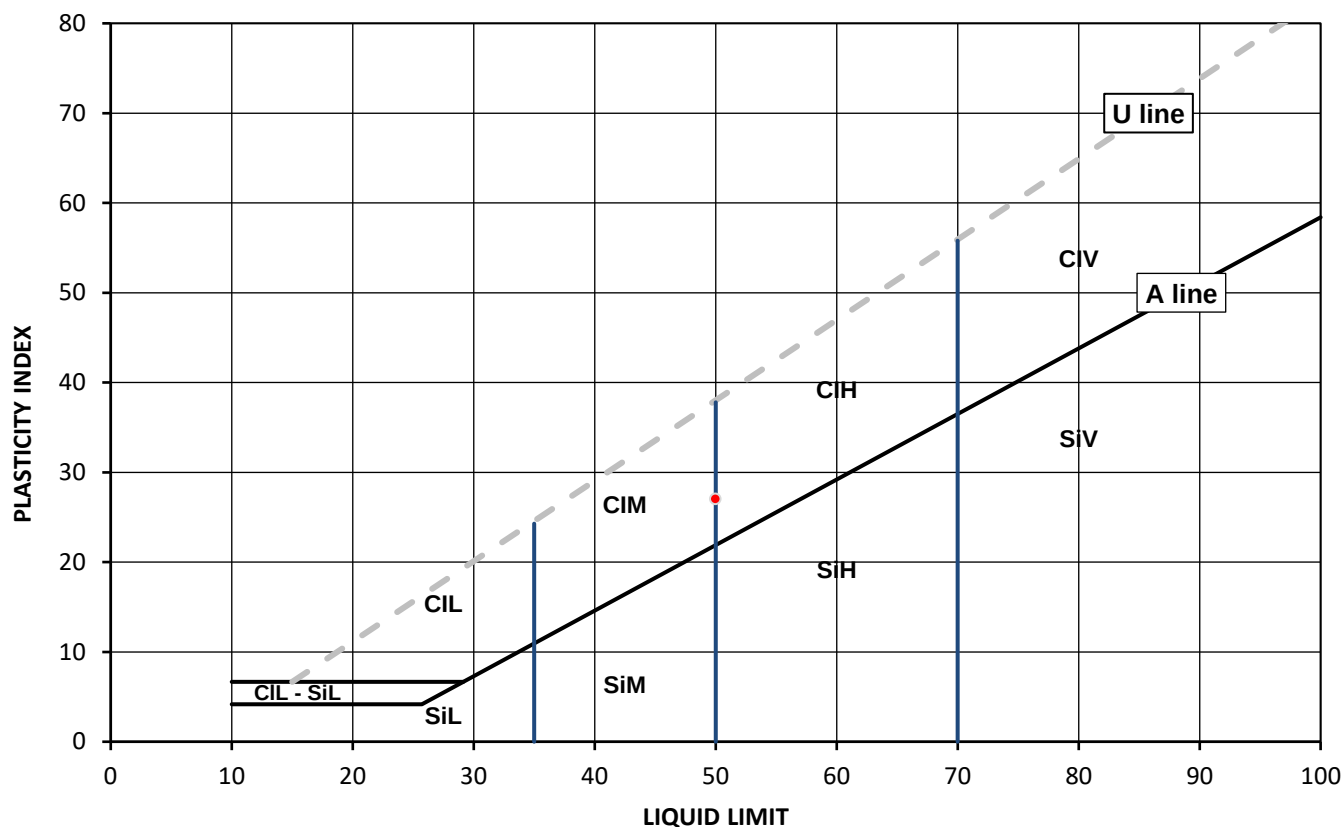
Depth Top [m]: 2.00

Depth Base [m]: Not Given

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
30	50	23	27	100



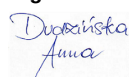
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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4041

Client:

Elemental GI LTD

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**SUMMARY OF CLASSIFICATION TEST RESULTS**

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
 Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
 1990: Clause 8.2

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Environmental Science

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 30/12/2022 - 03/01/2023

Sampled By: Client - JR

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2532207	WS01	Not Given	1.50	Not Given	B	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	27		88	40	20	20						
2532208	WS03	Not Given	0.80	Not Given	B	Brown slightly sandy CLAY	Atterberg 1 Point	25		100	52	22	30						
2532209	WS04	Not Given	1.00	Not Given	B	Brownish grey slightly sandy CLAY	Atterberg 1 Point	25		100	46	21	25						
2532210	WS06	Not Given	2.00	Not Given	B	Dark brown slightly sandy CLAY	Atterberg 1 Point	30		100	50	23	27						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Anna Dudzinska
 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



4041

Client:

Elemental GI LTD

SUMMARY REPORT**DETERMINATION OF WATER CONTENT**

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: E22208

Job Number: 22-13091

Date Sampled: Not Given

Date Received: 14/12/2022

Date Tested: 30/12/2022 - 03/01/2023

Sampled By: Client - JR

Site Address: Station yard, Cowbit

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2532207	WS01	Not Given	1.50	Not Given	B	Brown slightly gravelly sandy CLAY		27	Sample was quartered, oven dried at 106.1 °C			
2532208	WS03	Not Given	0.80	Not Given	B	Brown slightly sandy CLAY		25	Sample was quartered, oven dried at 106.8 °C			
2532209	WS04	Not Given	1.00	Not Given	B	Brownish grey slightly sandy CLAY		25	Sample was quartered, oven dried at 106.1 °C			
2532210	WS06	Not Given	2.00	Not Given	B	Dark brown slightly sandy CLAY		30	Sample was quartered, oven dried at 106.7 °C			

Comments:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

APPENDIX VI

Gas and Groundwater Monitoring Sheets

GROUND GAS MONITORING RECORD

Site:	E22208 - Land North of Stonegate, Cowbit	Engineer / Technician:	JR
Date:	20 th December 2022	Pressure (Start):	1005 mb
Equipment:	GFM 456 Gas Analyser and Dipmeter	Pressure (End):	1005 mb
Weather Observations:	Sunny, clear, dry and still.		

Borehole:	Methane (CH ₄ % v/v)		Carbon Dioxide (CO ₂ % v/v)		Oxygen (O ₂ % v/v)		Flow (l/hr)		Hydrogen Sulphide (H ₂ S ppm)	Carbon Monoxide (CO ppm)	Depth to Water (m)	Depth to Base (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
(Ambient)	-	0.0	-	0.0	-	20.6	N/A	N/A	0	0	N/A	N/A
WS01	1.9	1.9	1.0	1.0	5.5	5.5	0.0	0.0	0	0	2.70	4.87
WS06	0.0	0.0	0.7	0.7	19.9	19.9	0.0	0.0	0	0	3.40	4.75

Comments:

NOTES:

- Peak readings are the maximum results recorded for flow, CH₄ or CO₂ and the minimum results recorded for O₂.
- Steady readings are the values recorded after approx. 90 to 120 seconds of monitoring. Where values fluctuate then this period will have been lengthened.
- Gas analyser calibration certificates are available upon request.

GROUND GAS MONITORING RECORD

Site:	E22208 - Land North of Stonegate, Cowbit	Engineer / Technician:	JR
Date:	5 th January 2023	Pressure (Start):	1017 mb
Equipment:	GFM 456 Gas Analyser and Dipmeter	Pressure (End):	1017 mb
Weather Observations:	Slightly cloudy, dry and slightly breezy.		

Borehole:	Methane (CH ₄ % v/v)		Carbon Dioxide (CO ₂ % v/v)		Oxygen (O ₂ % v/v)		Flow (l/hr)		Hydrogen Sulphide (H ₂ S ppm)	Carbon Monoxide (CO ppm)	Depth to Water (m)	Depth to Base (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
(Ambient)	-	0.0	-	0.0	-	20.6	N/A	N/A	0	0	N/A	N/A
WS01	0.0	0.0	0.5	0.5	7.2	7.2	0.0	0.0	0	0	1.18	4.87
WS06	0.0	0.0	0.5	0.5	20.3	20.3	0.0	0.0	0	0	1.59	4.75

Comments:

NOTES:

- Peak readings are the maximum results recorded for flow, CH₄ or CO₂ and the minimum results recorded for O₂.
- Steady readings are the values recorded after approx. 90 to 120 seconds of monitoring. Where values fluctuate then this period will have been lengthened.
- Gas analyser calibration certificates are available upon request.

GROUND GAS MONITORING RECORD

Site:	E22208 - Land North of Stonegate, Cowbit	Engineer / Technician:	JR
Date:	11 th January 2023	Pressure (Start):	1004 mb
Equipment:	GFM 456 Gas Analyser and Dipmeter	Pressure (End):	1003 mb
Weather Observations:	Cloudy, dry and breezy.		

Borehole:	Methane (CH ₄ % v/v)		Carbon Dioxide (CO ₂ % v/v)		Oxygen (O ₂ % v/v)		Flow (l/hr)		Hydrogen Sulphide (H ₂ S ppm)	Carbon Monoxide (CO ppm)	Depth to Water (m)	Depth to Base (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
(Ambient)	-	0.0	-	0.0	-	20.6	N/A	N/A	0	0	N/A	N/A
WS01	0.0	0.0	0.5	0.5	7.0	7.0	0.0	0.0	0	0	1.15	4.87
WS06	0.0	0.0	0.2	0.2	20.4	20.4	0.0	0.0	0	0	1.13	4.72

Comments:

NOTES:

- Peak readings are the maximum results recorded for flow, CH₄ or CO₂ and the minimum results recorded for O₂.
- Steady readings are the values recorded after approx. 90 to 120 seconds of monitoring. Where values fluctuate then this period will have been lengthened.
- Gas analyser calibration certificates are available upon request.