# PHASE 2 ENVIRONMENTAL INVESTIGATION
# of a site at
# LONDON HOUSE 243 - 253 LOWER MORTLAKE ROAD
# for
# AVZ GEOENG LTD

Contaminated Land Solutions

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# 1 EXECUTIVE SUMMARY

The most recent and proposed site usage is as an office building.

The phase 1 report indicates potential for contamination to be present from its former use as timber yard and from surrounding commercial uses including gas works, petrol filling stations, garage, tyre dealers.

In this investigation A single lead exceedance, surpassing the screening value for commercial use, was identified. However, although the lead concentrations in the remaining samples are below the screening value, they are unusually high. Therefore, soil remediation in the proposed soft landscaped areas will be necessary.

Additionally a single Dibenz(a,h)anthracene exceedance was also identified. At this level it is considered that remediation in the soft landscaped areas is required.

Leachate testing on all four samples identified concentrations surpassing the screening values. Given the results there is a potential risk to the aquifer from the made ground, further leachate testing on remaining made ground is recommended to ensure that it does not pose a risk to the aquifer.

The site classifies as green or Characteristic Situation 1 when the GSV is compared to the CIRIA C665 guidance. Given that no flow rates were recorded in any visit, it is considered suitable that the site is classified as CS1. Therefore, gas protection measures are not necessary.

Vapours were detected, with a peak concentration of 230 ppm at BH1. The highest concentrations were found in the borehole adjacent to the petrol station, suggesting that the off-site petrol station is the likely source of the vapours. Given the high concentrations detected, there is considered to be a vapour risk to the receptors on site. The maximum reading from the borehole within the existing building was 0.1 ppm.

To protect the on-site receptors from potential vapour intrusion in the new building, it is recommended that a vapour-resistant barrier is incorporated into the construction of the new extensions. Furthermore, a handheld PID sweep should be conducted inside the existing building that will remain after the external areas have been remediated. The sweep shall specifically monitor the internal perimeter, service entries and inspection chambers.
Areas where the development is proposed to comprise of buildings and hardstanding do not pose a significant risk to either on-site or off-site receptors therefore made ground

can remain in these areas. Where areas of communal soft landscaping and permeable paving are proposed a barrier should be placed between any remaining contamination and on-site receptors in the form of 300mm of clean soil. Leachate testing must be undertaken on any remaining made ground to determine if it is suitable to remain on site. Alternatively, contaminated material can be removed down to a depth of natural ground.

It is recommended that a remediation strategy and verification plan is prepared.

It is recommended that this report is referenced in the site Health and Safety Plan and that normal good hygiene practice is observed during the works and subsequent building and grounds maintenance.

If any potentially contaminated spoil is to be removed from site, the Waste Acceptance Criteria (WAC) testing should be agreed with the facility to which the spoil is being transported.

## Risk Summary

| Very Low | Low | Moderate / Low | Moderate | High |
|---|---|---|---|---|

| | | Receptors | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Site Users | Ground Workers | Neighbours | Proposed Building | Aquifer | Watercourse | Ecological Receptor |
| Sources | Timber yard, works (On Site) | | | | | | | |
| | Gas works, petrol filling stations garage, tyre dealers (Off site) | | | | | | | |
| | Vehicle tailpipe emissions (Off site) | | | | | | | |
| | Naturally occurring contaminants | | | | | | | |

## 2 BRIEF

The purpose of this report is to investigate the potential sources of contamination identified in the phase 1 desktop study. In the light of the investigation results to update the site-specific conceptual model and risk assessment and where source-pathway-receptor linkages are identified advise on potential remedial options.

This report should be read in conjunction with the phase 1 environmental report, ref 2684-P1E-1 by GO contaminated Land Solutions.

## 3 INVESTIGATION STRATEGY

The phase 1 environmental desktop report shows there is a potential for contamination to be present from the sites former use as a timber yard and from surrounding commercial uses including gas works, petrol filling stations, garage and tyre dealers.

The principles of the strategy are to:

- Identify the nature and extent of any contamination in the made ground across the site.
- Confirm the presence or otherwise of ground gas impacting the site.

Non-targeted sampling has been used as contamination location is unknown.

| Location Reference | Rationale for Location | Depth (mbgl) | Sampling, Testing & Monitoring |
|---|---|---|---|
| TP6 | Proposed soft landscape | 0.10-0.60 | Asbestos, metals, pH, banded aromatic & aliphatic hydrocarbons, speciated PAHs. |
| TP7 | | 0.10-0.60 | |
| TP8 | | 0.20-1.00 | |
| BH1 | Proposed new extension | 1.00-4.20 | Asbestos, metals, pH, banded aromatic & aliphatic hydrocarbons, speciated PAHs.<br><br>Ground gas and vapour monitoring |
| BH2 | Insite of the existing building | NA | Ground gas and vapour monitoring |
| BH3 | Western portion of the site | NA | |

## 4 SITE DESCRIPTION

The site is very approximately rectangular shaped in plan and occupies 0.24 ha.

The site is currently occupied by a two-storey building with a car park at the front of the property and access around the sides of the building to an overgrown area to the rear.

**Photograph 1: View of the site frontage from the footpath of Lower Mortlake Road**

Most recently, the property served as a commercial office; however, it is currently vacant.

Access to the property is granted through the entrance door on the southern side of the building. The internal walls on the ground floor have been removed, creating an open space. A toilet situated on the eastern side of the ground floor, was identified during the site visit.

Furthermore, the property features a small basement located on the southern side. Access to the basement is available via the staircase situated on the southern side of the ground floor.

A car park situated in front of the property on the southern side of the site has been identified. The parking area is fully hard surfaced.

The rear of the property is severely overgrown with areas of hard surface in the form of concrete slabs. From the rear of the property the ground slopes down towards the northern and western site boundary.

The eastern site boundary is defined by a brick wall beyond which is a petrol station.

The western site boundary is also defined by a by a brick wall beyond which is the neighbouring property (237 Lower Mortlake Road)

The southern site boundary is defined by the back of the footpath to Lower Mortlake Road.

The northern site boundary is defined by a timber fence beyond which are the gardens of the properties fronting on to Raleigh Road.

The nearby surrounding area is residential with some commercial activity to the south, west and east, mainly shops.

No significant visual or olfactory evidence of contamination was noted during the visit.

# 5 SITE WORKS

## 5.1 Programme

The site works were undertaken on 28 February and 6 March 2024.

## 5.2 Trial Pits

A total of nine trial pits were dug by hand to depths between the depths of 0.35 and 1.20m below ground level.

A total of three trial pits (TP6, TP7 and TP8) were undertaken on the site for the purpose of obtaining soil samples.

The remaining six trial pits were undertaken for geotechnical purposes.

### 5.3 Boreholes

A total of three boreholes were dug by mechanical means using a Terrier drive in Rig to depths of between 5.00 and 14.5m below ground level for geotechnical purposes.

A sample was taken from BH1 and tested in the lab.

A 35m standpipe was installed on completion in all three boreholes.

## 6 GROUND CONDITIONS

### 6.1 Geological Survey

Reference to the geological survey of Great Britain indicates that beneath made ground, the area generally is underlain by superficial deposits comprising sand and gravel which is described as Kempton Park Gravel Member.

The superficial deposits are underlain by bedrock comprising clay and silt described as London Clay Formation

### 6.1 Hydrogeology

The Environment Agency maps show the site to be located over a Secondary A Aquifer in the superficial or drift deposits, in the bedrock they show the site to be over an Unproductive Strata.

Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Secondary A Aquifers comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The soils overlying the aquifers are assumed to have a high leaching potential (U) and a worst-case vulnerability classification (H) is assumed due to a lack of data available for restored workings and urban areas.

The Environment Agency maps show the site is not located within a source protection zone of a borehole abstraction point.

The Environment Agency define a zone according to how the groundwater behaves in that area. From this a model of the groundwater environment is developed on which to define the zones.

Groundwater source catchments are divided into three zones:

SPZ1 – Inner protection zone

Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.

SPZ2 – Outer protection zone

Defined by a 400 day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction.

SPZ3 – Source catchment protection zone

Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75.

## 6.2 Hydrology

The nearest surface water feature appears to be a pond, approximately 667 metres to the northeast.

The main water course of significance to the site would appear to be the River Thames which is approximately 1354 metres to the northeast at the nearest point.

These are both considered to be too distant to be significantly impacted by the site.

The Environment Agency maps show the site is not located within a flood zone.

The British Geological Society data shows the site lies in an area with potential for groundwater flooding to occur at surface.

# 7 PROPOSED DEVELOPMENT

Plan details for the proposed redevelopment of the site are shown on the LRA Retinue drawing contained in appendix C.

As stated in the decision notice the development comprises: Extension, refurbishment and landscaping to existing Class E office building including a single storey rear extension, stair core extensions, and second floor roof extension with second floor rear terrace

It is assumed that the existing site levels will remain generally as existing.

Access to the property is gained via a dedicated entrance from Lower Mortlake Road

# 8 CONTAMINATION SAMPLING and TESTING

## 8.1 Laboratory Testing

All samples were placed immediately in cool boxes with ice packs and collected by courier for transport to the laboratory.

The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for the majority of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

All samples were tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA). These include, heavy metals, aromatic and aliphatic hydrocarbons, in accordance with Environment Agency guidelines, and speciated PolyAromatic Hydrocarbon (PAH) only.

All samples were analysed for the presence of asbestos.

## 8.2 Soil Test Results

All the results have been compared to the Atkins ATRISKsoil SSVs for commercial use, for either 1% or 6% soil organic matter, as appropriate, where available. These guideline values have been derived using the updated CLEA v1.071 model, previously published Category 4 Screening Levels (C4SLs) by DEFRA and information in the Environment Agency guidance SR2. Where ATRISKsoil SSVs have not been derived, the Category 4 Screening Levels have been used, and for determinands which do not have either of the above, the LQM/CIEH Suitable 4 Use Levels (S4ULs) assessment criteria have been used.

To assess the genotoxic poly-aromatic hydrocarbons (PAHs), the benzo-a-pyrene surrogate marker approach has been adopted. The results for genotoxic PAHs have been compared to the soil PAH coal tar mixtures used in the Culp et al 1998 study, to determine if they are sufficiently similar and establish if benzo-a-pyrene is a suitable surrogate marker for PAHs.

The LQM PAH profiling tool has been used to confirm the validity of the surrogate marker approach. The results show that it is appropriate to use benzo-a-pyrene as a surrogate marker for this data set. The results of this profiling are available in appendix I.

| TEST RESULTS ABOVE SCREENING VALUES | | | | |
|---|---|---|---|---|
| **Determinand** | **Reference** | **Depth** | **Value (mg/kg)** | **Screening value (mg/kg)** |
| Lead | BH1 | 1.00-4.20 | 3750 | 2310 |
| Dibenz(a,h)anthracene | TP7 | 0.10-0.60 | 5.85 | 3.5 |

A single Dibenz(a,h)anthracene exceedance was identified.

A single lead exceedance was also identified. Although the lead concentrations in the remaining samples are below the screening value, they are unusually high. It is unlikely therefore that the exceedance represents a 'hot-spot'.

Soil remediation in the proposed soft landscaped areas is considered necessary.

All samples were screened in the laboratory for the presence of asbestos fibres. No asbestos was identified in any of the samples.

Given the Lead exceedance found in samples across the site leachate testing was undertaken on four samples.

The screening value applied is that of The Water Supply (UK DWS) Regulations 2016.

| LEACHATE TEST RESULTS | | | | |
|---|---|---|---|---|
| **Determinand** | **Reference** | **Depth** | **Value (ug/l)** | **Screening value (ug/l)** |
| Lead Leachate | BH1 | 1.00-4.20 | 29 | 10 |
| | TP6 | 0.10-0.60 | 39 | |
| | TP7 | 0.20-0.60 | 29 | |
| | TP8 | 0.20-1.00 | 67 | |

Given the above results there is a potential risk to the aquifer from the made ground. While some made ground will be removed as part of site remediation, it will be necessary to undertake leachate testing on any made ground remaining to ensure that it does not pose a risk to the aquifer.

Full test results can be found in appendix H.

## 8.3 Gas Monitoring and Assessment

The hazardous ground gases considered to pose a potential threat to the development are methane and carbon dioxide. The table below summarises the maximum values recorded at each borehole during each visit.

| Date | Borehole ref | Maximum Carbon Dioxide %v/v | Maximum Methane %v/v | Atmospheric Pressure (mb) | PID Vapour (ppm) | Flow Rate l/hr |
|---|---|---|---|---|---|---|
| 24/03/24 | BH1 | 2.3 | 0.0 | 1001 | 230 | 0.0 |
| | BH2 | 4.2 | 0.0 | 1001 | 0.1 | 0.0 |
| | BH3 | 2.5 | 0.0 | 1001 | 11.6 | 0.0 |
| 10/04/24 | BH1 | 2.5 | 0.0 | 1025 | 51 | 0.0 |
| | BH2 | 3.5 | 0.0 | 1025 | 0.0 | 0.0 |
| | BH3 | 1.5 | 0.0 | 1025 | 0.0 | 0.0 |
| 24/03/24 | BH1 | 3.6 | 0.0 | 1018 | 76 | 0.0 |
| | BH2 | 5.1 | 0.0 | 1018 | 0.0 | 0.0 |
| | BH3 | 2.3 | 0.0 | 1018 | 4.3 | 0.0 |

Full monitoring results can be found in appendix G.

Atmospheric pressures ranged from 1001 to 1025 and no flow rates were detected. The results of the monitoring showed no methane presence on site. A maximum Carbon dioxide concentration of 5.1%v/v was detected in BH2.

No detectable gas flow rate has been recorded in any of the visits, therefore the instrument level of detection of 0.1l/hr has been used to calculate the GSV:

$$\text{GSV (l/h)} = \text{flow rate (l/h)} * \text{maximum gas value} /100$$

$$\text{GSV (l/h)} = 0.1 * 5.1/100=0.0051$$

The max. Carbon Dioxide concentration of 5.1 %v/v was used to calculate a GSV value of 0.0051 l/h.

Therefore, gas protection measures are not necessary.

### 8.1 Vapour Monitoring and Assessment

The Phase 1 report identified the former on-site timber yard, gas works, and off-site petrol filling stations and tyre dealers as potential sources of vapours. As a result, vapour monitoring was conducted alongside ground gas monitoring.

Vapour monitoring was carried out using a RAE system PID monitor with a 10.6eV lamp, connected via inert tubing to the stopcock valve.

A total of 3No. rounds of monitoring were undertaken.

Vapours were detected, with a peak concentration of 230 ppm at BH1. The highest concentrations were found in the borehole adjacent to the petrol station, suggesting that the off-site petrol station is the likely source of the vapours. Given the high concentrations detected, there is considered to be a vapour risk to the receptors on site. The maximum reading from the borehole within the existing building was 0.1ppm

To protect the on-site receptors from potential vapour intrusion in the new building, it is recommended that a vapour-resistant barrier is incorporated into the construction of the new extensions. Furthermore, a handheld PID sweep should be conducted inside the existing building that will remain after the external areas have been remediated. The sweep shall specifically monitor the internal perimeter, service entries and inspection chambers.

## 9 REVISED CONCEPTUAL MODEL

The legislative framework for the regulation of contaminated land is embodied in Part IIA of the Environmental Protection Act 1990, implemented in the Contaminated Land (England) Regulations 2000. This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The approach adopted by UK contaminated land policy is that of “suitability for use” which implies that the land should be suitable for its current use and made suitable for any proposed future use.

In this revised contamination assessment the site has been modelled using the Source-Pathway-Receptor approach to produce a site specific conceptual model.

Source - substances or potential contaminants which may cause harm

Pathway - a linkage or route between a source and receptor

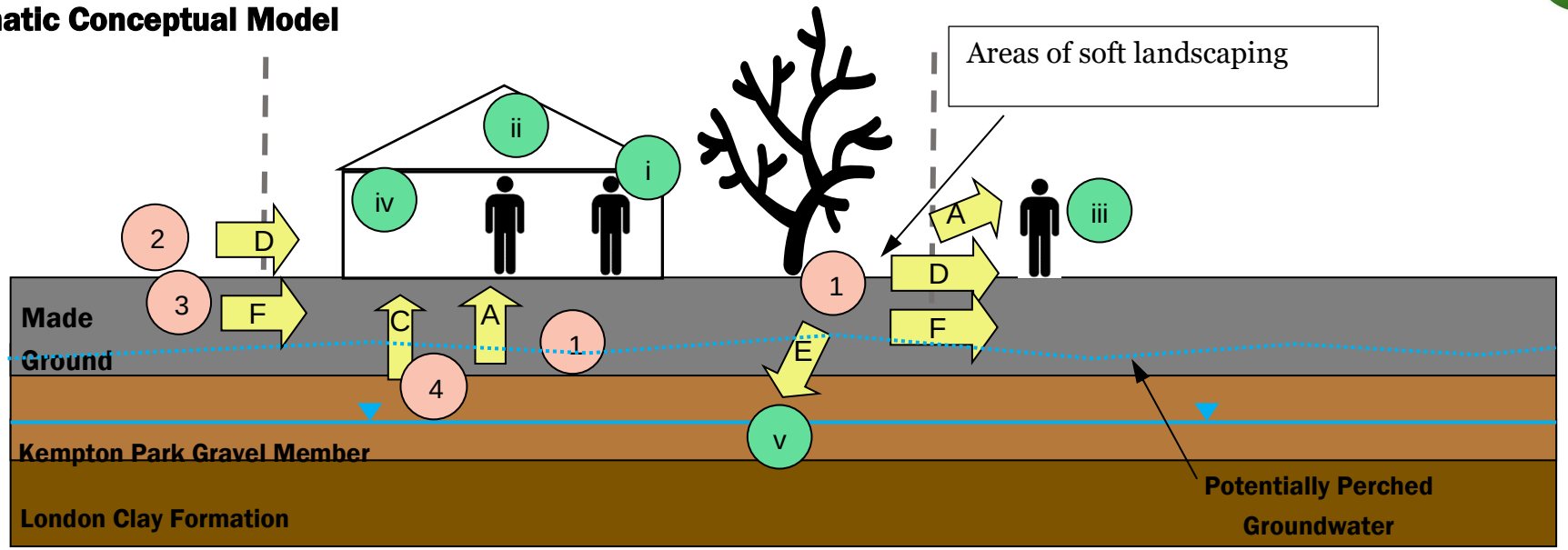
Receptor - humans, plant life, groundwater etc., which could be harmed by a contaminant

Geological records indicate that the site is underlain by an aquifer in the superficial stratum and therefore there is a potential for contaminants to be transported both to and from site in the groundwater.

From the information available at present a revised conceptual model has been considered.

| | | Potential pathways | | | | | | | | | | | Comments on discounted pathways | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inhalation of contaminated vapour | Inhalation of contaminated dust | Direct Soil Ingestion | Direct dermal contact | Inhalation of asbestos | Drinking contaminated water supply | Direct contact of soil with building materials | Surface water run-off | Surface water percolation to groundwater | Migration via groundwater | Build-up of ground gas | | |
| Receptors | Site Users | Y | Y | Y | Y | N | Y | | | | | N | No asbestos identified within soils. | Site classified as CS1 when GSV is calculated |
| | Ground Workers | Y | Y | Y | Y | N | | | | | | N | | |
| | Neighbours | Y | Y | | | N | | | Y | | Y | N | | |
| | Proposed Building | | | | | | | Y | | | | N | | |
| | Watercourse | | | | | | | | N | | N | | No potentially significant watercourse identified nearby. | |
| | Aquifer | | | | | | | | | Y | | | | |

## Schematic Conceptual Model




| Sources | Pathways | Receptors |
|---|---|---|
| 1 Timber yard, works (On Site) | A Inhalation, ingestion, dermal contact, vapours | i Site Users |
| 2 Gas works, petrol filling stations garage, tyre dealers (Off site) | B Drinking contaminated water supply | ii Ground Workers |
| 3 Vehicle tailpipe emissions (Off site) | C Direct contact of soil with building materials | iii Neighbours |
| 4 Naturally occurring contaminants | D Surface water run-off | iv Proposed Building |
| | E Surface water percolation to groundwater | v Groundwater (Secondary A Aquifer) |
| | F Migration via groundwater | |

## 10 REVISED RISK ASSESSMENT

The level of information provided by the phase 1 desktop study report together with the other information within this report is considered suitable to provide the data for a satisfactory risk assessment for the site. While there will always be uncertainties due to known or unknown gaps in information it is considered that sufficient information is available to reduce those uncertainties to within acceptable limits for the nature of the site under review.

An asbestos survey of existing structures and infrastructure (as defined under Section 5(a) of the Control of Asbestos Regulations 2012) was beyond the brief of this report. The risk assessment has been undertaken on the basis that should asbestos be identified within buildings or infrastructure, these materials will be removed appropriately by licensed contractors and asbestos materials disposed of in accordance with legal requirements prior to demolition or other works in order to avoid contaminating soils at the site.

Only contaminants identified to exceed the environmental screening level have been included in the Risk Assessment.

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Timber yard, works (On Site) | Determinands exceeding screening levels: Lead, Dibenz (a,h)anthracene VOCs | Site Users | Dermal contact | Mild | Likely | Moderate/Low risk | Remediation required |
| | | | Inhalation of vapours, indoors and outdoors | Medium | Likely | Moderate risk | Install a membrane in new extensions & undertake a handheld PID sweep inside of the existing building |
| | | | Soil Ingestion | Medium | Unlikely | Low risk | Remediation required |
| | | | Inhalation of contaminated dust | Mild | Likely | Moderate/Low risk | |
| | | | Drinking of water from supply impacted by contaminated soil | Mild | Low likelihood | Low risk | A barrier water supply pipe may be required by water supply company. It is recommended that this report is provided to the water supplier with a request for the testing, if any, that they require. |

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Timber yard, works (On Site) | Determinands exceeding screening levels: Lead, Dibenz (a,h)anthracene VOCs | Ground Workers | Dermal contact | Mild | Likely | Moderate/Low risk | Information to be contained in site Health & Safety Plan and File. Use of appropriate PPE and normal good hygiene measures.<br><br>Appropriate dust control measures during construction. |
| | | | Inhalation of vapours, indoors and outdoors | Mild | Low likelihood | Low risk | |
| | | | Soil Ingestion | Mild | Low likelihood | Low risk | |
| | | | Inhalation of contaminated dust | Mild | Likely | Moderate/Low risk | |
| Timber yard, works (On Site) | Determinands exceeding screening levels: Lead, Dibenz (a,h)anthracene VOCs | Neighbours | Inhalation of vapours, in and outdoors | Mild | Low likelihood | Low risk | No action required |
| | | | Inhalation of contaminated dust (during construction) | Mild | Low likelihood | Low risk | Appropriate dust control measures during construction. |
| | | | Inhalation of contaminated dust (after construction) | Mild | Unlikely | Very low risk | No action required. |
| | | | Surface water run-off | Mild | Low likelihood | Low risk | No action required. |
| | | | Lateral migration of groundwater transporting contaminants | Mild | Low likelihood | Low risk | |

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Timber yard, works (On Site) | Determinands exceeding screening levels:<br>Lead, Dibenz (a,h)anthracene<br>VOCs | Aquifer | Vertical percolation to groundwater via Foundations | Medium | Low likelihood | Low risk | Foundations should be designed in such a way that they do not create a pathway for surface water percolation. |
| | | | Vertical percolation to groundwater via soft landscaped and permeable areas | Mild | Likely | Moderate/Low risk | Remediation required |
| | | | Percolation to groundwater via SuDS | Mild | Likely | Moderate/Low risk | |
| Naturally occurring contaminants | Sulphates<br>pH | Proposed Building | Direct contact of soil with building materials | Medium | Low likelihood | Moderate/low risk | As the protection of concrete is normally resolved in the building design process, the designer of the foundations should determine the requirement to undertake any investigation.<br><br>For the existing structure it is recommended that a building surveyor, civil or structural engineer is asked for advice. |

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Gas works, petrol filling stations garage, tyre dealers (Off site) | Determinands exceeding screening levels: Lead, Dibenz (a,h)anthracene VOCs | Site Users (via ground-water migration) | Dermal Contact | Mild | Likely | Moderate/Low risk | Remediation required |
| | | | Inhalation of vapours, indoors and outdoors | Medium | Likely | Moderate risk | Install a membrane in new extensions & undertake a handheld PID sweep inside of the existing building |
| | | | Soil Ingestion | Medium | Unlikely | Low risk | Remediation required |
| | | | Inhalation of contaminated dust (post development works) | Medium | Low likelihood | Moderate/Low risk | |
| | | | Drinking of water supply impacted by contaminated soil | Mild | Low likelihood | Low risk | A barrier water supply pipe may be required by water supply company. It is recommended that this report is provided to the water supplier with a request for the testing, if any, that they require. |

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Gas works, petrol filling stations garage, tyre dealers (Off site) | Determinands exceeding screening levels: Lead, Dibenz (a,h)anthracene VOCs | Ground Workers (via ground-water migration) | Dermal Contact | Mild | Likely | Moderate/Low risk | Information to be contained in site Health & Safety Plan and File. Use of appropriate PPE and normal good hygiene measures.<br><br>Appropriate dust control measures during construction. |
| | | | Inhalation of vapours, in & outdoors | Medium | Low likelihood | Moderate/low risk | |
| | | | Soil Ingestion | Mild | Low likelihood | Low risk | |
| | | | Inhalation of contaminated dust | Mild | Likely | Moderate/Low risk | |
| Vehicle tailpipe emissions (Off site) | Lead | Site Users | Dermal Contact | Mild | Likely | Moderate/Low risk | Remediation required |
| | | | Soil Ingestion | Medium | Unlikely | Low risk | |
| | | | Inhalation of contaminated dust | Mild | Likely | Moderate/Low risk | |

| Sources | Potential pollutant | Receptor | Pathway | Hazard severity | Likelihood of occurrence | Risk / Significance | Comment & control measures |
|---|---|---|---|---|---|---|---|
| Vehicle tailpipe emissions (Off site) | Lead | Ground Workers | Dermal Contact | Mild | Likely | Moderate/Low risk | Information to be contained in site Health & Safety Plan and File. Use of appropriate PPE and normal good hygiene measures.<br><br>Appropriate dust control measures during construction. |
| | | | Soil Ingestion | Mild | Low likelihood | Low risk | |
| | | | Inhalation of contaminated dust | Mild | Likely | Moderate/Low risk | |

Any visual or olfactory evidence of contamination noted during works should be investigated by a suitably qualified person and their recommendations implemented.

## 11 SITE WORKS and UNEXPECTED CONDITIONS

The sample locations were positioned to cover the site. However, there are areas where investigations were not carried out, and although unlikely given the size of the site, it should be considered possible that other areas may potentially be contaminated. Construction operatives should remain vigilant for any unexpected contamination encountered during development (eg discoloured soil or odours or buried waste). Any unexpected conditions should be investigated by a suitably qualified person and their recommendations implemented.

It is recommended that construction operatives use appropriate PPE, normal good hygiene measures, and appropriate dust control measures if necessary. The risks to construction operatives identified, should be addressed under a Construction (Design and Management) (CDM) Plan. The CDM Regulations place legal duties on those involved in construction work. All construction projects require a plan to ensure that health and safety issues are properly considered during a project's development so that the risk of harm to workers is reduced.

## 12 CONCLUSIONS

A single Dibenz(a,h)anthracene exceedance was identified. A single lead exceedance was also identified. Although the lead concentrations in the remaining samples are below the screening value, they are unusually high. It is unlikely therefore that the exceedance represents a 'hot-spot'. Soil remediation in the proposed soft landscaped areas is considered necessary.

Dute to the high lead concentrations identified on site leachate testing was undertaken on all four samples. Given that all results of the leachate testing have surpassed the screening values it is considered that there is a potential risk to the aquifer from the made ground. While some made ground will be removed as part of site remediation, it will be necessary to undertake leachate testing on any made ground remaining to ensure that it does not pose a risk to the aquifer.

The site classifies as Characteristic Situation 1 when the GSV is compared to the CIRIA C665 guidance. Given that no flow rates were recorded in any visit, it is considered suitable that the site is classified as CS1. Therefore, gas protection measures are not necessary.

Vapours were detected, with a peak concentration of 230 ppm at BH1. The highest concentrations were found in the borehole adjacent to the petrol station, suggesting that the off-site petrol station is the likely source of the vapours. Given the high concentrations detected, there is considered to be a vapour risk to the receptors on site. The maximum reading from the borehole within the existing building was …

To protect the on-site receptors from potential vapour intrusion in the new building, it is recommended that a vapour-resistant barrier is incorporated into the construction of the new extensions. Furthermore, a handheld PID sweep should be conducted inside the existing building that will remain after the external areas have been remediated. The sweep shall specifically monitor the internal perimeter, service entries and inspection chambers.

Confirmation should be sought from the water supplier on the appropriate supply pipe to be installed.

Areas where the development is proposed to comprise of buildings and hardstanding do not pose a significant risk to on-site and off-site receptors therefore made ground can remain in these areas. Where areas of communal soft landscaping and permeable paving are proposed a barrier should be placed between any remaining contamination and on-

site receptors in the form of 300mm of clean soil. Leachate testing must be undertaken on any remaining made ground to determine if it is suitable to remain on site. Alternatively, contaminated material can be removed down to a depth of natural ground.

It is recommended that a remediation strategy and verification plan is prepared.

It is recommended that this report is referenced in the site Health and Safety Plan and that normal good hygiene practice is observed during the works and subsequent building and grounds maintenance.

It is recommended that appropriate dust control measures are implemented during construction. To assist in establishing what would be appropriate reference should be made to the Institute of Air Quality Management report entitled: Guidance on the assessment of dust from demolition and construction, version 1.1.

The sample locations were positioned to provide a general spread across the site. However, there are areas where investigations were not carried out, and due to the presence of contamination identified, it should be considered possible that other areas may potentially be contaminated. Construction operatives should remain vigilant of any unexpected contamination encountered during development (eg discoloured soil or odours or buried waste).

It is also possible the asbestos may be present in other areas of the site and therefore construction operatives should also ensure that appropriate PPE and good hygiene measures are used, and dust control measures during construction where necessary. Any debris from earlier demolition found during site strip is to be inspected for asbestos by a suitably experienced contractor.

If any potentially contaminated spoil is to be removed from site, the Waste Acceptance Criteria (WAC) testing should be agreed with the facility to which the spoil is being transported.

## 13 REFERENCES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*This document has been prepared for the titled project and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and the prior written authority of GO Contaminated Land Solutions Ltd being obtained. No responsibility or liability is accepted for the consequences of this document being used for a purpose other than that for which it was commissioned. Any person using or relying on this document for such other purpose will by such use or reliance be taken to confirm his agreement to indemnify GO Contaminated Land Solutions Ltd for all loss or damage resulting therefrom. GO Contaminated Land Solutions Ltd accepts no responsibility or liability for this document to any party other than* ***AVZ GeoEng Ltd*** *by whom it was commissioned.*

*The recommendations made and the opinions expressed in this report are based on the borehole records, examination of samples and the results of site and laboratory tests.*

*The report is issued on the condition that GO Contaminated Land Solutions Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the boreholes, trial pits or other tests carried out during the investigation.*

*In addition, GO Contaminated Land Solutions Ltd will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata either between the borehole positions or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.*

*Groundwater levels may also vary with time from those reported during our site investigation due to factors such as tidal conditions, heavy pumping from nearby wells or seasonal changes.*

*All soil samples will be kept for a period of 28 days after the date of the invoice for this project unless otherwise notified to GO Contaminated Land Solutions Ltd in writing. Should samples be required to be stored for longer than 28 days then a storage charge will be levied.*

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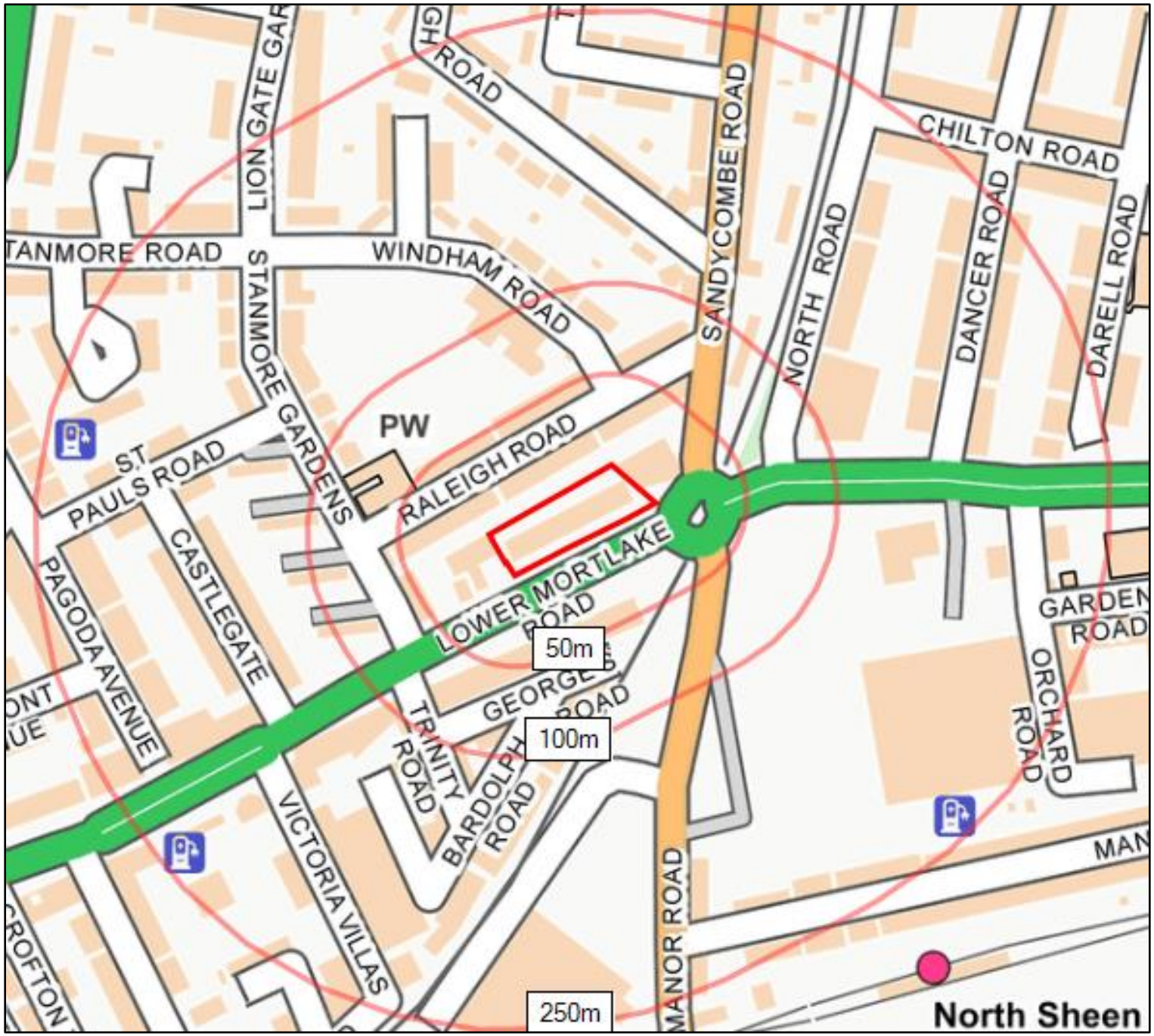
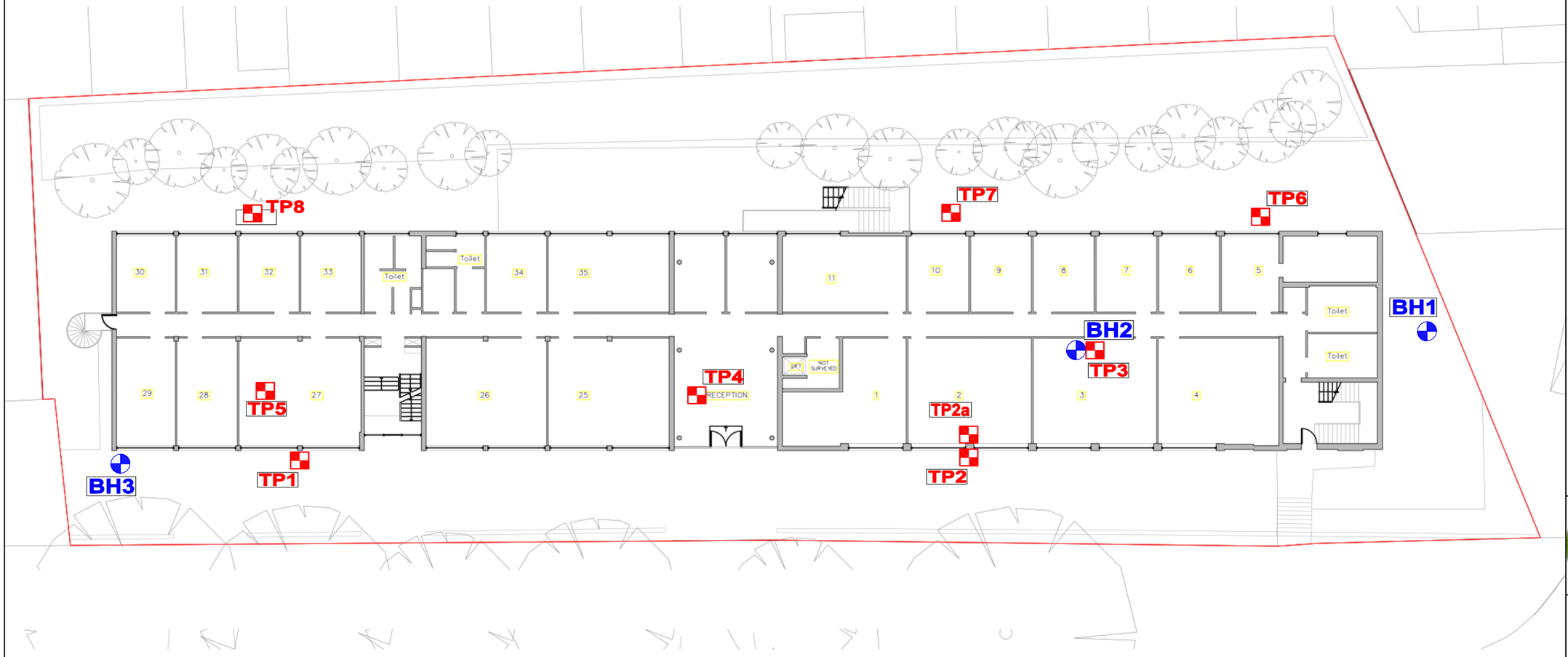
# Appendix A – Site Location Plan




2684-P2E-1-A: London House 243- 253 Lower Mortlake Road
AVZ GeoEng Ltd

Contaminated Land Solutions

## Appendix B – Site Works Plan




LEGEND:

BH - Borehole

TP - Trial pit

AVZ GeoEng Ltd

Birch Grove
70 Copthorne Road
Felbridge, Surrey
RH19 2NU
United Kingdom

Email: info@avzgeoeng.co.uk
Web: www.avzgeoeng.co.uk
Mob: 07885977732
Tel: 01342457117

Client

Silver Bells Administration Limited

Project Title

London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL

Drawing Title

Layout Investigation Points Plan

| Drawn | Date | Checked | Date | Approved | Date |
|---|---|---|---|---|---|
| SKZ | 14/03/2024 | BZ | 14/03/2024 | BZ | 14/03/2024 |

| Scale | Orig Size | Dimensions |
|---|---|---|
| NTS | | M |

| Project No. | Drawing File |
|---|---|
| 2214/23 | |

| Drawing No. | Rev. |
|---|---|
| FIGURE_2 | |

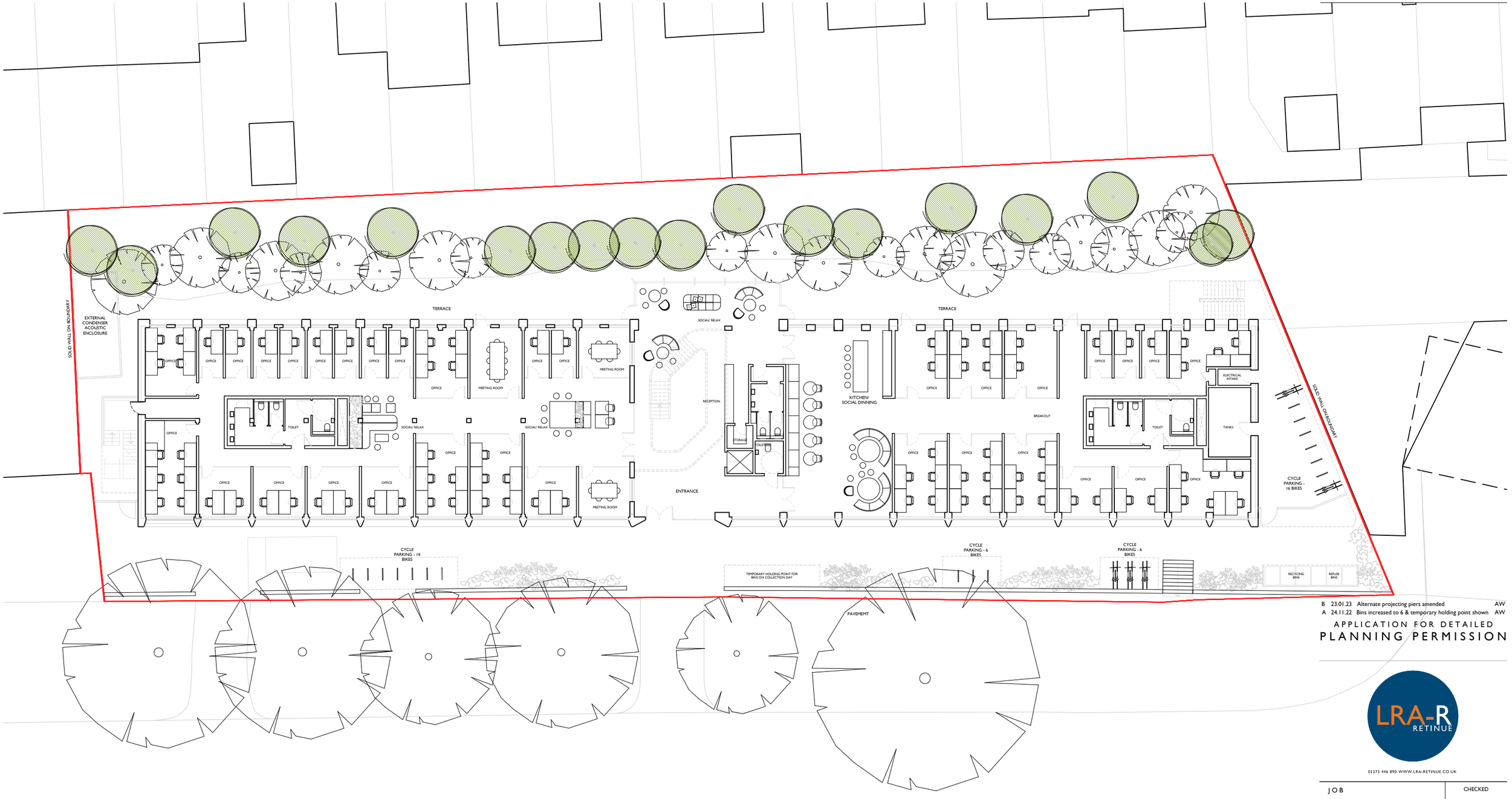
Contaminated Land Solutions

## Appendix C – Proposed Site Plan

Only figured dimensions are to be used. All dimensions to be checked on site.

Please note: Refer to 'type' of drawing below; planning drawings should only be treated as such.

Notes




**+SP** Site Plan - scale 1:250 at A3

Scale in Metres

0 2 4 6 8 10 12

N

| | | |
|---|---|---|
| B | 23.01.23 | Alternate projecting piers amended AW |
| A | 24.11.22 | Bins increased to 6 & temporary holding point shown AW |

APPLICATION FOR DETAILED
PLANNING PERMISSION


LRA-R RETINUE

01273 446 890 WWW.LRA-RETINUE.CO.UK


| | |
|---|---|
| JOB<br>LONDON HOUSE<br>243-253 LOWER MORTLAKE ROAD<br>RICHMOND<br>TW92LL | CHECKED<br>LRA |
| | DRAWN<br>LRA |
| CLIENT<br>ALI KHAN | DATE<br>09.22 |
| | SCALE<br>1:250 @ A3 |
| DRAWING<br>PROPOSED SITE PLAN & GROUND FLOOR LEVEL | REVISION<br>B |
| | NUMBER<br>2011-PA-010 |

PA-010


24 Windlesham Road, Brighton, East Sussex BN1 3AG. UK
LRA-Retinue registered in England and Wales 12353276

Contaminated Land Solutions

# Appendix D –Borehole Logs (BH1-BH3)

AVZGeoEng Ltd
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RH19 2NU
Telephone: 01342457117
info@avzgeoeng.co.uk

# BOREHOLE LOG

| Project | | | | BOREHOLE No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | BH1 |
| Job No | Date | Ground Level (m) | Co-Ordinates (Local) | |
| SKZ_2214/23 | 28-02-24<br>06-03-24 | | | |
| Contractor | | | | Sheet |
| AVZGeoEng Ltd | | | | 1 of 2 |

| SAMPLES & TESTS | | | Water | Reduced Level | Legend | Depth (Thick-ness) | STRATA DESCRIPTION | Geology | Instrument/ Backfill |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | | | | | | |
| | | | | | | (1.10) | MADE GROUND: Brown silty sand and gravel with occasional brick fragments. | | |
| 1.00-1.45<br>1.00 | SPT1 | N14 | | | | 1.10 | MADE GROUND: Grey to dark grey and brown, silty sand and occasional gravel, with frequent clay pockets, coal ash and clinker. | | |
| 2.00-2.45<br>2.00 | SPT2 | N6 | | | | (3.10) | | | |
| 3.00-3.45<br>3.00 | SPT3 | N4 | | | | | | | |
| 4.00-4.45<br>4.00 | SPT4 | N10 | | | | 4.20 | | | |
| | | | | | | 4.40 | MADE GROUND: Grey to dark grey very clayey sand with occasional gravel and brick fragments. | | |
| | | | | | | (0.60) | Firm, light brown to brown grey mottled, sandy to very sandy silty CLAY. (River Terrace Deposits) | | |
| 5.00-5.45<br>5.00 | SPT5 | N49 | | | | 5.00 | Dense, light brown to brown slightly gravelly SAND. (River Terrace Deposits) | | |
| | | | | | | (1.00) | | | |
| 6.00-6.45<br>6.00 | SPT6 | N139 | | | | 6.00 | Very dense to dense, light brown to brown and grey, occasionally slightly silty SAND and GRAVEL. (River Terrace Deposits) | | |
| | | | | | | (3.00) | | | |

| Boring Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Depth | Date | Time | Casing Depth | Casing Dia. mm | Water Depth |
| | | | | | |

| Chiselling | | | Water Added | |
|---|---|---|---|---|
| From | To | Hours | From | To |
| | | | | |

**GENERAL REMARKS**

he location was CAT scanned and inspection pit excavated by hand prior the commencement of the drilling. A 35mm standpipe was installed on completion of the work to allow for future monitoring. Groundwater at 8.5mbgl..

| All dimensions in metres<br>Scale 1:50 | Client Silver Bells Administration Limited | Method/ Plant Used Terrier Drive in Sampling | Logged By B Zarkovski |
|---|---|---|---|

AVZGeoEng Ltd
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info@avzgeoeng.co.uk

# BOREHOLE LOG

| Project | | | | BOREHOLE No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | BH1 |
| Job No | Date | Ground Level (m) | Co-Ordinates (Local) | |
| SKZ_2214/23 | 28-02-24<br>06-03-24 | | | |
| Contractor | | | | Sheet |
| AVZGeoEng Ltd | | | | 2 of 2 |

| SAMPLES & TESTS | | | Water | Reduced Level | Legend | Depth (Thick-ness) | STRATA DESCRIPTION | Geology | Instrument/ Backfill |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | | | | | | |
| 8.00-8.45<br>8.00 | SPT7 | N51 | | | | 9.00 | Very dense to dense, light brown to brown and grey, occasionally slightly silty SAND and GRAVEL. (River Terrace Deposits) *(continued)* | | |
| 10.00-<br>10.45<br>10.00 | SPT8 | N20 | | | | (2.00)<br>11.00 | Medium dense, light brown to brown and grey, occasionally slightly silty SAND with occasional gravel. (River Terrace Deposits) | | |
| | HV1 | 105,105,100 | | | | | Stiff, grey slightly blue, laminated, occasionally slightly sandy silty CLAY. (London Clay Formation) | | |
| 12.00-<br>12.45<br>12.00 | SPT9 | N24 | | | | (3.50) | | | |
| | HV2 | 110,115,115 | | | | | | | |
| 14.00-<br>14.45<br>14.00 | HV3<br>SPT10 | 120,125,125<br>N29 | | | | 14.50 | | | |

| Boring Progress and Water Observations | | | | | | Chiselling | | | Water Added | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Date | Time | Casing Depth | Casing Dia. mm | Water Depth | From | To | Hours | From | To |
| | | | | | | | | | | |

**GENERAL REMARKS**

he location was CAT scanned and inspection pit excavated by hand prior the commencement of the drilling. A 35mm standpipe was installed on completion of the work to allow for future monitoring. Groundwater at 8.5mbgl..

| All dimensions in metres<br>Scale 1:50 | Client Silver Bells Administration Limited | Method/ Plant Used Terrier Drive in Sampling | Logged By B Zarkovski |
|---|---|---|---|

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# BOREHOLE LOG

| Project | | | | BOREHOLE No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | BH2 |
| Job No | Date | Ground Level (m) | Co-Ordinates (Local) | |
| SKZ_2214/23 | 28-02-24<br>06-03-24 | | | |
| Contractor | | | | Sheet |
| AVZGeoEng Ltd | | | | 1 of 1 |

| SAMPLES & TESTS | | | Water | Reduced Level | Legend | Depth (Thick-ness) | STRATA DESCRIPTION | Geology | Instrument/ Backfill |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | | | | | | |
| | | | | | | 0.25 | MADE GROUND: Concrete | | |
| 1.00-1.45<br>1.00 | SPT1 | N7 | | | | (1.75)<br>2.00 | MADE GROUND: Light brown to brown, occasionally clayey silty sand and occasional gravel, brick fragments and coal ash. | | |
| 2.00-2.45<br>2.00 | SPT2 | N4 | | | | | MADE GROUND: Brown to dark brown with occasional black spots, silty sand and gravel, with frequent coal ash, clinker, occasional porcelain and metal fragments. | | |
| 3.00-3.45<br>3.00 | SPT3 | N6 | | | | (2.00)<br>4.00 | | | |
| 4.00-4.45<br>4.00 | SPT4 | N5 | | | | (0.50)<br>4.50 | MADE GROUND: Grey to dark grey very clayey sand with occasional gravel and organic odor. | | |
| | | | | | | (0.50)<br>5.00 | Firm, brown grey to grey brown mottled, silty CLAY. (River Terrace Deposits) | | |
| 5.00-5.45<br>5.00 | SPT5 | N22 | | | | | | | |

| Boring Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Depth | Date | Time | Casing Depth | Casing Dia. mm | Water Depth |
| | | | | | |

| Chiselling | | | Water Added | |
|---|---|---|---|---|
| From | To | Hours | From | To |
| | | | | |

**GENERAL REMARKS**

he location was CAT scanned and inspection pit excavated by hand prior the commencement of the drilling. A 35mm standpipe was installed on completion of the work to allow for future monitoring. Borehole remained dry.

| All dimensions in metres<br>Scale 1:50 | Client Silver Bells Administration Limited | Method/ Plant Used Terrier Drive in Sampling | Logged By B Zarkovski |
|---|---|---|---|

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# BOREHOLE LOG

| Project | | | | BOREHOLE No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | BH3 |
| Job No | Date | Ground Level (m) | Co-Ordinates (Local) | |
| SKZ_2214/23 | 28-02-24<br>06-03-24 | | | |
| Contractor | | | | Sheet |
| AVZGeoEng Ltd | | | | 1 of 1 |

| SAMPLES & TESTS | | | Water | Reduced Level | Legend | Depth (Thick-ness) | STRATA DESCRIPTION | Geology | Instrument/ Backfill |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | | | | | | |
| | | | | | | 0.05 | MADE GROUND: Tarmac | | |
| | | | | | | 0.18 | MADE GROUND: Concrete | | |
| | | | | | | (0.82) | MADE GROUND: Light brown to brown, occasionally clayey silty sand and occasional gravel, brick and brick fragments. | | |
| | | | | | | 1.00 | | | |
| 1.00-1.45<br>1.00 | SPT1 | N52 | | | | | MADE GROUND: Brown grey occasionally black and dark grey sand and gravel with frequent concrete fragments, occasional coal ash, clinker and brick fragments. | | |
| 2.00-2.45<br>2.00 | SPT2 | N8 | | | | (2.30) | | | |
| 3.00-3.45<br>3.00 | SPT3 | N26 | | | | 3.30 | | | |
| | | | | | | (0.70) | Dense, light brown SAND and GRAVEL. (River Terrace Deposits) | | |
| | | | | | | 4.00 | | | |
| 4.00-4.45<br>4.00 | SPT4 | N40 | | | | (1.00) | Light brown to brown, SAND, with occasional gravel. (River Terrace Deposits) | | |
| | | | | | | 5.00 | | | |
| 5.00-5.45<br>5.00 | SPT5 | N43 | | | | | | | |

| Boring Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Depth | Date | Time | Casing Depth | Casing Dia. mm | Water Depth |
| | | | | | |

| Chiselling | | | Water Added | |
|---|---|---|---|---|
| From | To | Hours | From | To |
| | | | | |

**GENERAL REMARKS**

he location was CAT scanned and inspection pit excavated by hand prior the commencement of the drilling. A 35mm standpipe was installed on completion of the work to allow for future monitoring. Borehole remained dry.

| All dimensions in metres<br>Scale 1:50 | Client Silver Bells Administration Limited | Method/ Plant Used Terrier Drive in Sampling | Logged By B Zarkovski |
|---|---|---|---|

Contaminated Land Solutions

# Appendix E – Trial Pit Records (TP6-TP8)

AVZGeoEng Ltd
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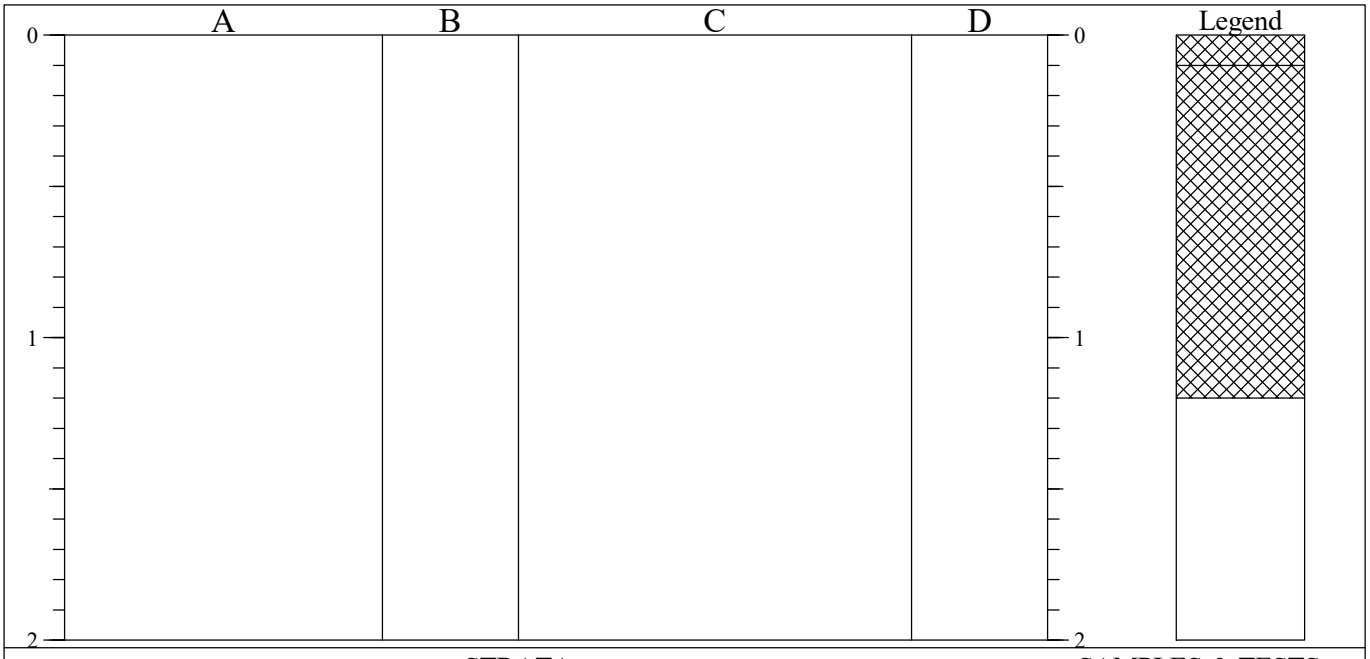
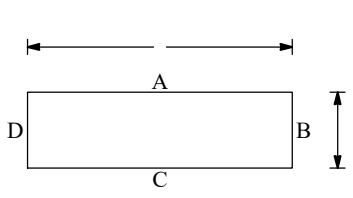
# TRIAL PIT LOG

| Project | | | | TRIAL PIT No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | **TP6** |
| Job No: SKZ_2214/23 | Date: 28-02-24 06-03-24 | Ground Level (m): | Co-Ordinates (Local): | |
| Contractor: AVZGeoEng Ltd | | | | Sheet: 1 of 1 |




| STRATA | | | SAMPLES & TESTS | | |
|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Remarks/Tests |
| 0.00-0.10 | | MADE GROUND: Concrete | | | |
| 0.10-1.20 | | MADE GROUND: Brown slightly clayey silty sand and occasional gravel. Occasional bricks and coal ash, frequent brick fragments present in the sample. | | | |

Shoring/Support:
Stability:




## GENERAL REMARKS

The location was CAT scanned and inspection pit excavated by hand. The TRIAL PIT was backfilled with arisings on completion.

| All dimensions in metres Scale 1:25 | Client: Silver Bells Administration Limited | Method/ Plant Used: Hand Dug | Logged By: B Zarkovski |
|---|---|---|---|

AVZGeoEng Ltd
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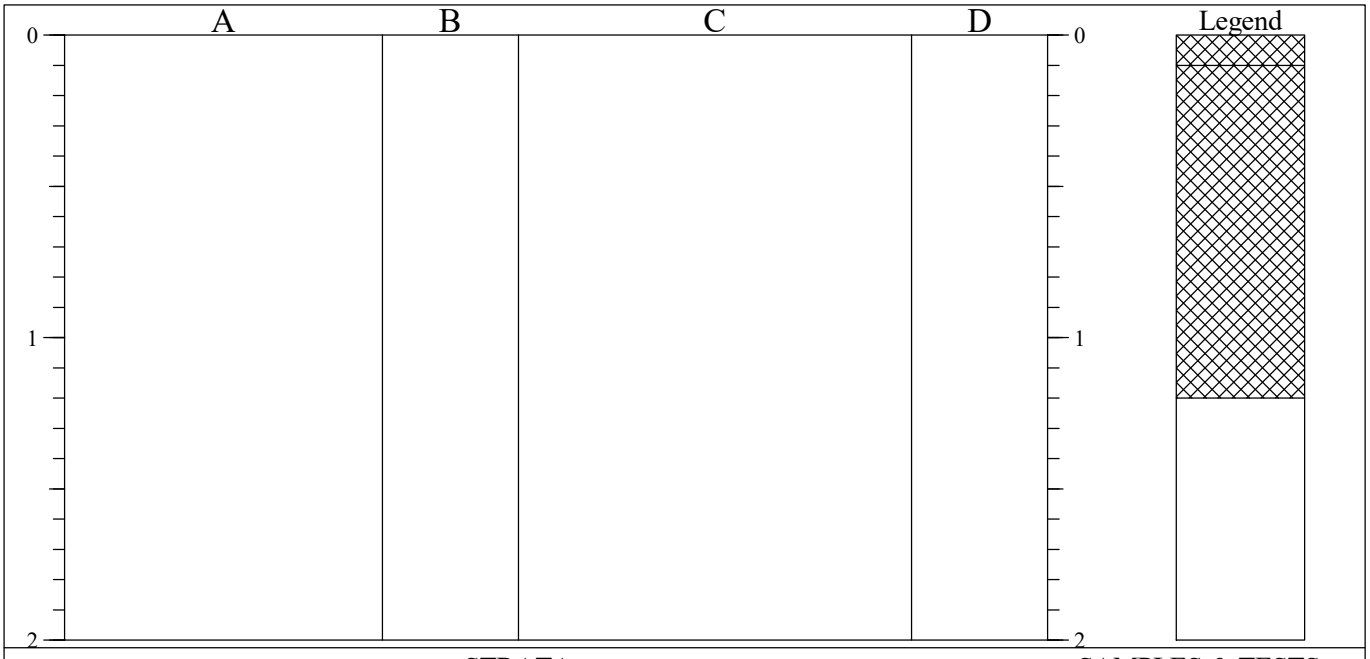
RH19 2NU
Telephone: 01342457117
info@avzgeoeng.co.uk

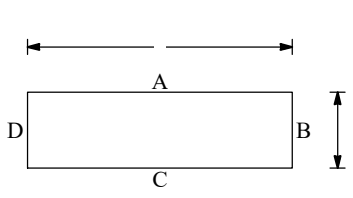
# TRIAL PIT LOG

| Project | | | | TRIAL PIT No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | **TP7** |
| Job No: SKZ_2214/23 | Date: 28-02-24 06-03-24 | Ground Level (m): | Co-Ordinates (Local): | |
| Contractor: AVZGeoEng Ltd | | | | Sheet: 1 of 1 |




| STRATA | | | SAMPLES & TESTS | | |
|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Remarks/Tests |
| 0.00-0.10 | | MADE GROUND: Topsoil | | | |
| 0.10-1.20 | | MADE GROUND: Brown slightly clayey silty sand and occasional gravel. Occasional bricks, metal, ceramic and coal ash, and frequent brick fragments present in the sample. | | | |

Shoring/Support:
Stability:




## GENERAL REMARKS

The location was CAT scanned and inspection pit excavated by hand. The TRIAL PIT was backfilled with arisings on completion.

| All dimensions in metres Scale 1:25 | Client: Silver Bells Administration Limited | Method/ Plant Used: Hand Dug | Logged By: B Zarkovski |
|---|---|---|---|

AVZGeoEng Ltd
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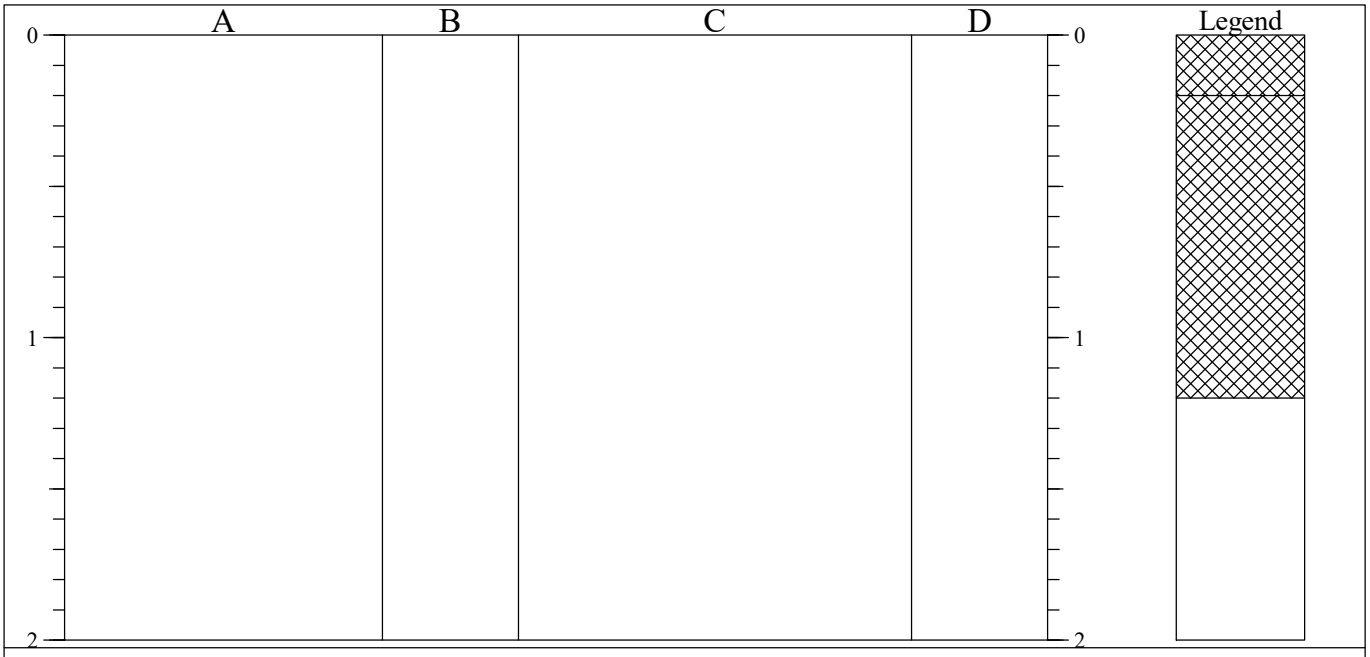
# TRIAL PIT LOG

| Project | | | | TRIAL PIT No |
|---|---|---|---|---|
| London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | | | | **TP8** |
| Job No | Date | Ground Level (m) | Co-Ordinates (Local) | |
| SKZ_2214/23 | 28-02-24<br>06-03-24 | | | |
| Contractor | | | | Sheet |
| AVZGeoEng Ltd | | | | 1 of 1 |

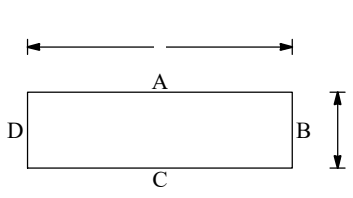



## STRATA

## SAMPLES & TESTS

| Depth | No | DESCRIPTION | Depth | No | Remarks/Tests |
|---|---|---|---|---|---|
| 0.00-0.20 | | MADE GROUND: Dark brown topsoil | | | |
| 0.20-1.20 | | MADE GROUND: Brown slightly clayey silty sand and occasional gravel. Occasional bricks, brick fragments and coal ash present in the sample. | | | |

Shoring/Support:
Stability:




## GENERAL REMARKS

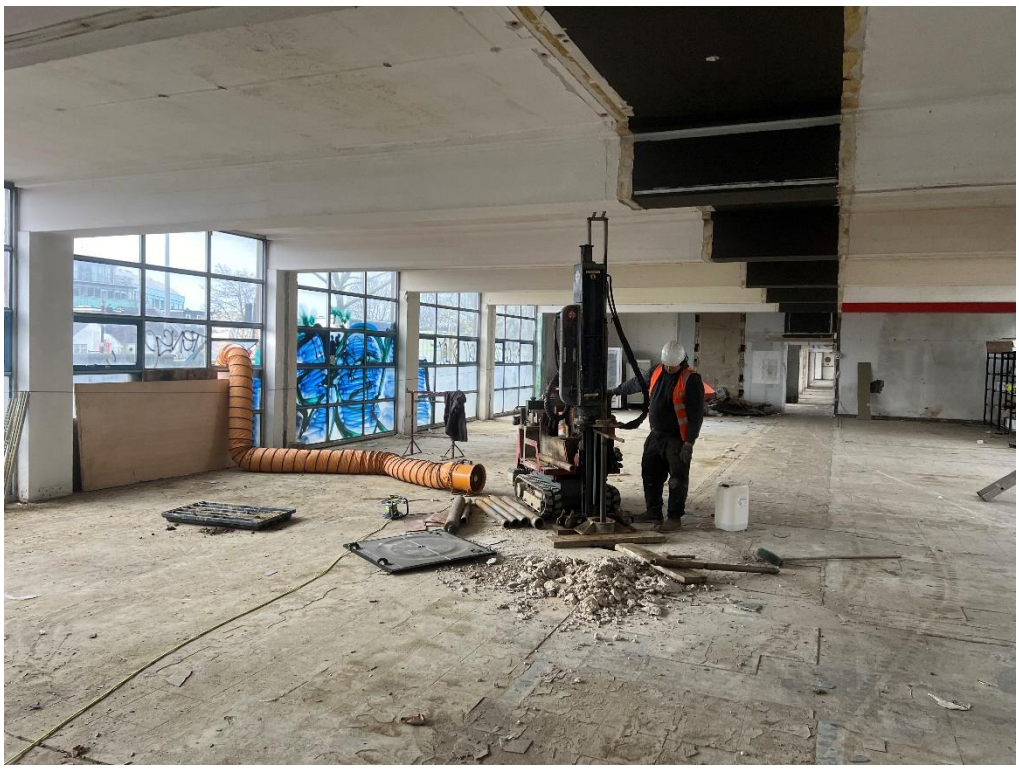
The location was CAT scanned and inspection pit excavated by hand. The TRIAL PIT was backfilled with arisings on completion.

| All dimensions in metres<br>Scale 1:25 | Client Silver Bells Administration Limited | Method/ Plant Used Hand Dug | Logged By B Zarkovski |
|---|---|---|---|

Contaminated Land Solutions

## Appendix F– Borehole & Trial Pit Photographs

| | | |
|---|---|---|
| AVZ GeoEng Ltd | **Factual Report on Ground Investigation** | **PHOTOGRAPHIC LOG** |
| **Client:** Silver Bells Administration Limited | **Site:** London House, 243-253 Lower Mortlake Road, Richmond, TW9 2LL | **Job No: 2214/23** |

| | |
|---|---|
| **Photo No.1** | **Figure 6** |
| |  |
| **Description:** **Performing Drilling at the location** | |

| | |
|---|---|
| **Photo No.2** | **Figure 6** |
| |  |
| **Description:** **Core Recovered From BH1** | |

| Photo No.3 | Figure 6 |  |
|---|---|---|
| | | |
| **Description:**<br>**Core Recovered From BH2** | | |

| Photo No.4 | Figure 6 |  |
|---|---|---|
| | | |
| **Description:**<br>**Core Recovered From BH3** | | |

Figure 6

| Photo No.11 | Figure 6 |
|---|---|
| | |
| **Description:**<br>**Trial Pit TP6** | |


| Photo No.12 | Figure 6 |
|---|---|
| | |
| **Description:**<br>**Trial Pit TP7** | |

| Photo No.13 | Figure 6 |  |
|---|---|---|
| | | |
| **Description:**<br>**Trial Pit TP8** | | |

Figure 6

Contaminated
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# Appendix G – Gas & Groundwater Monitoring Results

Contaminated Land Solutions

## GROUNDWATER & GAS MONITORING RESULTS

| Project No. | 2684 |
|---|---|
| Project Name | London House 243 - 253 Lower Mortlake Road |

| BH ref | Date | Time | Weather | Pressure (mb) | | Flow Rate (l/hr) | Methane (%) | | Oxygen (%v/v) | | Carbon dioxide (%) | | Carbon Monoxide (%) | | Hydrogen Sulphide | | VOC & SVOC Vapours (ppm) | | | Ground water level (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Atmos-pheric | in BH | | Initial | Steady | Initial | Steady | Initial | Steady | Initial | Steady | Initial | Steady | Initial | Peak | Steady | |
| BH1 | 25/03/2024 | 10:58 | Overcast | 1001 | 1001 | 0.0 | 0.0 | 0.0 | 18.8 | 18.1 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 239 | 230 | Dry |
| | 10/04/2024 | 10:45 | Overcast, mild | 1025 | 1025 | 0.0 | 0.0 | 0.0 | 18.1 | 17.1 | 2.0 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 57 | 51 | |
| | 24/04/2024 | 10:00 | Mild, sunny | 1018 | 1018 | 0.0 | 0.0 | 0.0 | 20.1 | 16.5 | 0.2 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 78 | 76 | |
| | | | | | | | | | | | | | | | | | | | | |
| BH2 | 25/03/2024 | 10:40 | Overcast | 1001 | 1001 | 0.0 | 0.0 | 0.0 | 20.2 | 17.8 | 0.1 | 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | |
| | 10/04/2024 | 10:35 | Overcast, mild | 1025 | 1025 | 0.0 | 0.0 | 0.0 | 20.1 | 16.5 | 0.0 | 3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 24/04/2024 | 10:15 | Mild, sunny | 1018 | 1018 | 0.0 | 0.0 | 0.0 | 20.4 | 15.2 | 0 | 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | | | | | | | | | | | | | | | | | | | | |
| BH3 | 25/03/2024 | 11:15 | Overcadt | 1001 | 1001 | 0.0 | 0.0 | 0.0 | 20.1 | 18.3 | 0.1 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.6 | 11.6 | |
| | 10/04/2024 | 10:50 | Overcast, mild | 1025 | 1025 | 0.0 | 0.0 | 0.0 | 17.9 | 18.1 | 1.7 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 1.0 | |
| | 24/04/2024 | 10:27 | Mild, sunny | 1018 | 1018 | 0.0 | 0.0 | 0.0 | 20.3 | 19.8 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.1 | 4.3 | |

Monitoring Equipment: Gas Data GFM436 Multichannel Portable gas analyser, an ATEX and MCERTS accredited hand held gas analyser.
Monitoring for VOCs and SVOCs: MiniRAE Lite PID manufactured by RAE System fitted with a 10.6 eV lamp.

Monitoring for VOCs and SVOCs taken with a MiniRAE Lite PID manufactured by RAE Systems fitted with a 10.6 eV lamp.

Contaminated
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Solutions

# Appendix H – Contamination Testing

**Unit A2**
**Windmill Road**
**Ponswood Industrial Estate**
**St Leonards on Sea**
**East Sussex**
**TN38 9BY**
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

## Certificate of Analysis

## THE ENVIRONMENTAL LABORATORY LTD

| | |
|---|---|
| **Analytical Report Number:** | 24-52732 |
| **Issue:** | 2. Replaces Analytical Report number 24-52732; issue no.1 |
| **Date of Issue:** | 03/04/2024 |
| **Contact:** | Peter George |
| **Customer Details:** | GO Contaminated Land Solutions Ltd<br>4 De Frene Road<br>Sydenham<br>London<br>SE26 4AB |
| **Quotation No:** | Q24-04324 |
| **Order No:** | Not Supplied |
| **Customer Reference:** | 2684 |
| **Date Received:** | 08/03/2024 |
| **Date Approved:** | 03/04/2024 |
| **Details:** | London House, 243-253 Lower Mortlake Road, TW9 2LL |
| **Approved by:** | |

Tim Reeve, Technical Coordinator

# Re-Issue Summary

Client: GO Contaminated Land Solutions Ltd
Address: 4 De Frene Road, Sydenham, London, SE26 4AB

**Date:** **03-Apr-24**

**Report No.:** **24-52732**

**Issue:** **2**

This report replaces 24-52732, issue: 1, issued: 19 March 2024

## Reason for Change

1 - Client request – additional analysis

## Details of Changes to Work / Results

**Sample Refs:**

**Tests* / Dets*:**
Leachate metals 10:1
NRA Leachate extraction

Key
A - Additional Work added
D - Work Deleted
E - Result Edited*
R - Work Repeated*

*If a result changed, please refer to the previous report for the old result. The new result will be shown in this report.

**Re-issued by:** Tim Reeve, Technical Coordinator **Approved by:** Tim Reeve, Technical Coordinator

## Sample Summary

**Report No.: 24-52732, issue number 2**

| Elab No. | Client's Ref. | Date Sampled | Date Scheduled | Description | Deviations |
|---|---|---|---|---|---|
| 355042 | TP6 0.10 - 0.60 | 06/03/2024 | 08/03/2024 | Sandy silty loam | |
| 355043 | TP7 0.10 - 0.60 | 06/03/2024 | 08/03/2024 | Sandy silty loam | |
| 355044 | TP8 0.20 - 1.00 | 06/03/2024 | 08/03/2024 | Sandy silty loam | |
| 355045 | BH1 1.00 - 4.20 | 06/03/2024 | 08/03/2024 | Sandy loam | |

# Results Summary

**Report No.: 24-52732, issue number 2**

| | | | | ELAB Reference | 355042 | 355043 | 355044 | 355045 |
|---|---|---|---|---|---|---|---|---|
| | | | | Customer Reference | | | | |
| | | | | Sample ID | | | | |
| | | | | Sample Type | SOIL | SOIL | SOIL | SOIL |
| | | | | Sample Location | TP6 | TP7 | TP8 | BH1 |
| | | | | Sample Depth (m) | 0.10 - 0.60 | 0.10 - 0.60 | 0.20 - 1.00 | 1.00 - 4.20 |
| | | | | Sampling Date | 06/03/2024 | 06/03/2024 | 06/03/2024 | 06/03/2024 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | | |
| **Soil sample preparation parameters** | | | | | | | | |
| Moisture Content | N | % | 0.1 | | 10.5 | 12.1 | 11.7 | 17.4 |
| Stones Content | N | % | 0.1 | | 17.1 | 13.0 | 18.6 | 14.6 |
| Material removed | N | % | 0.1 | | 17.1 | 13.0 | 18.6 | 14.6 |
| Description of Inert material removed | N | | 0 | | Stones | Stones | Stones | Stones |
| **Metals** | | | | | | | | |
| Arsenic | M | mg/kg | 1 | | 22.3 | 19.4 | 39.0 | 29.1 |
| Cadmium | M | mg/kg | 0.5 | | 1.3 | 1.0 | 285 | 18.9 |
| Chromium | M | mg/kg | 5 | | 59.9 | 23.5 | 26.8 | 32.2 |
| Copper | M | mg/kg | 5 | | 138 | 107 | 175 | 2260 |
| Lead | M | mg/kg | 5 | | 775 | 570 | 1700 | 3750 |
| Mercury | M | mg/kg | 0.5 | | 2.3 | 2.1 | 9.7 | 18.1 |
| Nickel | M | mg/kg | 5 | | 40.6 | 15.9 | 32.9 | 101 |
| Selenium | M | mg/kg | 1 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Zinc | M | mg/kg | 5 | | 321 | 428 | 451 | 2270 |
| **Inorganics** | | | | | | | | |
| Free Cyanide | N | mg/kg | 1 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Hexavalent Chromium | N | mg/kg | 0.8 | | < 0.8 | < 0.8 | < 0.8 | < 0.8 |
| **Miscellaneous** | | | | | | | | |
| pH | M | pH units | 0.1 | | 7.2 | 8.2 | 8.0 | 8.8 |
| Soil Organic Matter | U | % | 0.1 | | 1.7 | 1.3 | 2.5 | 2.1 |

# Results Summary

**Report No.: 24-52732, issue number 2**

| | | | | |
|---|---|---|---|---|
| ELAB Reference | 355042 | 355043 | 355044 | 355045 |
| Customer Reference | | | | |
| Sample ID | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL |
| Sample Location | TP6 | TP7 | TP8 | BH1 |
| Sample Depth (m) | 0.10 - 0.60 | 0.10 - 0.60 | 0.20 - 1.00 | 1.00 - 4.20 |
| Sampling Date | 06/03/2024 | 06/03/2024 | 06/03/2024 | 06/03/2024 |

| Determinand | Codes | Units | LOD | | | | |
|---|---|---|---|---|---|---|---|
| **Phenols** | | | | | | | |
| Total Monohydric Phenols | N | mg/kg | 5 | < 5 | < 5 | < 5 | < 5 |
| **Polyaromatic hydrocarbons** | | | | | | | |
| Naphthalene | SM | mg/kg | 0.02 | 0.15 | 1.77 | 1.46 | 0.44 |
| Acenaphthylene | SM | mg/kg | 0.02 | 0.40 | 6.56 | 0.84 | 1.19 |
| Acenaphthene | SM | mg/kg | 0.02 | 0.18 | 1.34 | 1.59 | 0.20 |
| Fluorene | S | mg/kg | 0.02 | 0.28 | 5.90 | 1.29 | 0.99 |
| Phenanthrene | SM | mg/kg | 0.02 | 4.48 | 107 | 16.7 | 10.4 |
| Anthracene | S | mg/kg | 0.02 | 1.51 | 32.4 | 4.27 | 2.41 |
| Fluoranthene | SM | mg/kg | 0.02 | 9.46 | 128 | 31.5 | 13.5 |
| Pyrene | SM | mg/kg | 0.02 | 8.30 | 98.4 | 26.8 | 10.9 |
| Benzo(a)anthracene | S | mg/kg | 0.02 | 4.61 | 45.1 | 16.0 | 5.40 |
| Chrysene | SM | mg/kg | 0.02 | 4.34 | 44.1 | 16.7 | 5.09 |
| Benzo(b)fluoranthene | SM | mg/kg | 0.02 | 4.39 | 42.1 | 17.8 | 5.28 |
| Benzo(k)fluoranthene | SM | mg/kg | 0.03 | 2.11 | 18.4 | 8.20 | 2.39 |
| Benzo(a)pyrene | S | mg/kg | 0.02 | 4.42 | 38.9 | 16.7 | 5.04 |
| Indeno(1,2,3-cd)pyrene | SM | mg/kg | 0.02 | 2.73 | 25.5 | 10.6 | 3.23 |
| Dibenzo(a,h)anthracene | SM | mg/kg | 0.02 | 0.63 | 5.85 | 2.60 | 0.72 |
| Benzo[g,h,i]perylene | SM | mg/kg | 0.02 | 2.55 | 25.4 | 10.7 | 2.99 |
| Total PAH(16) | NS | mg/kg | 0.34 | 50.6 | 627 | 184 | 70.1 |

# Results Summary

**Report No.: 24-52732, issue number 2**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | ELAB Reference | 355042 | 355043 | 355044 | 355045 |
| | | | Customer Reference | | | | |
| | | | Sample ID | | | | |
| | | | Sample Type | SOIL | SOIL | SOIL | SOIL |
| | | | Sample Location | TP6 | TP7 | TP8 | BH1 |
| | | | Sample Depth (m) | 0.10 - 0.60 | 0.10 - 0.60 | 0.20 - 1.00 | 1.00 - 4.20 |
| | | | Sampling Date | 06/03/2024 | 06/03/2024 | 06/03/2024 | 06/03/2024 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | |
| **Metals** | | | | | | | |
| Lead 10:1 extract | N | ug/l | 5 | 39 | 29 | 67 | 29 |

2683

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

# Results Summary

**Report No.: 24-52732, issue number 2**

## Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

In accordance with procedures, a 1kg soil sample should be analysed. For amounts less than this caution should be used when analysing the data as sample size is smaller than the recommended amount, therefore samples could be deemed as not being representative of the materials present on site.

| Elab No | Depth (m) | Clients Reference | Description of Sample Matrix # | Asbestos Identification | Gravimetric Analysis Total (%) | Gravimetric Analysis by ACM Type (%) | Free Fibre Analysis (%) | Total Asbestos (%) | F/mm2 (I) |
|---|---|---|---|---|---|---|---|---|---|
| 355042 | 0.10 - 0.60 | TP6 | Brown Soil, Stones, Clinker, Brick, China, Concrete, Organics | No asbestos detected | n/t | n/t | n/t | n/t | n/t |
| 355043 | 0.10 - 0.60 | TP7 | Brown Soil, Stones, Clinker, Concrete, Brick | No asbestos detected | n/t | n/t | n/t | n/t | n/t |
| 355044 | 0.20 - 1.00 | TP8 | Brown Soil, Stones, Clinker | No asbestos detected | n/t | n/t | n/t | n/t | n/t |
| 355045 | 1.00 - 4.20 | BH1 | Brown Soil, Stones, Clinker, Brick, Concrete, Organics | No asbestos detected | n/t | n/t | n/t | n/t | n/t |

# Method Summary

**Report No.: 24-52732, issue number 2**

| Parameter | Codes | Analysis Undertaken On | Date Tested | Method Number | Technique |
|---|---|---|---|---|---|
| **Soil** | | | | | |
| Leachate metals 10:1 extract | N | | 03/04/2024 | 301 | ICPMS |
| Free cyanide | N | As submitted sample | 15/03/2024 | 107 | Colorimetry |
| Hexavalent chromium | N | As submitted sample | 12/03/2024 | 110 | Colorimetry |
| pH | M | Air dried sample | 13/03/2024 | 113 | Electromeric |
| Aqua regia extractable metals | M | Air dried sample | 12/03/2024 | 300 | ICPMS |
| Phenols in solids | N | As submitted sample | 12/03/2024 | 121 | HPLC |
| Asbestos identification | U | Air dried sample | 14/03/2024 | 281 | Microscopy |
| Soil organic matter | U | Air dried sample | 12/03/2024 | BS1377:P3 | Titrimetry |

Tests marked N are not UKAS accredited

## Report Information

**Report No.: 24-52732, issue number 2**

**Key**

| | |
|---|---|
| U | hold UKAS accreditation |
| M | hold MCERTS and UKAS accreditation |
| N | do not currently hold UKAS accreditation |
| ^ | MCERTS accreditation not applicable for sample matrix |
| * | UKAS accreditation not applicable for sample matrix |
| S | Subcontracted to approved laboratory UKAS Accredited for the test |
| SM | Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test |
| NS | Subcontracted to approved laboratory. UKAS accreditation is not applicable. |
| I/S | Insufficient Sample |
| U/S | Unsuitable sample |
| n/t | Not tested |
| < | means "less than" |
| > | means "greater than" |
| LOD | LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. |

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.

ELAB are unable to provide an interpretation or opinion on the content of this report.

The results relate only to the sample received.

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

**Deviation Codes**

| | |
|---|---|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

**Sample Retention and Disposal**

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

**TPH Classification - HWOL Acronym System**

| | |
|---|---|
| HS | Headspace analysis |
| EH | Extractable Hydrocarbons - i.e. everything extracted by the solvent |
| CU | Clean-up - e.g. by florisil, silica gel |
| 1D | GC - Single coil gas chromatography |
| Total | Aliphatics & Aromatics |
| AL | Aliphatics only |
| AR | Aromatics only |
| 2D | GC-GC - Double coil gas chromatography |
| #1 | EH_Total but with humics mathematically subtracted |
| #2 | EH_Total but with fatty acids mathematically subtracted |
| _ | Operator - underscore to separate acronyms (exception for +) |
| + | Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total |
| MS | Mass Spectrometry |

## End of Report

Elab Customer Services
The Environmental Laboratory Ltd
Unit 42, Windmill Road
Ponswood Industrial Estate
St Leonards-on-Sea
East Sussex
TN38 9BY

**Normec DETS Limited**
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
**t:** 01622 850410

# DETS Report No: 24-02597

| | |
|---|---|
| **Site Reference:** | 24-52732 |
| **Project / Job Ref:** | TPHCWG Analysis |
| **Order No:** | PO 12344 |
| **Sample Receipt Date:** | 12/03/2024 |
| **Sample Scheduled Date:** | 12/03/2024 |
| **Report Issue Number:** | 1 |
| **Reporting Date:** | 18/03/2024 |

**Authorised by:**

Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Normec DETS Limited**
**Unit 1, Rose Lane Industrial Estate**
**Rose Lane**
**Lenham Heath**
**Maidstone**
**Kent ME17 2JN**
**Tel : 01622 850410**

4480

| Soil Analysis Certificate - TPH CWG Banded | | | | | | |
|---|---|---|---|---|---|---|
| **DETS Report No: 24-02597** | **~Date Sampled** | 06/03/24 | 06/03/24 | 06/03/24 | 06/03/24 | |
| **The Environmental Laboratory Ltd** | **~Time Sampled** | None Supplied | None Supplied | None Supplied | None Supplied | |
| **~Site Reference: 24-52732** | **~TP / BH No** | 355042 | 355043 | 355044 | 355045 | |
| **~Project / Job Ref: TPHCWG Analysis** | **~Additional Refs** | TP6 | TP7 | TP8 | BH1 | |
| **~Order No: PO_12344** | **~Depth (m)** | 0.10 - 0.60 | 0.10 - 0.60 | 0.20 - 1.00 | 1.00 - 2.40 | |
| **Reporting Date: 18/03/2024** | **DETS Sample No** | 703701 | 703702 | 703703 | 703704 | |

| Determinand | Unit | RL | Accreditation | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aliphatic >C5 - C6 | mg/kg | < 0.01 | NONE | < 0.01 | < 0.01 | < 0.01 | < 0.01 | |
| Aliphatic >C6 - C8 | mg/kg | < 0.05 | NONE | < 0.05 | < 0.05 | 0.14 | < 0.05 | |
| Aliphatic >C8 - C10 | mg/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| Aliphatic >C10 - C12 | mg/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| Aliphatic >C12 - C16 | mg/kg | < 3 | MCERTS | < 3 | < 3 | < 3 | < 3 | |
| Aliphatic >C16 - C21 | mg/kg | < 3 | MCERTS | < 3 | < 3 | < 3 | < 3 | |
| Aliphatic >C21 - C34 | mg/kg | < 10 | MCERTS | < 10 | < 10 | < 10 | < 10 | |
| Aliphatic (C5 - C34) | mg/kg | < 21 | NONE | < 21 | < 21 | < 21 | < 21 | |
| Aromatic >C5 - C7 | mg/kg | < 0.01 | NONE | < 0.01 | < 0.01 | < 0.01 | < 0.01 | |
| Aromatic >C7 - C8 | mg/kg | < 0.05 | NONE | < 0.05 | < 0.05 | < 0.05 | < 0.05 | |
| Aromatic >C8 - C10 | mg/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| Aromatic >C10 - C12 | mg/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| Aromatic >C12 - C16 | mg/kg | < 2 | MCERTS | 7 | 5 | 3 | 2 | |
| Aromatic >C16 - C21 | mg/kg | < 3 | MCERTS | 47 | 55 | 44 | 8 | |
| Aromatic >C21 - C35 | mg/kg | < 10 | MCERTS | 26 | 44 | 41 | < 10 | |
| Aromatic (C5 - C35) | mg/kg | < 21 | NONE | 80 | 104 | 89 | < 21 | |
| Total >C5 - C35 | mg/kg | < 42 | NONE | 80 | 104 | 89 | < 42 | |

~ Sample details provided by the customer

**Normec DETS Limited**
**Unit 1, Rose Lane Industrial Estate**
**Rose Lane**
**Lenham Heath**
**Maidstone**
**Kent ME17 2JN**
**Tel : 01622 850410**

| Soil Analysis Certificate - BTEX / MTBE | | | | | | |
|---|---|---|---|---|---|---|
| **DETS Report No: 24-02597** | **~Date Sampled** | 06/03/24 | 06/03/24 | 06/03/24 | 06/03/24 | |
| **The Environmental Laboratory Ltd** | **~Time Sampled** | None Supplied | None Supplied | None Supplied | None Supplied | |
| **~Site Reference: 24-52732** | **~TP / BH No** | 355042 | 355043 | 355044 | 355045 | |
| **~Project / Job Ref: TPHCWG Analysis** | **~Additional Refs** | TP6 | TP7 | TP8 | BH1 | |
| **~Order No: PO_12344** | **~Depth (m)** | 0.10 - 0.60 | 0.10 - 0.60 | 0.20 - 1.00 | 1.00 - 2.40 | |
| **Reporting Date: 18/03/2024** | **DETS Sample No** | 703701 | 703702 | 703703 | 703704 | |

| Determinand | Unit | RL | Accreditation | | | | | |
|---|---|---|---|---|---|---|---|---|
| Benzene | ug/kg | < 2 | MCERTS | < 2 | < 2 | 5 | < 2 | |
| Toluene | ug/kg | < 5 | MCERTS | < 5 | < 5 | < 5 | < 5 | |
| Ethylbenzene | ug/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| p & m-xylene | ug/kg | < 2 | MCERTS | < 2 | 3 | < 2 | < 2 | |
| o-xylene | ug/kg | < 2 | MCERTS | < 2 | < 2 | < 2 | < 2 | |
| MTBE | ug/kg | < 5 | MCERTS | < 5 | < 5 | < 5 | < 5 | |

~ Sample details provided by the customer

**Normec DETS Limited**
**Unit 1, Rose Lane Industrial Estate**
**Rose Lane**
**Lenham Heath**
**Maidstone**
**Kent ME17 2JN**
**Tel : 01622 850410**

| Soil Analysis Certificate - Sample Descriptions | |
|---|---|
| DETS Report No: 24-02597 | |
| The Environmental Laboratory Ltd | |
| ~Site Reference: 24-52732 | |
| ~Project / Job Ref: TPHCWG Analysis | |
| ~Order No: PO_12344 | |
| Reporting Date: 18/03/2024 | |

| DETS Sample No | ~TP / BH No | ~Additional Refs | ~Depth (m) | Moisture Content (%) | Sample Matrix Description |
|---|---|---|---|---|---|
| 703701 | 355042 | TP6 | 0.10 - 0.60 | 10.2 | Brown sandy loam with stones and vegetation |
| 703702 | 355043 | TP7 | 0.10 - 0.60 | 12.8 | Brown sandy loam with stones and vegetation |
| 703703 | 355044 | TP8 | 0.20 - 1.00 | 9.6 | Black sandy loam with stones and concrete |
| 703704 | 355045 | BH1 | 1.00 - 2.40 | 22.5 | Brown sandy loam with stones and concrete |

*Moisture content is part of procedure E003 & is not an accredited test*
Insufficient Sample I/S
Unsuitable Sample U/S
~ Sample details provided by the customer

**Normec DETS Limited**
**Unit 1, Rose Lane Industrial Estate**
**Rose Lane**
**Lenham Heath**
**Maidstone**
**Kent ME17 2JN**
**Tel : 01622 850410**

**Soil Analysis Certificate - Methodology & Miscellaneous Information**

**DETS Report No: 24-02597**

**The Environmental Laboratory Ltd**

**~Site Reference: 24-52732**

**~Project / Job Ref: TPHCWG Analysis**

**~Order No: PO_12344**

**Reporting Date: 18/03/2024**

| Matrix | Analysed On | Determinand | Brief Method Description | Method No |
|---|---|---|---|---|
| Soil | D | Boron - Water Soluble | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES | E012 |
| Soil | AR | BTEX | Determination of BTEX by headspace GC-MS | E001 |
| Soil | D | Cations | Determination of cations in soil by aqua-regia digestion followed by ICP-OES | E002 |
| Soil | D | Chloride - Water Soluble (2:1) | Determination of chloride by extraction with water & analysed by ion chromatography | E009 |
| Soil | AR | Chromium - Hexavalent | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry | E016 |
| Soil | AR | Cyanide - Complex | Determination of complex cyanide by distillation followed by colorimetry | E015 |
| Soil | AR | Cyanide - Free | Determination of free cyanide by distillation followed by colorimetry | E015 |
| Soil | AR | Cyanide - Total | Determination of total cyanide by distillation followed by colorimetry | E015 |
| Soil | D | Cyclohexane Extractable Matter (CEM) | Gravimetrically determined through extraction with cyclohexane | E011 |
| Soil | AR | Diesel Range Organics (C10 - C24) | Determination of hexane/acetone extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | Electrical Conductivity | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement | E022 |
| Soil | AR | Electrical Conductivity | Determination of electrical conductivity by addition of water followed by electrometric measurement | E023 |
| Soil | D | Elemental Sulphur | Determination of elemental sulphur by solvent extraction followed by GC-MS | E020 |
| Soil | AR | EPH (C10 – C40) | Determination of acetone/hexane extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | EPH Product ID | Determination of acetone/hexane extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40) | Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS | E004 |
| Soil | D | Fluoride - Water Soluble | Determination of Fluoride by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Fraction Organic Carbon (FOC) | Determination of TOC by combustion analyser. | E027 |
| Soil | D | Organic Matter (SOM) | Determination of TOC by combustion analyser. | E027 |
| Soil | D | TOC (Total Organic Carbon) | Determination of TOC by combustion analyser. | E027 |
| Soil | AR | Exchangeable Ammonium | Determination of ammonium by discrete analyser. | E029 |
| Soil | D | FOC (Fraction Organic Carbon) | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | D | Loss on Ignition @ 450oC | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace | E019 |
| Soil | D | Magnesium - Water Soluble | Determination of water soluble magnesium by extraction with water followed by ICP-OES | E025 |
| Soil | D | Metals | Determination of metals by aqua-regia digestion followed by ICP-OES | E002 |
| Soil | AR | Mineral Oil (C10 - C40) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge | E004 |
| Soil | AR | Moisture Content | Moisture content; determined gravimetrically | E003 |
| Soil | D | Nitrate - Water Soluble (2:1) | Determination of nitrate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Organic Matter | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | AR | PAH - Speciated (EPA 16) | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards | E005 |
| Soil | AR | PCB - 7 Congeners | Determination of PCB by extraction with acetone and hexane followed by GC-MS | E008 |
| Soil | D | Petroleum Ether Extract (PEE) | Gravimetrically determined through extraction with petroleum ether | E011 |
| Soil | AR | pH | Determination of pH by addition of water followed by electrometric measurement | E007 |
| Soil | AR | Phenols - Total (monohydric) | Determination of phenols by distillation followed by colorimetry | E021 |
| Soil | D | Phosphate - Water Soluble (2:1) | Determination of phosphate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Sulphate (as SO4) - Total | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES | E013 |
| Soil | D | Sulphate (as SO4) - Water Soluble (2:1) | Determination of sulphate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Sulphate (as SO4) - Water Soluble (2:1) | Determination of water soluble sulphate by extraction with water followed by ICP-OES | E014 |
| Soil | AR | Sulphide | Determination of sulphide by distillation followed by colorimetry | E018 |
| Soil | D | Sulphur - Total | Determination of total sulphur by extraction with aqua-regia followed by ICP-OES | E024 |
| Soil | AR | SVOC | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS | E006 |
| Soil | AR | Thiocyanate (as SCN) | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry | E017 |
| Soil | D | Toluene Extractable Matter (TEM) | Gravimetrically determined through extraction with toluene | E011 |
| Soil | D | Total Organic Carbon (TOC) | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | AR | TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS | E004 |
| Soil | AR | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS | E004 |
| Soil | AR | VOCs | Determination of volatile organic compounds by headspace GC-MS | E001 |
| Soil | AR | VPH (C6-C8 & C8-C10) | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID | E001 |

**D Dried**
**AR As Received**
~ Sample details provided by the customer

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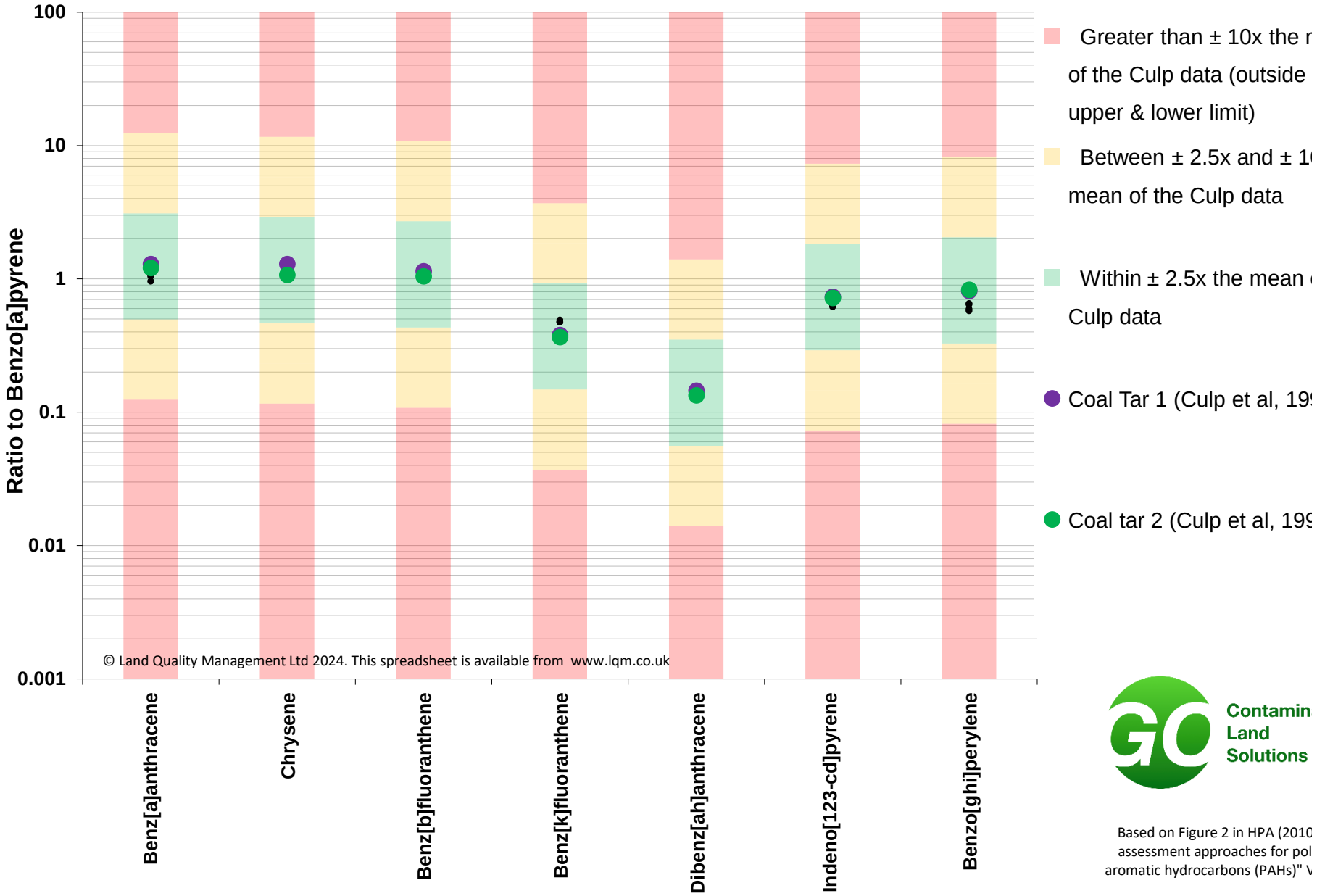
# Appendix I – LQM PAH Profiling Tool Results




Contamin
Land
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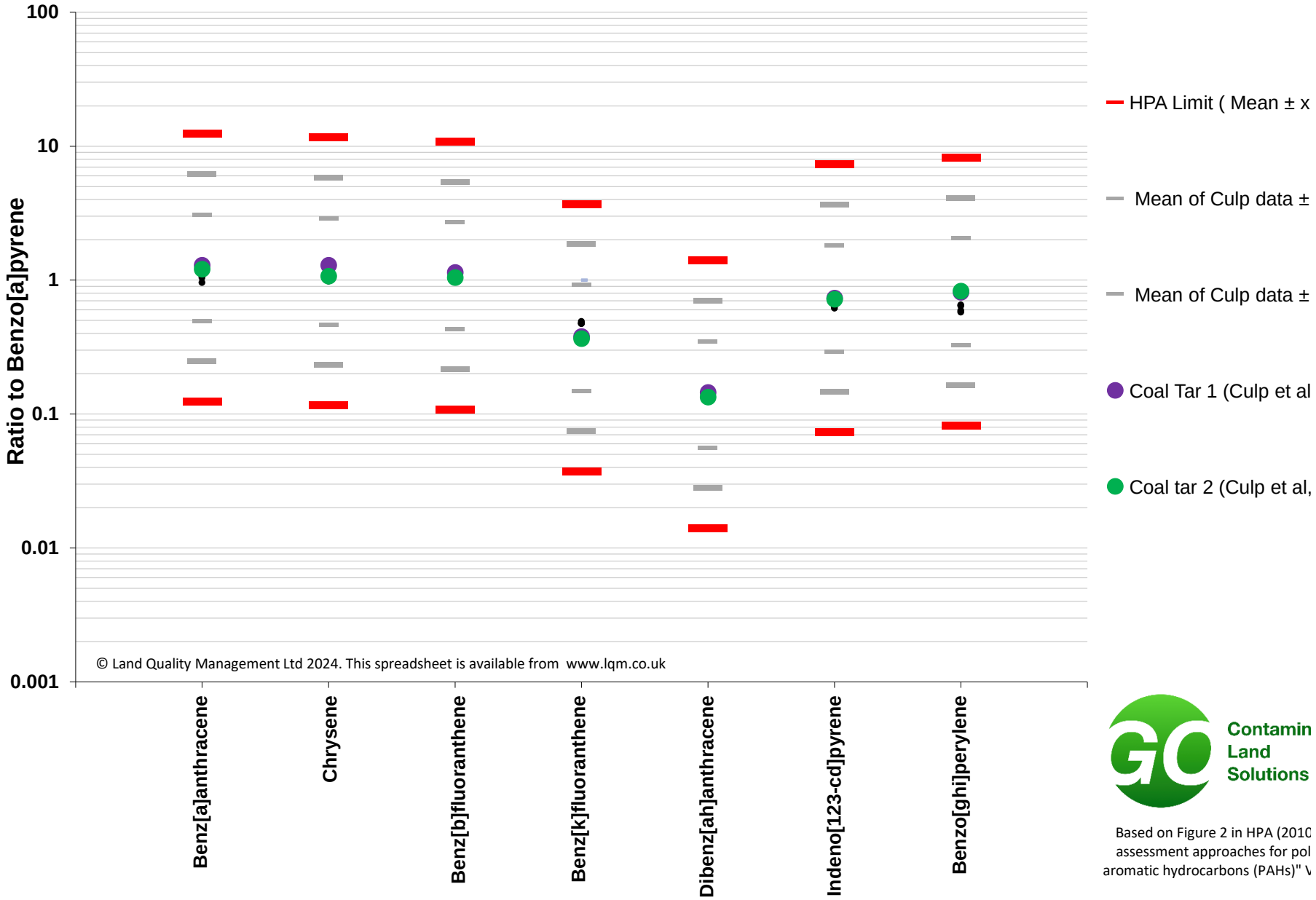
Based on Figure 2 in HPA (2010
assessment approaches for pol
aromatic hydrocarbons (PAHs)" V




Contamin
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Based on Figure 2 in HPA (2010
assessment approaches for pol
aromatic hydrocarbons (PAHs)" V

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# Appendix J – Gas Monitor and PID Calibration Certificates

VAN WALT
Monitoring your needs

# OUTWARDS CHECKLIST

## PID Service and Calibration

PID Serial Number: 590-902813
Customer and Company: GO Contaminated Land Solutions

| | Reading | Target | Acceptable | Pass | Lot no / Expiry date |
|---|---|---|---|---|---|
| 100ppm Isobutylene gas | 100.0 | 100 | ± 10% * | ✓ | W0374731-1 / 04/11/27 |
| Fresh Air | 0.0 | 0.0 | ± 10% * | ✓ | |

This PID was calibrated and was within acceptable range on the day of calibration. The PID can keep calibration for up to 30 days. If measurements become unstable re-calibrate the PID using the Isobutylene gas provided. * On bump test after calibration.

Service Checklist

- [x] PID Turns on/off
- [x] Sensor block cleaned
- [x] Pump rebuilt
- [x] Internal tubes replaced
- [x] Metal filter and o-ring changed
- [x] Charger PAT Tested

Comments

Other work carried out

* Serviced & calibrated to manufacturers standards

Signed: [signature] Date: 11/10/23

Name: Reece Munn Cross checked contents initials: TR

| TEST DATE AND CONDITIONS | | |
|---|---|---|
| Date | 04/10/2023 | |
| Atmospheric Pressure | 1005 | mB |
| Ambient Temperature | 22.3 | °C |
| Environics Serial No. | 5089 | |


**GAS DATA LTD**
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## *GFM436 Final Inspection & Calibration Check Certificate*

| | |
|---|---|
| Customer | GO Contaminated Land Solutions Ltd |
| Certificate Number | 124598 |
| Order Number | 336053 |

| | |
|---|---|
| Serial Number | 12884 |
| Software Version | G436-00.0027/0010 |

| Recalibration DUE Date |
|---|
| 04/10/24 |

| Instrument Checks | | | | | |
|---|---|---|---|---|---|
| Keyboard | ✓ | | Display Contrast | ✓ | |
| Pump Flow In | 400 | *Accept > 200 cc/min* | Pump Flow @ -200mb | 250 | *Accept > 200 cc/min* |
| Clock Set / Running | ✓ | | Labels Fitted | ✓ | |

| Gas Checks | | | | | | |
|---|---|---|---|---|---|---|
| | $CH_4$ | | $CO_2$ | | $O_2$ | |
| | Instrument Gas Readings % | True Gas Value % | Instrument Gas Readings % | True Gas Value % | Instrument Gas Readings % | True Gas Value % |
| Sensor | 59.5 | 60 | 39.4 | 40 | 20.9 | 20.9 |
| | *Accept ±3.0* | | *Accept ±3.0* | | *Accept ±0.5* | |
| | 4.9 | 5 | 5.0 | 5 | 6.0 | 6 |
| | *Accept ±0.3* | | *Accept ±0.3* | | *Accept ±0.3* | |
| Zero Reading 100% N2 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| | *Accept ±0.0* | | *Accept ±0.0* | | *Accept ±0.1* | |

| Optional Gas Checks | | | | | | |
|---|---|---|---|---|---|---|
| Applied Gas & Range | | Concentration Tested @ (ppm) | Instrument Readings *(ppm)* | | | |
| | | | Zero Reading | | Instrument Gas Reading | |
| Gas Type | Range *(ppm)* | | | | | |
| H2S | 5000 | *1500* | 0 | *Accept ±0.0* | 1500 | *Accept ±5.0%* |
| CO | 2000 | *1000* | 0 | *Accept ±0.0* | 1000 | *Accept ±5.0%* |
| Hexane | *2.0%* | 2.0% | 0 | *Accept ±0.0* | 1.99 | *Accept ±10.0%* |

| TEST DATE AND CONDITIONS | | |
|---|---|---|
| Date | 4.10.23 | |
| Atmospheric Pressure | 1005 | mB |
| Ambient Temperature | 22.3 | °C |
| Environics Serial No. | 5039 | |

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# GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

| INSTRUMENT DETAILS | | | |
|---|---|---|---|
| SO Number | Instrument Type | Instrument Serial Number + SW Version | Job Number(s) |
| 336053 | GFM436 | 12884 9436-27/10 | 124598 |

**Calibration Technician** ..... **Date** 4.10.23

**Inspection Technician** ..... **Date** 5.10.23

| INSTRUMENT CHECKS | | Pass (P), Fail (F) or not applicable (NA) | INSTRUMENT PACKING LIST | | Tick if included |
|---|---|---|---|---|---|
| Function Tests | Dust Caps Fitted | P | Instrument | | ✓ |
| | Keyboard Test (All Keys) | P | Leather Case | | ✓ |
| | Backlight | P | Instrument Strap | | ✓ |
| | Clock Set / Running | P | AC Battery Charger (UK) | | ✓ |
| | Comms Test | P | AC Battery Charger (EURO) | | X |
| | Pump Flow Test (In & Out) | P | AC Battery Charger (US) | | X |
| | Overall Leak Test (30mB) | n/a | AC Battery Charger (AUS) | | X |
| | Battery Charge Test | P | Gas Sample Pipe - *(new issue)* | | ✓ |
| | Service Date set to? | 4.10.24 | Flow Sample Pipe - *(new issue)* | | ✓ |
| Channel Tests | Data Logging Enabled? | P | Hard Carry Case | | ✓ |
| | Verify CH4/LEL/Hexane/PID | P | Spares Pot | | ✓ |
| | Verify CO2 | P | Allen Key | | X |
| | Verify O2 | P | Temperature Probe | | X |
| | Verify H2S | P | Vane Anemometer | | X |
| | Verify CO | P | USB Cable | | ✓ |
| | Verify LEL | P | USB Memory stick | | ✓ |
| | Verify 1st Option Gas | N/A | SM V5 Software | Ver 6.05 | ✓ |
| | Verify Atmospheric pressure | P | Internal Filter Pack | Qty | X |
| | Verify differential pressure | P | External Filter Pack | Qty | X |
| | Verify flow | P | Field Guide | | X |
| | Verify temperature probe input | P | **Extra Items:** | | |
| | Verify vane anemometer input | P | Sample Tube | | |
| DataBase Checks | Jobcard(s) completed and signed | P | | | |
| | Jobcard(s) booked off database | P | | | |
| | Calibration certificate completed | P | | | |
| | Complete & print QI record | n/a | | | |
| Label Checks | No. of Calibration label fitted | GDC 13106 | **Comments:** | | |
| | MCERTS label displayed | N/A | | | |
| | Warranty label fitted | P | | | |
| H2S Range | H2S Range from Sales Order | 5000 ppm | | | |
| | H2S Range from Cal Cert | 5000 ppm | | | |
| | Over-range value correct? | P | | | |

| Cross Gas Effects | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Applied Gas *(ppm)* | | Instrument Readings *(ppm)* | | | | | | | |
| Gas Type | Concentration | Toxic 1: | H2S | Toxic 2: | CO | Toxic 3: | HEX | | |
| H2S | *1500* | 1500 | | 0 | | 0 | | | |
| CO | *1000* | 70 | | 1000 | | 0 | | | |
| Hexane | *2.0%* | 0 | | 0 | | 1.99 | | | |

| Pressure Checks | | | | |
|---|---|---|---|---|
| Atmospheric Pressure [AP] *(mB)* | | | | |
| Current Atmospheric Pressure (mB) | | Instrument Atmospheric Pressure Reading (mB) | | |
| *AP Open Ports* | | 1005 | *Accept ±2.0* | |
| AP Port (Internal) | *+800 mB* | 800 | *Accept ±5.0* | |
| | *+1200mb* | 1200 | *Accept ±5.0* | |

| Flow Checks | | | | | |
|---|---|---|---|---|---|
| Borehole Flow | | | Differential Pressure | | |
| Applied Reading *(l/h)* | Instrument Reading *(l/h)* | | Applied Pressure *(Pa)* | Instrument Reading *(Pa)* | |
| *-30* | -29.8 | *Accept ±3.0* | -437 | -438 | *Accept ±50* |
| *-3* | -3.0 | *Accept ±1.0* | -17 | -18 | *Accept ±6.0* |
| *0* | 0.0 | *Accept ±0.0* | 0 | 0 | *Accept ±0.5* |
| *3* | 3.1 | *Accept ±0.5* | 14 | 15 | *Accept ±3.0* |
| *30* | 30.0 | *Accept ±3.0* | 319 | 321 | *Accept ±50* |
| *60* | 60.0 | *Accept ±6.0* | 965 | 965 | *Accept ±130* |
| *90* | 90.7 | *Accept ±9.0* | 1890 | 1939 | *Accept ±250* |

| Temperature Checks | | |
|---|---|---|
| Calibration Temperature<br>Applied Temperature °C | Instrument Temperature Reading °C | |
| *-10* | -10.0 | *Accept ±2.0* |
| *0* | 0.0 | *Accept ±1.0* |
| *30* | 30.0 | *Accept ±1.0* |
| *60* | 60.0 | *Accept ±1.0* |
| *100* | 100.0 | *Accept ±1.0* |

| Technician: | Date Tested: |
|---|---|
| *Jack Rutland* | *04/10/2023* |

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.