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GEO-ENVIRONMENTAL ASSESSMENT (GROUND INVESTIGATION) REPORT

UNITS 1-15 PREMIER ESTATES,
SUSSEX STREET,
BRISTOL,
BS2 0RA



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EXECUTIVE SUMMARY

Dominvs Project Company 23 Limited commissioned Jomas Associates Ltd to undertake a Geo-environmental ground investigation at the site referred to as Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA.

The principal objectives of the study were as follows:

- To determine the nature and where possible, the extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

| Site History and Ground Investigation | |
|---------------------------------------|--|
| Desk Study Overview | <p>A Desk Study report has been produced for the site and issued separately. A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.</p> <p>A review of earliest available (1884) historical maps indicates that the site was comprised of four rows of terraced housing with private gardens. Henry Street runs down through the middle of site, and Princess Street runs along the north-west of site. By the map dated 1950, 2No ruins were identified on-site. Few changes occur to the site until the map dated 1964 when the housing to the east of Henry Street has all been demolished, except for 1No in the north of site. A depot has been constructed in this area. Some buildings have been demolished west of Henry Street, with 17No terraced residential houses with private gardens remaining. By 1972, all residential buildings on site have been demolished. Henry Street is no longer present. 1No warehouse type building has been constructed in the west of site, and 3No smaller buildings have been constructed in the south-west of site. The smaller buildings in the south-west of site appear to have been demolished by 1985. Few changes then occur to the site until the present day. Current site uses include commercial/industrial; business operate out of the units on site including “The Invisible Circus” circus training (Unit 15), “Bristol Scrap Metal” (Units 6-11), “Calor Gas” (Units 12 & 13), “Crown Scaffolding” (Unit 1) and “Sovereign Motors” (Units 4-5).</p> <p>In the late 19th century, the land use in the vicinity of site was largely mixed industrial and residential with major railway lines and stations present. During the 1950s and 1960s, much of the surrounding land underwent heavy industrial redevelopments, with the construction of depots and factories and demolition of residential buildings. In the 1970s, many of the surrounding railway lines became disused and business parks were built in these areas. Currently, the site is part of Premier Business Park.</p> |

| Site History and Ground Investigation | |
|---------------------------------------|---|
| | <p>Information provided by the British Geological Survey indicates that the site is directly underlain by solid deposits of the Redcliffe Sandstone Member.</p> <p>No superficial or artificial deposits are reported on site.</p> <p>Borehole records from approximately 144m north-east of the site indicated Made Ground to a depth of 3.2mbgl, overlying possible tidal flat deposits to 8.4mbgl, beneath which were deposits of sand, gravel and sandstone to the base of the borehole</p> <p>The solid deposits underlying the site are identified as a Secondary A Aquifer.</p> <p>A review of the Enviro+Geosight Report indicates that there are 2No groundwater abstractions within 2km of the site; the nearest of which is located 65m north-west. There are no potable water abstractions reported within 2km of the site and there are no source protection zones within 500m of the site.</p> <p>There are 23No surface water abstractions within 2km of the site; the nearest of which is located 366m south-west.</p> <p>There are no surface water features or water networks (OS MasterMap) reported within 250m of the site.</p> <p>There are no Environment Agency Zone 2 or 3 floodplains reported within 50m of the site.</p> <p>In order to clarify the potential risks associated with the historic coal mining in the area, it was recommended that Consultant's Coal Mining Report is obtained for the site.</p> <p>An intrusive investigation was also recommended to confirm the preliminary geo-environmental risks identified. The investigation should assess the thickness of Made Ground and allow samples of made ground and natural soils to be taken for laboratory analysis. Soil gas monitoring should be undertaken due to the presence of a historical landfill site 144m to the east of the site (former Barton Hill Gas Holder Site). This should be undertaken in accordance with CIRIA C665.</p> |
| Intrusive Investigation | <p>The ground investigation was undertaken on 30 August 2022, and consisted of the following:</p> <ul style="list-style-type: none"> 5 No windowless sampling boreholes, drilled to a maximum depth of 2.9m below ground level (bgl), with associated in-situ testing and sampling; Laboratory analysis for chemical purposes; 4No return visits to monitor ground gas concentrations and groundwater levels. |
| Ground Conditions | <p>The results of the ground investigation revealed a ground profile comprising Made Ground to a maximum depth of 2.7mbgl, overlying sand deposits of the Redcliffe Sandstone Member.</p> <p>Groundwater was not reported during the course of the investigation.</p> |

| Site History and Ground Investigation | |
|---------------------------------------|---|
| Environmental Considerations | <p>Following generic risk assessments, elevated concentrations of arsenic and lead were detected in soils in excess of generic assessment criteria for the protection of human health within a “residential without plant uptake” end-use scenario.</p> <p>No asbestos containing materials or fibres were detected in the Made Ground samples analysed in the laboratory.</p> <p>Where the site is to be covered by the building footprint and hard surfacing, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, Made Ground should be encapsulated with a minimum 450mm of imported clean topsoil, placed on a geotextile membrane. Further investigation is recommended to increase the sample density across the site and beneath building footprints. Recommended remedial measures may be revised based on the findings of such works.</p> <p>The current soils may not satisfy the requirements of BS:3882 due to elevated concentrations of phytotoxic contaminants.</p> <p>The risk to controlled waters from soils is considered low on the basis that the extensive hard cover of the site will severely restrict the potential mobilisation of contaminants within the Made Ground.</p> <p>Based on the calculated GSVs, and in consideration of the conceptual site model, the site is classified as Characteristic Situation 1 (CS1) and no formal gas protection measures are considered to be necessary.</p> <p>Upgraded potable water supply pipe materials are unlikely to be required. The water supply pipe requirements for this site should be discussed at an early stage with the relevant utility provider.</p> <p>A remedial strategy will be required for the proposed development. This should include reference to information from the currently pending petroleum licensing information request. Further investigation is recommended within the vicinity of tanks that may be reported by the petroleum licensing authority (if any – response pending) and within the footprints of the existing building.</p> <p>If tanks are identified on site these will require removal along with associated hydrocarbon impacted soils under the supervision of a suitably qualified environmental consultant with appropriate verification works undertaken.</p> <p>As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.</p> |

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Dominvs Project Company 23 Limited (“The Client”) has commissioned Jomas Associates Ltd, to assess the risk of contamination posed by the ground conditions at a site referred to as Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA, prior to the redevelopment of the site.

1.1.2 To this end a Desk Study has been produced for the site and issued separately (Jomas, August 2022), followed by an intrusive investigation (detailed in this report).

1.1.3 The previous reports undertaken for the site by Jomas are detailed in Table 1.1:

Table 1.1: Previous Reports - Jomas

| Title | Author | Reference | Date |
|---|----------------------|----------------|----------------|
| Desk Study/Preliminary Risk Assessment Report for Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Jomas Associates Ltd | P4639J2633/JLW | 17 August 2022 |

1.1.4 The intrusive investigation was undertaken in accordance with Jomas proposal dated 04 August 2022

1.2 Proposed Development

1.2.1 It is understood that proposed development comprises demolition of the existing buildings on site and construction of a new building comprising commercial/retail units at ground level and residential units above. No private gardens or extensive areas of soft landscaping are anticipated.

1.2.2 For the purposes of the contamination risk assessment, the proposed development is classified as ‘Residential without plant uptake’.

1.3 Objectives

1.3.1 The objectives of Jomas’ investigation were as follows:

To conduct an intrusive investigation, to determine the nature and extent of contaminants potentially present at the site;

To establish the presence of significant pollutant linkages, in accordance with the procedures set out within Part IIA of the Environmental Protection Act 1990, associated statutory guidance and current best practice including the EA report R&D CLR 11.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

Intrusive ground investigation to determine shallow ground conditions, and potential for contamination at the site;

Undertaking of laboratory chemical testing upon samples obtained;

The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

1.5 Supplied Documentation

1.5.1 A report previously prepared by a third-party was supplied to Jomas Associates at the commencement of this investigation. Table 1.2 details the document supplied:

Table 1.2: Supplied Reports

| Title | Author | Reference | Date |
|--|----------------------|-----------|--------------|
| Environmental Report for Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Argyll Environmental | 298881269 | 25 July 2022 |

1.6 Limitations

1.6.1 Jomas Associates Ltd has prepared this report for the sole use of Dominvs Project Company 23 Limited, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas Associates Limited. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.6.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be correct. Jomas Associates Limited does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.6.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.6.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.

- 1.6.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.
- 1.6.6 This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.

2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

| | |
|----------------------------|--|
| Name of Site | - |
| Address of Site | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA |
| Approx. National Grid Ref. | 360144 172903 |
| Site Area (Approx) | 0.74ha |
| Site Occupation | Light industrial use |
| Local Authority | Bristol City Council |
| Proposed Site Use | Demolition of existing buildings, and construction of a mixed-use building |

2.2 Desk Study Overview

2.2.1 A Desk Study report has been produced for the site and issued separately. A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.

2.2.2 A review of earliest available (1884) historical maps indicates that the site was comprised of four rows of terraced housing with private gardens. Henry Street runs down through the middle of site, and Princess Street runs along the north-west of site. By the map dated 1950, 2No ruins were identified on-site. Few changes occur to the site until the map dated 1964 when the housing to the east of Henry Street has all been demolished, except for 1No in the north of site. A depot has been constructed in this area. Some buildings have been demolished west of Henry Street, with 17No terraced residential houses with private gardens remaining. By 1972, all residential buildings on site have been demolished. Henry Street is no longer present. 1No warehouse type building has been constructed in the west of site, and 3No smaller buildings have been constructed in the south-west of site. The smaller buildings in the south-west of site appear to have been demolished by 1985. Few changes then occur to the site until the present day. Current site uses include commercial/industrial; business operate out of the units on site including "The Invisible Circus" circus training (Unit 15), "Bristol Scrap Metal" (Units 6-11), "Calor Gas" (Units 12 & 13), "Crown Scaffolding" (Unit 1) and "Sovereign Motors" (Units 4-5).

2.2.3 In the late 19th century, the land use in the vicinity of site was largely mixed industrial and residential with major railway lines and stations present. During the 1950s and 1960s, much of the surrounding land underwent heavy industrial redevelopments, with the construction of depots and factories and demolition of

residential buildings. In the 1970s, many of the surrounding railway lines became disused and business parks were built in these areas. Currently, the site is part of Premier Business Park.

- 2.2.4 Information provided by the British Geological Survey indicates that the site is directly underlain by solid deposits of the Redcliffe Sandstone Member.
- 2.2.5 No superficial or artificial deposits are reported on site.
- 2.2.6 Borehole records from approximately 144m north-east of the site indicated Made Ground to a depth of 3.2mbgl, overlying possible tidal flat deposits to 8.4mbgl, beneath which were deposits of sand, gravel and sandstone to the base of the borehole
- 2.2.7 The solid deposits underlying the site are identified as a Secondary A Aquifer.
- 2.2.8 A review of the Enviro+Geosight Report indicates that there are 2No groundwater abstractions within 2km of the site; the nearest of which is located 65m north-west. There are no potable water abstractions reported within 2km of the site and there are no source protection zones within 500m of the site.
- 2.2.9 There are 23No surface water abstractions within 2km of the site; the nearest of which is located 366m south-west.
- 2.2.10 There are no surface water features or water networks (OS MasterMap) reported within 250m of the site.
- 2.2.11 There are no Environment Agency Zone 2 or 3 floodplains reported within 50m of the site.
- 2.2.12 In order to clarify the potential risks associated with the historic coal mining in the area, it was recommended that Consultant's Coal Mining Report is obtained for the site.
- 2.2.13 An intrusive investigation was also recommended to confirm the preliminary geo-environmental risks identified. The investigation should assess the thickness of Made Ground and allow samples of made ground and natural soils to be taken for laboratory analysis. Soil gas monitoring should be undertaken due to the presence of a historical landfill site 144m to the east of the site (former Barton Hill Gas Holder Site). This should be undertaken in accordance with CIRIA C665.
- 2.2.14 The conceptual site model is reproduced in Table 2.2 overleaf.

Table 2.2: Preliminary Risk Assessment for the Site

| Sources | Pathways (P) | Receptors | Consequence of Impact | Probability of Impact | Risk Estimation | Hazard Assessment |
|--|--|--|-----------------------|-----------------------|-----------------------|---------------------------|
| <p>Potential for contaminated ground associated with previous and current site use – on site (S1)</p> <ul style="list-style-type: none"> - Depot (1986) - Fuel distribution and suppliers (current) - Scrap metal merchants (current) - Special purpose machinery and equipment (current) - Electronic equipment (current) <p>Potential for Made Ground associated with previous development operations – on site (S2)</p> <p>Potential buried/above-ground tanks associated with former and current site use, and potential tanks observed during the walkover – on site (S3)</p> <p>Current and previous industrial use – off site (S4)</p> <ul style="list-style-type: none"> - Railways sidings (immediately N of the site) - Unspecified warehouse 7m SE (1986) - Plastic works and engineering works 60m NE (1972) - Railway land 61m N (1913) - Unspecified works 63m N (1986) - Garage 70m S (1972) - Nursery 71m SE (1921) <p>Historical landfill – off site (S5)</p> <ul style="list-style-type: none"> - Former Barton Hill Gas Holder Site 144m E (1984-1992) | <p>Ingestion and dermal contact with contaminated soil (P1)</p> <p>Inhalation or contact with potentially contaminated dust and vapours (P2)</p> <p>Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)</p> | <p>Construction workers (R1)</p> <p>Maintenance workers (R2)</p> <p>Neighbouring site users (R3)</p> <p>Future site users (R4)</p> <p>Building foundations and on site buried services (water mains, electricity and sewer) (R5)</p> | Medium | Likely | Moderate | GI – Ground Investigation |
| | | | Severe for Asbestos | Low likelihood | Moderate for Asbestos | |
| | Accumulation and migration of soil gases (P5) | | Severe | Low likelihood | Moderate | |
| | <p>Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff (P3)</p> <p>Horizontal and vertical migration of contaminants within groundwater (P4)</p> | <p>Neighbouring site users (R3)</p> <p>Building foundations and on site buried services (water mains, electricity and sewer) (R5)</p> <p>Controlled Waters (R6)</p> <ul style="list-style-type: none"> - Secondary A aquifer - 2No groundwater abstractions within 2km | Medium | Low likelihood | Moderate | |

3 GROUND INVESTIGATION

3.1 Scope of Works

3.1.1 The ground investigation was undertaken on 30 August 2022.

3.1.2 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, is presented in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

| Investigation Type | Number of Exploratory Holes Achieved | Exploratory Hole Designation | Depth Achieved (m BGL) | Justification |
|------------------------------|--------------------------------------|------------------------------|------------------------|--|
| Windowless Sampler Boreholes | 5 | WS1 –WS5 | Max. depth 2.9mbgl | Obtain shallow samples for contamination testing. WS1 – located adjacent to known buried tanks on site WS2 – non-targeted to provide site coverage WS3 – non-targeted to provide site coverage WS4 – located in the east of site, closest to the Former Barton Hill Gas Holder Site WS5 – non-targeted to provide site coverage |
| Monitoring Wells | 3 | WS1, WS3 and WS4 | Max. depth 2mbgl | Combined soil gas and groundwater monitoring wells. All response zones in Made Ground and Redcliffe Sandstone Member |

3.1.3 The ground investigation was undertaken in accordance with British Standard BS5930:2015+A1:2020 “Code of practice for ground investigations”, British Standard BS10175:2011+A2:2017 “Investigation of potentially contaminated sites - code of practice” and AGS Guidelines for Good Practice in Site Investigations.

3.1.4 Exploratory hole positions are shown on the exploratory hole location plan presented in Figure 2, Appendix 1. The exploratory hole records are included in Appendix 2.

3.1.5 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated so that no depression was left.

3.2 Laboratory Analysis

3.2.1 A programme of chemical laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.

3.2.2 Chemical testing of soils was undertaken by i2 Analytical Limited, which holds UKAS and MCERTS accreditations for a wide range of determinands.

3.2.3 The samples were analysed for a wide range of contaminants as shown in Table 3.2 below:

Table 3.2: Chemical Tests Scheduled

| Test Suite | No. of tests |
|-----------------------------|--------------|
| | Made Ground |
| Basic Suite 3 | 3 |
| Basic Suite 5 | 5 |
| Hydrocarbon Suite | 5 |
| Total Organic Carbon | 4 |
| Asbestos Screen & ID | 8 |
| Polychlorinated Biphenyls | 2 |
| Leachable Basic Suite 5 | 3 |
| Leachable Hydrocarbon Suite | 3 |

3.2.4 The determinands contained in the Basic Suite 3 are as detailed in Table 3.3 overleaf. Basic Suite 5 contains the same determinands but without the hydrocarbon compounds to avoid overlapping with the extended hydrocarbon testing.

3.2.5 The Hydrocarbon Suite includes TPHCWG, PAH, phenols and VOCs including BTEX & MTBE.

Table 3.3: Basic Suite of Determinands

| DETERMINAND | LIMIT OF DETECTION (mg/kg) | UKAS ACCREDITATION | TECHNIQUE |
|---------------------------------------|----------------------------|--------------------|--------------------|
| Arsenic | 1 | Y (MCERTS) | ICPMS |
| Cadmium | 0.2 | Y (MCERTS) | ICPMS |
| Chromium | 1 | Y (MCERTS) | ICPMS |
| Chromium (Hexavalent) | 4 | Y (MCERTS) | Colorimetry |
| Lead | 1 | Y (MCERTS) | ICPMS |
| Mercury | 0.3 | Y (MCERTS) | ICPMS |
| Nickel | 1 | Y (MCERTS) | ICPMS |
| Selenium | 1 | Y (MCERTS) | ICPMS |
| Copper | 1 | Y (MCERTS) | ICPMS |
| Zinc | 1 | Y (MCERTS) | ICPMS |
| Boron (Water Soluble) | 0.2 | Y (MCERTS) | ICPMS |
| pH Value | 0.1 units | Y (MCERTS) | Electrometric |
| Sulphate (Water Soluble) | 0.0125g/l | Y (MCERTS) | Ion Chromatography |
| Total Cyanide | 1 | Y (MCERTS) | Colorimetry |
| Speciated/Total PAH | 0.05/0.80 | Y (MCERTS) | GCFID |
| Phenols | 1 | Y (MCERTS) | HPLC |
| Total Petroleum Hydrocarbons (banded) | - | N Y (MCERTS) | Gas Chromatography |

- 3.2.6 To support the selection of appropriate tier 1 screening values, 4No samples were analysed for total organic carbon.
- 3.2.7 The laboratory test results are included in Appendix 3.

4 GROUND CONDITIONS ENCOUNTERED

4.1 General

4.1.1 A factual record of the conditions encountered during the physical investigation of the site is presented in the following section.

4.2 Ground Conditions

4.2.1 The ground conditions encountered are summarised in Table 4.1 below.

Table 4.1: Ground Conditions Encountered

| Stratum and Description | Encountered from (mbgl) | Base of strata (mbgl) | Thickness range (m) |
|--|-------------------------|----------------------------------|---------------------------------------|
| Concrete over black/brown/red/grey clayey sandy gravel with localised medium cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded flint, concrete and brick. Cobbles consist of angular concrete and brick. (MADE GROUND) Encountered in WS1, WS2, WS3 & WS5. | GL | 0.5 – 1.5 | 0.5 – 1.5 |
| (Concrete over) Black/brown/red silty sandy slightly gravelly clay. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint, concrete and sandstone. (MADE GROUND) | GL – 1.5 | 1.1 – 2.7 | 0.4 – 1.5 |
| Medium dense becoming very dense orange/red SAND. Sand is fine to medium. (REDCLIFFE SANDSTONE MEMBER) Encountered in WS1, WS4 & WS5. | 1.2 – 2.7 | >2.0 – >2.9 [base not proven] | >0.2 – >0.8 [thickness not proven] |
| Medium dense becoming very dense light brown gravelly SAND. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (REDCLIFFE SANDSTONE MEMBER) Encountered in WS2 & WS3. | 1.1 – 1.5 | >1.7 – >1.9 [base not proven] | >0.4 – >0.6 [thickness not proven] |

**Consistency estimated using semi-empirical correlations with SPT N-values, Plasticity Indices and published literature

4.2.2 Made Ground was found to be deepest in the south of the site.

4.3 Groundwater

4.3.1 Groundwater was not reported during the course of the investigation.

4.3.2 It should be noted that changes in groundwater levels can occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer installed within appropriate response zones. Changes in groundwater level can have a direct effect on excavation stability and dewatering requirements, and cohesive soils can soften under rising or high groundwater levels.

-
- 4.4 Physical and Olfactory Evidence of Contamination
- 4.4.1 With the exception of a black colouration of some of the Made Ground soils, no other visual or olfactory evidence of potential contamination was identified within the investigation positions.
- 4.5 Limitations
- 4.5.1 The boreholes were proposed to be drilled to 5mbgl, however, the drilling equipment refused on the very dense granular deposits of the Redcliffe Sandstone Member and, therefore, the boreholes were terminated at depths ranging from 1.7mbgl to 2.9mbgl.
- 4.5.2 The possible presence of unidentified natural and/or manmade obstructions elsewhere on site cannot be discounted.

5 RISK ASSESSMENT – ANALYTICAL FRAMEWORK

5.1 Context and Objectives

5.1.1 This section seeks to evaluate the level of chronic risk pertaining to human health and the environment which may result from both the existing use and proposed future use of the site. It makes use of the ground investigation findings, as described in the previous sections, to evaluate further the potential pollutant linkages identified in the desk study. A combination of qualitative and quantitative techniques is used, as described below.

5.1.2 The purpose of generic quantitative risk assessment is to compare concentrations of contaminants found on site against generic assessment criteria (GAC) to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required. The approaches detailed all broadly fit within a tiered assessment structure in line with the framework set out in the Department of Environment, Food and Rural Affairs (DEFRA), EA and Institute for Environment and Health Publication, Guidelines for Environmental Risk Assessment and Management.

5.2 Analytical Framework – Soils

5.2.1 There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

5.2.2 The soil analytical test results have been compared to Suitable 4 Use Levels (S4UL) published by the Chartered Institute of Environmental Health in order to assess the potential long-term risks to human health posed by contaminants in the soils. S4UL'S have been derived for a range of land uses and Soil Organic Matter contents. They represent the minimal or tolerable risk, above which further assessment of the risks or remedial action may be required.

5.2.3 In the absence of a S4UL recommended concentration, other available general assessment criteria (GAC), including the Category 4 Screening Levels (C4SL) published by DEFRA have been used. Site-specific assessments are undertaken wherever possible and/or applicable. All assessments are carried out in accordance with the CLEA protocol.

5.2.4 The assessment criteria used for the screening of determinands within soils are identified within Table 5.1.

Table 5.1: Selected Assessment Criteria - Contaminants in Soils

| Substance Group | Determinand(s) | Assessment Criteria Selected |
|---|---|------------------------------|
| <u>Organic Substances</u> | | |
| Non-halogenated Hydrocarbons | Total Petroleum Hydrocarbons (TPHCWG banded) | S4UL |
| | Total Phenols | S4UL |
| Polycyclic Aromatic Hydrocarbons (PAH-16) | Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene | S4UL |
| Volatile Organic Compounds (VOCs/sVOCs) | Toluene, Ethylbenzene, Benzene, Xylenes | S4UL |
| <u>Inorganic Substances</u> | | |
| Heavy Metals and Metalloids | Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Zinc | S4UL |
| | Copper, Zinc, Nickel | BS: 3882 (2015) |
| Cyanides | Free Cyanide | CLEA v1.06 |

- 5.2.5 It is understood that the site is to be converted to provide residential and commercial units, without private gardens. As a result, the site has been assessed with regards to a “residential without plant uptake” end use scenario.
- 5.2.6 GAC have been selected with consideration to the Soil Organic Matter (SOM) content of the soil. From the soils analytical results, the average value for Total Organic Carbon for the Made Ground is 1.13%, which gives an equivalent SOM of 1.94%. Therefore, published GAC have been selected as those derived assuming a SOM of 1%.
- 5.3 Analytical Framework –Leachate
- 5.3.1 The requirement to protect groundwater from pollution is outlined in Groundwater Protection: Principles and Practice (GP3, EA, August 2013, v1.1).
- 5.3.2 Where undertaken, the leachate quality analysis comprises a Level 1 assessment in accordance with the EA Remedial Targets Methodology Document (EA, 2006).

The criteria used by Jomas’ in the Level 1 assessment of leachate quality are shown in Table 5.2

5.3.3 Table.

Table 5.2: Selected Assessment Criteria - Contaminants in Water

| Substance Group | Determinand(s) | Assessment Criteria Selected |
|------------------------------|--|------------------------------|
| Metals | Arsenic, Boron, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, | EQS/DWS |
| | Zinc | EQS |
| | Selenium | DWS |
| PAHs | Sum of Four – benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene | DWS |
| PAH | Anthracene, Naphthalene | EQS |
| PAHs | Benzo(a)pyrene | EQS/ DWS |
| PAHs | Remainder | LEC |
| Total Petroleum Hydrocarbons | Aliphatic C5-C6, Aliphatic >C6-C8, Aliphatic >C8-C10. Aliphatic >C10-C12, Aliphatic >C12-C16, Aliphatic >C16-C21, Aromatic C5-C7, Aromatic >C7-C8, Aromatic >C8-C10, Aromatic >C10-C12, Aromatic >C12-C16, Aromatic >C16-C21, Aromatic > C21-C35 | /WHO |
| Benzene | Benzene | EQS/ DWS |
| Toluene | Toluene | EQS/ WHO |
| Ethylbenzene | Ethylbenzene | WHO |
| Xylene | Xylene | EQS/WHO |

Environmental Quality Standards EQS

Environmental Quality Standards (EQS) have been released by the EA for dangerous substances, as identified by the EC Dangerous Substances Directive. EQS can vary for each substance, for the hardness of the water and can be different for fresh, estuarine or coastal waters.

WHO Health

These screening criteria have been taken from the World Health Organisation Guidelines for Drinking Water Quality (2017). The health value is a guideline value representing the concentration of a contaminant that does not result in any significant risk to the receptor over a lifetime of exposure.

Further criteria have been obtained from 'Petroleum Products in Drinking-water' - Background document for development of WHO Guidelines for Drinking-water Quality (2005).

UK Drinking Water Standards (DWS)

These comprise screening criteria provided by the Drinking Water Inspectorate (DWI) in the Water Supply (Water Quality) Regulations 2018.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Screening of Soil Chemical Analysis Results – Human Health Risk Assessment

6.1.1 Laboratory analysis for soils is summarised in Tables 6.1 to 6.4. Raw laboratory data is included in Appendix 3.

6.1.2 Results have been screened against generic assessment criteria for a “residential without plant uptake” end-use scenario, assuming 1% soil organic matter.

Table 6.1: Soil Laboratory Test Results - Metals, Metalloids, Phenol, Cyanide

| Determinand | Unit | No. samples tested | Screening Criteria | Min | Max | No. Exceeding |
|----------------------------|-------|--------------------|--------------------|------|------|---|
| Arsenic | mg/kg | 8 | S4UL 40 | 4.8 | 59 | 2No exceedances: WS1 – 0.75mbgl WS3 – 0.5mbgl |
| Cadmium | mg/kg | 8 | S4UL 85 | <0.2 | 2.1 | 0 |
| Chromium | mg/kg | 8 | S4UL 910 | 4.8 | 44 | 0 |
| Lead | mg/kg | 8 | C4SL 310 | 15 | 400 | 2No exceedances: WS3 – 0.5mbgl WS5 – 1.0mbgl |
| Mercury | mg/kg | 8 | S4UL 56 | <0.3 | 0.3 | 0 |
| Nickel | mg/kg | 8 | S4UL 180 | 2.4 | 41 | 0 |
| Copper | mg/kg | 8 | S4UL 7100 | 2.9 | 240 | 0 |
| Zinc | mg/kg | 8 | S4UL 40000 | 39 | 590 | 0 |
| Total Cyanide ^A | mg/kg | 8 | CLEA v 1.06 33 | <1.0 | <1.0 | 0 |
| Selenium | mg/kg | 8 | S4UL 430 | <1.0 | <1.0 | 0 |
| Boron Water Soluble | mg/kg | 8 | S4UL 11000 | 0.2 | 2.2 | 0 |
| Phenols | mg/kg | 8 | S4UL 440 | <1.0 | <1.0 | 0 |

Notes: ^A Generic assessment criteria derived for free inorganic cyanide.

Table 6.2: Soil Laboratory Test Results - Polycyclic Aromatic Hydrocarbons (PAHs)

| Determinand | Unit | No. Samples Tested | Screening Criteria | Min | Max | No. Exceeding |
|----------------|-------|--------------------|--------------------|-------|-------|---------------|
| Naphthalene | mg/kg | 8 | S4UL 2.3 | <0.05 | 0.73 | 0 |
| Acenaphthylene | mg/kg | 8 | S4UL 2900 | <0.05 | <0.05 | 0 |
| Acenaphthene | mg/kg | 8 | S4UL 3000 | <0.05 | 0.28 | 0 |
| Fluorene | mg/kg | 8 | S4UL 2800 | <0.05 | <0.05 | 0 |
| Phenanthrene | mg/kg | 8 | S4UL 1300 | <0.05 | 2 | 0 |

| Determinand | Unit | No. Samples Tested | Screening Criteria | Min | Max | No. Exceeding |
|-----------------------|-------|--------------------|--------------------|-------|------|---------------|
| Anthracene | mg/kg | 8 | S4UL 31000 | <0.05 | 0.33 | 0 |
| Fluoranthene | mg/kg | 8 | S4UL 1500 | <0.05 | 3.2 | 0 |
| Pyrene | mg/kg | 8 | S4UL 3700 | <0.05 | 2.9 | 0 |
| Benzo(a)anthracene | mg/kg | 8 | S4UL 11 | <0.05 | 2.1 | 0 |
| Chrysene | mg/kg | 8 | S4UL 30 | <0.05 | 1.7 | 0 |
| Benzo(b)fluoranthene | mg/kg | 8 | S4UL 3.9 | <0.05 | 2.5 | 0 |
| Benzo(k)fluoranthene | mg/kg | 8 | S4UL 110 | <0.05 | 0.97 | 0 |
| Benzo(a)pyrene | mg/kg | 8 | S4UL 3.2 | <0.05 | 1.8 | 0 |
| Indeno(123-cd)pyrene | mg/kg | 8 | S4UL 45 | <0.05 | 1.2 | 0 |
| Dibenzo(ah)anthracene | mg/kg | 8 | S4UL 0.31 | <0.05 | 0.31 | 0 |
| Benzo(ghi)perylene | mg/kg | 8 | S4UL 360 | <0.05 | 1.5 | 0 |
| Total PAH | mg/kg | 8 | - | <0.80 | 21.5 | - |

Table 6.3: Soil Laboratory Test Results - Total Petroleum Hydrocarbons (TPH)

| TPH Band | Unit | No. Samples Tested | Screening Criteria | Min | Max | No. Exceeding |
|-----------------------------------|-------|--------------------|--------------------|-------|------|---------------|
| C ₈ -C ₁₀ | mg/kg | 3 | S4UL 27 | <0.1 | <0.1 | 0 |
| >C ₁₀ -C ₁₂ | mg/kg | 3 | S4UL 130 | <2.0 | <2.0 | 0 |
| >C ₁₂ -C ₁₆ | mg/kg | 3 | S4UL 1100 | <4.0 | <4.0 | 0 |
| >C ₁₆ -C ₂₁ | mg/kg | 3 | S4UL 1900 | <1.0 | 9.9 | 0 |
| >C ₂₁ -C ₃₅ | mg/kg | 3 | S4UL 1900 | <10 | 65 | 0 |
| Total TPH | mg/kg | 3 | - | <17.1 | 74.9 | - |

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected

Table 6.4: Soil Laboratory Analysis Results - Total Petroleum Hydrocarbons (TPHCWG)

| TPH Band | Unit | No. Samples Tested | Screening Criteria | Min | Max | No. Exceeding |
|---|-------|--------------------|--------------------|--------|--------|---------------|
| >C ₅ -C ₆ Aliphatic | mg/kg | 5 | S4UL 42 | <0.001 | <0.001 | 0 |
| >C ₆ -C ₈ Aliphatic | mg/kg | 5 | S4UL 100 | <0.001 | <0.001 | 0 |
| >C ₈ -C ₁₀ Aliphatic | mg/kg | 5 | S4UL 27 | <0.001 | <0.001 | 0 |
| >C ₁₀ -C ₁₂ Aliphatic | mg/kg | 5 | S4UL 130 | <1.0 | <1.0 | 0 |
| >C ₁₂ -C ₁₆ Aliphatic | mg/kg | 5 | S4UL 1100 | <2.0 | <2.0 | 0 |
| >C ₁₆ -C ₃₅ Aliphatic | mg/kg | 5 | S4UL 65000 | <16.0 | <16.0 | 0 |
| >C ₅ -C ₇ Aromatic | mg/kg | 5 | S4UL 370 | <0.001 | <0.001 | 0 |

| TPH Band | Unit | No. Samples Tested | Screening Criteria | Min | Max | No. Exceeding | |
|--|-------|--------------------|--------------------|------|--------|---------------|---|
| >C ₇ -C ₈ Aromatic | mg/kg | 5 | S4UL | 860 | <0.001 | <0.001 | 0 |
| >C ₈ -C ₁₀ Aromatic | mg/kg | 5 | S4UL | 47 | <0.001 | <0.001 | 0 |
| >C ₁₀ -C ₁₂ Aromatic | mg/kg | 5 | S4UL | 250 | <1.0 | 1.4 | 0 |
| >C ₁₂ -C ₁₆ Aromatic | mg/kg | 5 | S4UL | 1800 | <2.0 | 2.1 | 0 |
| >C ₁₆ -C ₂₁ Aromatic | mg/kg | 5 | S4UL | 1900 | <10 | <10 | 0 |
| >C ₂₁ -C ₃₅ Aromatic | mg/kg | 5 | S4UL | 1900 | <10 | 13 | 0 |
| Total TPH (Ali/Aro) | mg/kg | 5 | - | - | <10 | 23 | - |

6.2 Asbestos in Soil

6.2.1 8No samples of the Made Ground were screened in the laboratory for the presence of asbestos.

6.2.2 No asbestos containing materials (ACM) or fibres were reported in samples analysed in the laboratory.

6.3 Volatile Organic Compounds

6.3.1 In addition to the suites outlined previously, 5No samples were tested for the presence of volatile organic compounds (VOCs) including BTEX compounds (benzene, toluene, ethylbenzene, xylene).

6.3.2 No VOCs were reported above the laboratory detection limit within any of the samples tested.

6.4 Polychlorinated Biphenyl (PCB) Concentrations

6.4.1 In addition to the suites outlined previously, 2No samples from the vicinity of the off-site electrical substation were analysed for the presence of PCBs.

6.4.2 No PCBs were reported above the laboratory method detection limit.

6.5 Summary of Human Health Generic Quantitative Risk Assessment

6.5.1 In summary, concentrations of arsenic and lead in excess of the GAC have been recorded in samples of Made Ground.

6.6 Screening of Soil Chemical Analysis Results – Potential Risks to Plant Growth

6.6.1 Zinc, copper and nickel are phytotoxins and could therefore inhibit plant growth in soft landscaped areas. Concentrations measured in soil for these determinands have been compared with the pH dependent values given in BS:3882 (2015). This does not constitute a full BS:3882 topsoil test.

6.6.2 Table 6.5 shows the soil analytical results compared with the relevant screening values, adopting a pH value of greater than 7, as indicated by the results of the laboratory analysis.

Table 6.5: Soil Laboratory Analysis Results - Phytotoxic Determinands

| Determinand | Threshold level (mg/kg) | Min (mg/kg) | Max (mg/kg) | No. Exceeding |
|-------------|-------------------------|-------------|-------------|---|
| Nickel | 110 | 2.4 | 41 | 0 |
| Copper | 200 | 2.9 | 240 | 1 No exceedance: WS3 – 0.5mbgl |
| Zinc | 300 | 39 | 590 | 2 No exceedances: WS3 – 0.5mbgl WS5 – 1.0mbgl |

6.6.3 A number of samples have recorded determinands in excess of threshold levels. The current soils may not satisfy the requirements of BS:3882.

6.7 Screening for Water Pipes Materials

6.7.1 The results of the analysis have been assessed for potential impact upon water supply pipes. Table 6.6 below summarises the findings of the assessment:

Table 6.6: Screening Guide for Water Pipes

| Determinand | No. of tests | Threshold for Polyethylene Pipes* (mg/kg) | Value for site data (mg/kg) | | No of Exceedances |
|-------------|--------------|---|-----------------------------|--------------|-------------------|
| | | | Min | Max | |
| Total VOCs | 5 | 0.5 | <0.056 | <0.056 | 0 |
| BTEX | 5 | 0.1 | <0.005 | <0.005 | 0 |
| MTBE | 5 | 0.1 | <0.001 | <0.001 | 0 |
| EC5-EC10 | 8 | 1 | <0.006 | <0.1 | 0 |
| EC10-EC16 | 8 | 10 | <6.0 | ≥3.5 <6.5 | 0 |
| EC16-EC40 | 8 | 500 | <11.0 | 74.9 | 0 |
| Naphthalene | 8 | 5 | <0.05 | 0.73 | 0 |
| Phenols | 8 | 2 | <1.0 | <1.0 | 0 |

* UK Water Industry Research (2010) Source Guidance for Selection of Water Supply Pipes to be Used in Brownfield Sites. Report No. 10/WM/03/21.

6.7.2 The above suggests that upgraded pipe work is unlikely to be required.

6.7.3 The water supply pipe requirements for this site should be discussed at an early stage with the relevant utility provider.

- 6.8 Assessment of Soil Analytical Data with Respect to Controlled Waters
- 6.8.1 At the Preliminary Risk Assessment (Desk Study) stage, risks to controlled waters were moderate.
- 6.8.2 The following controlled waters receptors were identified:
- Secondary A Aquifer within the Redcliffe Sandstone Member
2No groundwater abstractions, the nearest 65m north-west of the site
- 6.8.3 Pathways for migration of leachable/mobile contamination were considered to be potentially present within the underlying Redcliffe Sandstone Member.
- 6.8.4 The ground conditions encountered are considered to confirm the expected geological succession and confirmed that potential pathways for migration of leachable / mobile contamination are present. Further assessment of these risks is provided in Section 7, with the evaluation of leachate analytical data.
- 6.8.5 Elevated levels of polyaromatic hydrocarbons (PAHs) have been found in the Made Ground. The only PAHs with stated “moderate” or “high” mobility rankings in groundwater (as per CL:AIRE, 2017) are naphthalene, acenaphthylene, and acenaphthene. Of these compounds, only naphthalene has a statutory water quality standard. Naphthalene was detected at a maximum concentration of 0.73mg/kg within a single sample out of the 8No analysed. Considering that no visual or olfactory evidence of potentially mobile contamination has been encountered, the low concentrations of PAHs detected in soils are not considered to pose a risk to controlled waters.
- 6.8.6 The presence of localised impacted soils beneath building footprints or in the vicinity of below ground fuel tanks that may be reported on site (information request to the petroleum licensing authority is pending) cannot be ruled out. Such soils may pose a risk to controlled water if present, and further investigation is recommended once access beneath current building footprints is possible.
- 6.9 Waste Characterisation
- 6.9.1 The classification of materials for waste disposal purposes was outside the scope of this report. Should quantities of material require off-site disposal, waste classification will be required to determine whether soils may be treated as hazardous or non-hazardous.
- 6.9.2 Note that Waste Acceptance Criteria (WAC) analysis may then be required by the landfill operator to determine whether materials can be disposed of at either an inert, stable non-reactive hazardous or hazardous landfill.

7 GENERIC QUANTITATIVE RISK ASSESSMENT – LEACHATE DATA

7.1 Assessment of Leachate Analytical Data with Respect to Controlled Waters

7.1.1 No groundwater was reported within the monitoring wells during the 4No return monitoring visits, so groundwater samples could not be collected from site. 3No soil samples were scheduled for leachate analysis in their place.

7.1.2 The results of the laboratory testing are summarised in Tables 7.1 to 7.3 below and compared to GAC for controlled waters receptors. Analytical laboratory certificates are presented in Appendix 3.

Table 7.1: Leachate Laboratory Analysis Results – Metals, Metalloids, Phenol, Cyanide

| Determinand | Unit | No. samples tested | Screening Criteria | Min | Max | No of Exceedances |
|-----------------|------|--------------------|--------------------|-------|-------|--|
| Arsenic | µg/l | 3 | 10 DWS | <1.0 | 6.7 | 0 |
| | µg/l | | 50 EQS | <1.0 | 6.7 | 0 |
| Cadmium | µg/l | 3 | 5 DWS | <0.08 | <0.08 | 0 |
| | µg/l | | <0.08-0.25 EQS | <0.08 | <0.08 | 0 |
| Chromium | µg/l | 3 | 50 DWS | <0.4 | 5.6 | 0 |
| | µg/l | | 4.7 EQS | <0.4 | 5.6 | 1No exceedance: WS5 – 1.0mbgl |
| Lead | µg/l | 3 | 10 DWS | <1.0 | 62 | 1No exceedance: WS5 – 1.0mbgl |
| | µg/l | | 1.2* EQS | <1.0 | 62 | 1No exceedance: WS5 – 1.0mbgl |
| Nickel | µg/l | 3 | 20 DWS | <0.3 | 2.4 | 0 |
| | µg/l | | 4* EQS | <0.3 | 2.4 | 0 |
| Copper | µg/l | 3 | 1.0 EQS | 2.2 | 14 | 1No exceedance: WS5 – 1.0mbgl |
| | | | 2000 DWS | 2.2 | 14 | 0 |
| Zinc | µg/l | 3 | 10.9* EQS | 2 | 41 | 2No exceedances: WS3 – 0.5mbgl WS5 – 1.0mbgl |
| Mercury | µg/l | 3 | 1.0 DWS | <0.5 | <0.5 | 0 |
| | µg/l | 3 | 0.07 EQS | <0.5 | <0.5 | 0 |
| Selenium | µg/l | 3 | 10 DWS | <4.0 | <4.0 | 0 |
| Boron | µg/l | 3 | 1000 DWS | 10 | 85 | 0 |
| | µg/l | | 2000 EQS | 10 | 85 | 0 |
| Cyanide (Total) | µg/l | 3 | 50 DWS | <10 | <10 | 0 |
| | µg/l | | 1 EQS | <10 | <10 | 0 |

| Determinand | Unit | No. samples tested | Screening Criteria | Min | Max | No of Exceedances |
|-----------------|------|--------------------|--------------------|-----|-----|-------------------|
| Phenols (Total) | µg/l | 3 | 7.7 EQS | <10 | <10 | 0 |

* bioavailable concentration

**bioavailable concentration + ambient background concentration dissolved for Thames Groundwater (2 µg/L)

Table 7.2: Leachate Laboratory Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

| Determinand | Unit | No. samples tested | Screening Criteria | Min. | Max. | No. of Exceedances |
|---|------|--------------------|--------------------|--------|--------|--------------------|
| Naphthalene | µg/l | 3 | 2.0 EQS | <0.001 | <0.001 | 0 |
| Acenaphthylene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Acenaphthene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Fluorene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Phenanthrene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Anthracene | µg/l | 3 | 0.1 EQS | <0.001 | <0.001 | 0 |
| Fluoranthene | µg/l | 3 | 0.0063 EQS | <0.001 | <0.001 | 0 |
| Pyrene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Benzo(a)anthracene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Chrysene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Benzo(b)fluoranthene | µg/l | 3 | 0.017 EQS | <0.001 | <0.001 | 0 |
| Benzo(k)fluoranthene | µg/l | 3 | 0.017 EQS | <0.001 | <0.001 | 0 |
| Benzo(a)pyrene | µg/l | 3 | 0.01 DWS | <0.001 | <0.001 | 0 |
| | µg/l | 3 | 0.00017 EQS | <0.001 | <0.001 | 0 |
| Indeno(a,h)anthracene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Dibenzo(ah)anthracene | µg/l | 3 | - | <0.001 | <0.001 | - |
| Benzo(g,h,i)perylene | µg/l | 3 | 0.0082 EQS | <0.001 | <0.001 | 0 |
| Sum of four Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Indeno(123-cd)pyrene | µg/l | 3 | 0.1 DWS | <0.004 | <0.004 | 0 |

Table 7.3: Leachate Laboratory Analysis Results – TPHCWG & BTEX

| Determinand | Unit | No. Samples tested | Screening Criteria | Min. | Max. | No. of Exceedances |
|-----------------|------|--------------------|--------------------|------|------|--------------------|
| Benzene | µg/l | 3 | 1.0 DWS | <1.0 | <1.0 | 0 |
| | µg/l | 3 | 10 EQS | <1.0 | <1.0 | 0 |
| Toluene | µg/l | 3 | 74 EQS | <1.0 | <1.0 | 0 |
| Ethylbenzene | µg/l | 3 | 300 WHO | <1.0 | <1.0 | 0 |
| Xylenes (total) | µg/l | 3 | 500 WHO | <2.0 | <2.0 | 0 |

| Determinand | Unit | No. Samples tested | Screening Criteria | | Min. | Max. | No. of Exceedances |
|--------------------|------|--------------------|--------------------|-----|------|------|--------------------|
| | µg/l | 3 | 30 | EQS | <2.0 | <2.0 | 0 |
| MTBE | µg/l | 3 | 15 | WHO | <10 | <10 | 0 |
| >C5-C6 Aliphatic | µg/l | 3 | 15000 | WHO | <1.0 | <1.0 | 0 |
| >C6-C8 Aliphatic | µg/l | 3 | 15000 | WHO | <1.0 | <1.0 | 0 |
| >C8-C10 Aliphatic | µg/l | 3 | 300 | WHO | <1.0 | <1.0 | 0 |
| >C10-C12 Aliphatic | µg/l | 3 | 300 | WHO | <10 | <10 | 0 |
| >C12-C16 Aliphatic | µg/l | 3 | 300 | WHO | <10 | <10 | 0 |
| >C16-C21 Aliphatic | µg/l | 3 | - | - | <10 | <10 | - |
| >C21-C35 Aliphatic | µg/l | 3 | - | - | <10 | <10 | - |
| >C5-C7 Aromatic | µg/l | 3 | 10 | WHO | <1.0 | <1.0 | 0 |
| >C7-C8 Aromatic | µg/l | 3 | 700 | WHO | <1.0 | <1.0 | 0 |
| >C8-C10 Aromatic | µg/l | 3 | 300 | WHO | <1.0 | <1.0 | 0 |
| >C10-C12 Aromatic | µg/l | 3 | 90 | WHO | <10 | <10 | 0 |
| >C12-C16 Aromatic | µg/l | 3 | 90 | WHO | <10 | <10 | 0 |
| >C16-C21 Aromatic | µg/l | 3 | 90 | WHO | <10 | <10 | 0 |
| >C21-C35 Aromatic | µg/l | 3 | 90 | WHO | <10 | <10 | 0 |

- 7.1.3 In addition to the suite outlined above, the 3No leachate samples were also analysed for a suite of volatile organic compounds (VOCs). None of the compounds analysed for were reported above the laboratory method detection limit.
- 7.1.4 A concentration of leachable lead was found to exceed environmental water quality standards and drinking water standards, and concentrations of chromium, lead, copper and zinc were found to exceed drinking water standards.
- 7.1.5 On the basis that the proposed development will comprise extensive hard cover and only limited soft landscaping, the potential for surface water infiltration and migration of contaminants is considered to be significantly reduced. In addition, no point source of lead has been identified and therefore specific remedial measures to address leachable lead concentrations are unlikely to be effective or economically viable.

8 SOIL GAS RISK ASSESSMENT

8.1 Soil Gas Results

8.1.1 4No return monitoring visits have been undertaken between 12 and 30 September 2022, to monitor wells installed within boreholes at the site for soil gas concentrations and groundwater levels.

8.1.2 The results of the monitoring undertaken are summarised in Table 8.1 below, with the monitoring records presented in Appendix 4.

Table 8.1: Summary of Gas Monitoring Data

| Hole No. | No. of monitoring events | CH ₄ (%) | CO ₂ (%) | O ₂ (%) | VOCs (ppm) | Steady Flow Rate (l/hr) | Peak Flow Rate (l/hr) | Depth to water (mbgl) | Well Response Zone as installed (top/bottom) (mbgl) | Strata targeted by response zone |
|----------|--------------------------|---------------------|---------------------|--------------------|------------|-------------------------|-----------------------|-----------------------|---|--|
| WS1 | 4 | 0.0–0.2 | 0.1–2.0 | 20.3–21.0 | 0.0–1.0 | 0.0–+0.2 | 0.0–+0.2 | Dry | 1.0–2.0 | Made Ground and Redcliffe Sandstone Member |
| WS3 | 4 | 0.0–0.2 | 0.4–2.1 | 17.7–23.2 | 0.0–1.1 | 0.0–+0.1 | 0.0–+0.1 | Dry | 1.0–1.9 | |
| WS4 | 4 | 0.0–0.2 | 0.9–4.6 | 14.2–22.7 | 0.0–1.3 | 0.0 | 0.0 | Dry | 1.0–2.0 | |

8.2 Screening of Results

8.2.1 As shown in Table 8.1, methane was detected at a maximum concentration of 0.2%. The concentrations of carbon dioxide ranged from 0.1% to 4.6% v/v. The maximum concentration of Volatile Organic Compounds measured was 1.3ppm. The maximum gas flow rate recorded was 0.2l/hr.

8.2.2 In the assessment of risks posed by hazardous ground gases and selection of appropriate mitigation measures, BS8485 (2015) + A1 (2019) identifies four types of development, termed Type A to Type D.

8.2.3 Type B buildings are defined as

“private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.”

8.2.4 Type B has been adopted as the relevant category for the proposed development.

8.2.5 The soil gas assessment method is based on that proposed by Wilson & Card (1999), which was a development of a method proposed in CIRIA publication R149 (CIRIA, 1995). The method uses both gas concentrations and borehole flow rates to define a characteristic situation based on the limiting borehole gas volume flow for methane and carbon dioxide. In both these methods, the limiting borehole gas volume flow is renamed as the Gas Screening Value (GSV).

8.2.6 The Gas Screening Value (litres of gas per hour) is calculated by using the following equation

$$\text{GSV} = (\text{Concentration}/100) \times \text{Flow rate}$$

Where concentration is measured in percent (%)
and flow rate is measured in litres per hour (l/hr)

8.2.7 In accordance with CIRIA C665, worst case conditions are used in the calculation of GSVs for the site. These have been summarised below in Table 8.2.

8.2.8 The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

Table 8.2: Summary of Gas Monitoring Data and Gas Screening Value

| Gas | Concentration (v/v %) | Peak Flow Rate (l/hr) | GSV (l/hr) | Characteristic Situation (after CIRIA C665) |
|-----------------|-----------------------|-----------------------|------------|---|
| CO ₂ | 4.6 | 0.2 | 0.0092 | 1 |
| CH ₄ | 0.2 | 0.2 | 0.0004 | 1 |

8.2.9 Based on the calculated GSVs, and in consideration of the conceptual site model, the site is classified as Characteristic Situation 1 (CS1) and no formal gas protection measures are considered to be necessary.

8.2.10 BS 8576:2013 has been used to derived threshold levels for carbon monoxide and volatile organic compounds.

8.2.11 Given the recorded levels it is not considered that additional protection measures need to be incorporated to protect end users from the recorded carbon monoxide concentrations.

8.2.12 PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 1.3ppm. No visual or olfactory evidence of potentially mobile contamination was observed during the investigation. It is considered that based on the information obtained to date, the risks to human health receptors via vapour inhalation pathways are generally low.

8.2.13 Notwithstanding the above, it is understood that tanks are present on site which could be a potential source of VOCs. A request has been made to the petroleum licensing authority for more information. It is recommended that any tanks identified on site are removed along with surrounding impacted soils under the

supervision by a suitably qualified geo-environmental engineer, with chemical analysis conducted on the soils surrounding the tanks as is considered suitable.

9 SUMMARY OF RESULTS

9.1 Land Quality Impact Summary

It is understood that the proposed development comprises demolition of the existing buildings on site and construction of a new building comprising commercial/retail units at ground level and residential units above. No private gardens or extensive areas of soft landscaping are anticipated.

Following generic risk assessments, elevated concentrations of arsenic and lead were detected in soils in excess of generic assessment criteria for the protection of human health within a “residential without plant uptake” end-use scenario.

No asbestos containing materials or fibres were detected in the Made Ground samples analysed in the laboratory.

Where the site is to be covered by the building footprint and hard surfacing, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, Made Ground should be encapsulated with a minimum 450mm of imported clean topsoil, placed on a geotextile membrane. Further investigation is recommended to increase the sample density across the site and beneath building footprints. Recommended remedial measures may be revised based on the findings of such works.

The current soils may not satisfy the requirements of BS:3882 due to elevated concentrations of phytotoxic contaminants.

The risk to controlled waters from soils is considered low on the basis that the extensive hard cover of the site will severely restrict the potential mobilisation of contaminants within the Made Ground.

Based on the calculated GSVs, and in consideration of the conceptual site model, the site is classified as Characteristic Situation 1 (CS1) and no formal gas protection measures are considered to be necessary.

Upgraded potable water supply pipe materials are unlikely to be required. The water supply pipe requirements for this site should be discussed at an early stage with the relevant utility provider.

A remedial strategy will be required for the proposed development. This should include reference to information from the currently pending petroleum licensing information request. Further investigation is recommended within the vicinity of tanks that may be reported by the petroleum licensing authority (if any – response pending) and within the footprints of the existing building.

If tanks are identified on site these will require removal along with associated hydrocarbon impacted soils under the supervision of a suitably qualified environmental consultant with appropriate verification works undertaken.

As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.

9.1.1 The above conclusions are made subject to approval by the statutory regulatory bodies.

9.2 Review of Pollutant Linkages Following Site Investigation

9.2.1 The site CSM has been revised and updated from that suggested in the desk study in view of the ground investigation data, including soil laboratory analysis results. Table 9.1 highlights whether pollutant linkages identified in the original CSM are still relevant following the risk assessment, or whether pollutant linkages, not previously identified, exist.

Table 9.1: Plausible Pollutants Linkages Summary (Pre Remediation)

| Potential Source (from desk study) | Pathway | Receptor | Relevant Pollutant Linkage? | Comment |
|---|---|--|-----------------------------------|--|
| <p>Potential for contaminated ground associated with previous and current site use – on site (S1)</p> <ul style="list-style-type: none"> - Depot (1986) - Fuel distribution and suppliers (current) - Scrap metal merchants (current) - Special purpose machinery and equipment (current) - Electronic equipment (current) <p>Potential for Made Ground associated with previous development operations – on site (S2)</p> <p>Potential buried/above-ground tanks associated with former and current site use, and potential tanks observed during the walkover – on site (S3)</p> | <p>Ingestion and dermal contact with contaminated soil (P1)</p> <p>Inhalation or contact with potentially contaminated dust and vapours (P2)</p> <p>Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)</p> | <p>Construction workers (R1)</p> <p>Maintenance workers (R2)</p> <p>Neighbouring site users (R3)</p> <p>Future site users (R4)</p> <p>Building foundations and on site buried services (water mains, electricity and sewer) (R5)</p> | Y | <p>See Section 8.1 above for remedial measures.</p> <p>The findings of this report should be included in the construction health and safety file, with adequate measures put in place for the protection of construction and maintenance workers.</p> <p>Contact should be made with relevant utility providers to confirm if upgraded materials are required.</p> |
| <p>Current and previous industrial use – off site (S4)</p> <ul style="list-style-type: none"> - Railways sidings (immediately N of the site) - Unspecified warehouse 7m SE (1986) - Plastic works and engineering works 60m NE (1972) - Railway land 61m N (1913) - Unspecified works 63m N (1986) - Garage 70m S (1972) - Nursery 71m SE (1921) <p>Historical landfill – off site (S5)</p> <ul style="list-style-type: none"> - Former Barton Hill Gas Holder Site 144m E (1984-1992) | <p>Accumulation and migration of soil gases (P5)</p> <p>Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff (P3)</p> <p>Horizontal and vertical migration of contaminants within groundwater (P4)</p> | <p>Neighbouring site users (R3)</p> <p>Building foundations and on site buried services (water mains, electricity and sewer) (R5)</p> <p>Controlled Waters (R6)</p> <ul style="list-style-type: none"> - Secondary A aquifer - 2No groundwater abstractions within 2km | N | <p>Site has been characterised as CS1 and no gas protection measures are deemed necessary.</p> <p>A significant risk of impact to controlled waters has not currently been identified; however, further investigation required in building footprints and in vicinity of fuel tanks that may be reported by the licensing authority.</p> |
| | | | ? | |

10 REFERENCES

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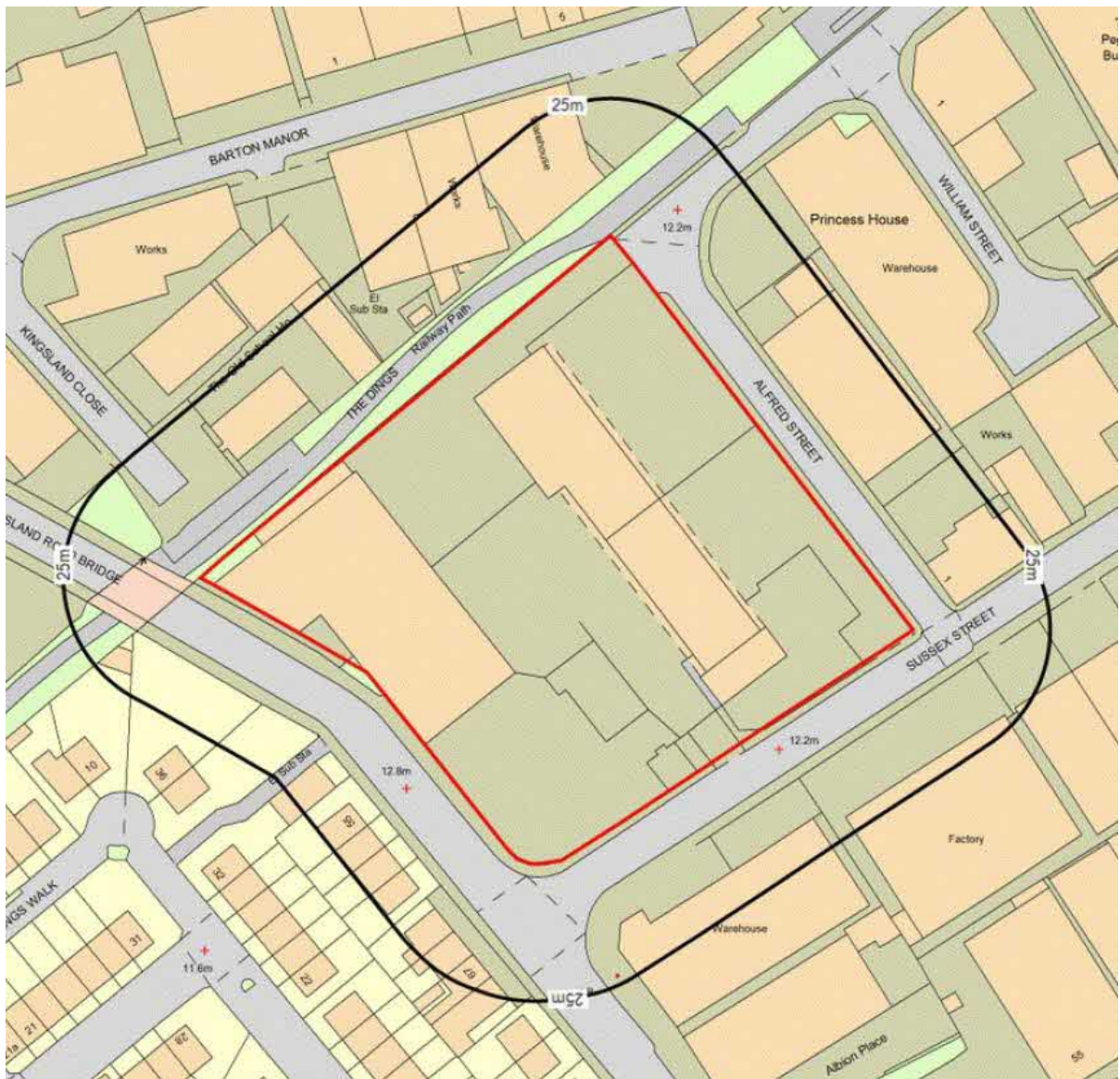
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Ministry of Housing, Communities & Local Government: National Planning Policy Framework. February 2019.

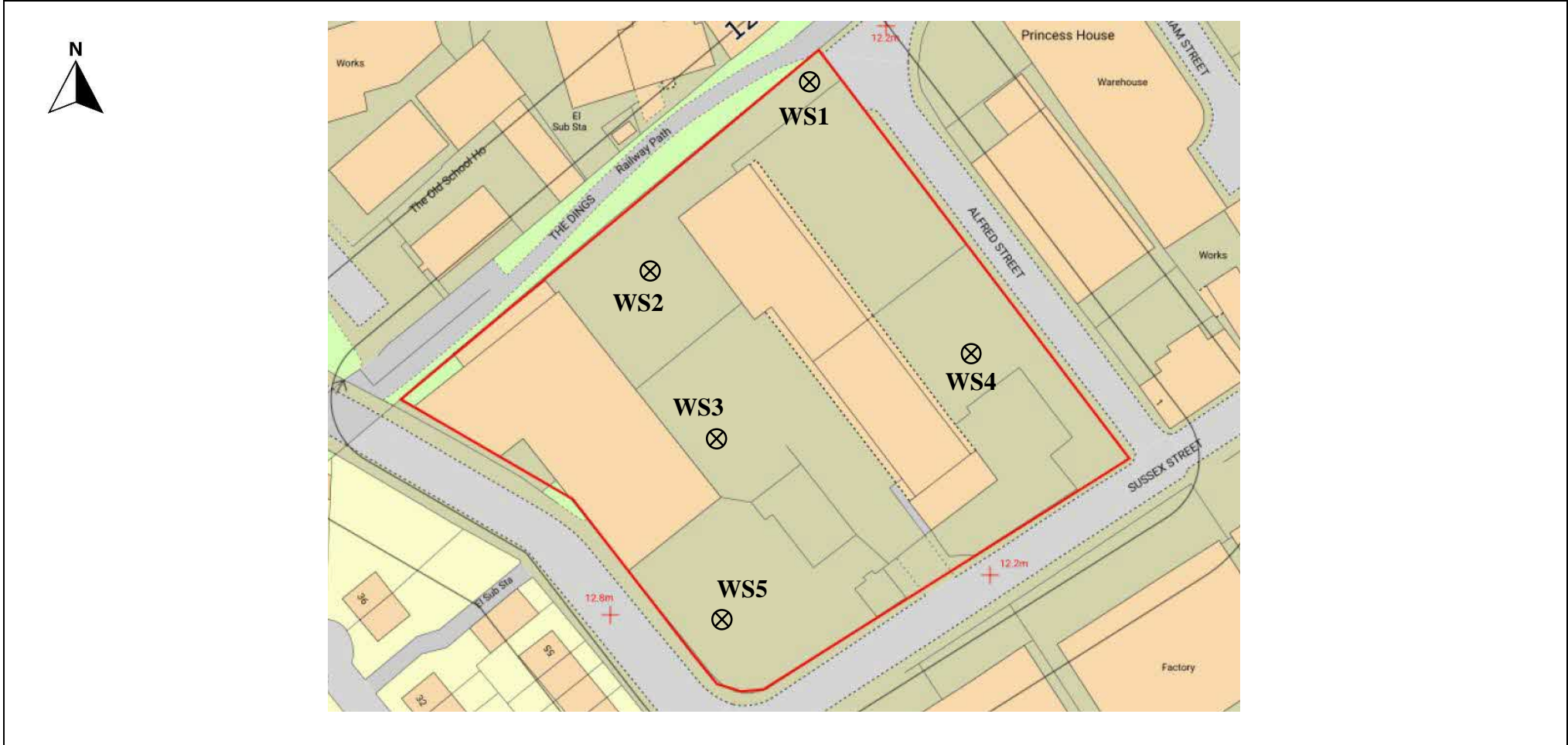
APPENDICES

APPENDIX 1 – FIGURES

| | | | |
|--------------|--|-------------|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Location Plan | PROJECT NO. | P4639J2633 |
| DATE | August 2022 | FIGURE | 1 |



| | | | |
|--------------|---|-------------|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Completed Exploratory Hole Plan | PROJECT NO. | P4639J2633 |
| DATE | August 2022 | FIGURE NO. | 2 |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 1: Access to Units 2-5. Photo taken viewing north-west. | | Photo 2: External yard for Units 2-5, which contains storage containers utilised as offices. Photo taken viewing north. | |



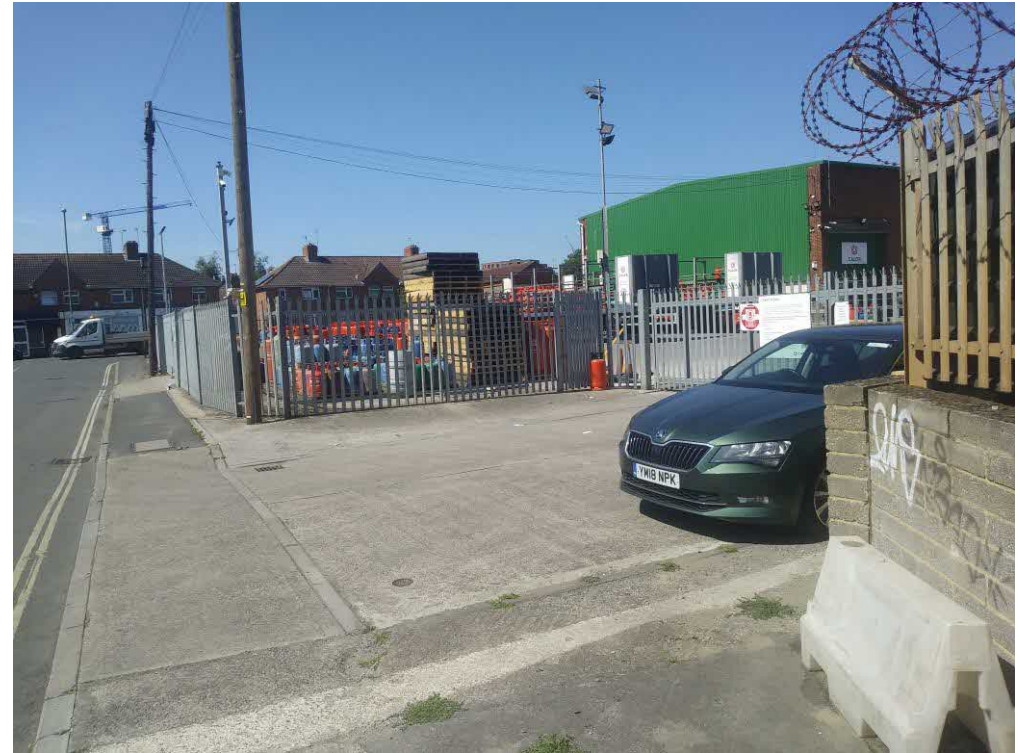
| | | | |
|--|---|--|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 3: External yard for Units 2-5, which contains storage containers utilised as offices. Photo taken viewing south-west. | | Photo 4: External yard for Units 2-5, with Units in the rear of the photo. Photo taken viewing west. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 5: Access gate to Unit 1 (Crown Scaffolding). Photo taken viewing west. | | Photo 6: External yard and buildings for Crown Scaffolding. Photo taken viewing west. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 7: External yard for Crown Scaffolding. Photo taken viewing north-west. | | Photo 8: Access to Units 12 & 13 (Calor Gas). Photo taken viewing west. | |



| | | | |
|--|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 9: External yard for Calor Gas. Photo taken viewing south. | | Photo 10: External yard and building for Calor Gas. Photo taken viewing south-west. | |



| | | | |
|---|---|--|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 11: External yard for Calor Gas, containing many gas cansiters. Photo taken viewing south-west. | | Photo 12: External yard for Calor Gas, containing many gas cansiters. Photo taken viewing north. | |
|  | |  | |

| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 13: 2No plastic pipes coming out of the concrete in the north of the Calor Gas yard, which could be vent pipes. | | Photo 14: Access to Units 14 & 15 (telecommunications company and The Invisible Circus. Photo taken viewing south-west. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 15: 3No manhole covers identified in the north of the site. | | Photo 16: External yard for Units 14 & 15. Photo taken viewing north. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 17: External yard and building for Units 14 & 15. Photo taken viewing north-west. | | Photo 18: Roller door to Unit 14. Photo taken viewing south-west. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 19: Access to Units 6-11 (Bristol Scrap Metal). Photo taken viewing west. | | Photo 20: External yard and buildings for Bristol Scrap Metal. Photo taken viewing south. | |



| | | | |
|--|---|--|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 21: Inside 1No unit occupied by Bristol Scrap Metal. Photo taken viewing west. | | Photo 22: External yard for Bristol Scrap Metal. Photo taken viewing north-east. | |



| | | | |
|---|---|---|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 23: 2No manhole covers located within the Bristol Scrap Metal yard. | | Photo 24: External yard for Bristol Scrap Metal. Photo taken viewing north. | |



| | | | |
|--|---|--|------------------------------------|
| PROJECT NAME | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | CLIENT | Dominvs Project Company 23 Limited |
| TITLE | Site Photo Plan | FIGURE | 3 |
| Photo 25: Western boundary of the site viewed from off-site. Land to the north noted to slope upwards to the north. Photo taken viewing north. | | Photo 26: View of the northern boundary of site from off-site, showing the retaining wall located along this boundary. Photo taken viewing east. | |
|  | |  | |

APPENDIX 2 – EXPLORATORY HOLE RECORDS



Exploratory Hole No:

WS1

| | | | |
|---------------------------------|---|-----------------|------------|
| Site Address: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Project No: | P4639J2633 |
| Client: | Dominvs Project Company 23 Limited | Ground Level: | 12.065 |
| Logged By: | JRO | Date Commenced: | 30/08/2022 |
| Checked By: | JLW | Date Completed: | 30/08/2022 |
| Type and diameter of equipment: | Windowless Sampler Rig | Sheet No: | 1 Of 1 |

Water levels recorded during boring, m

| | | | | | |
|---------------------------|--|--|--|--|--|
| Date: | | | | | |
| Hole depth: | | | | | |
| Casing depth: | | | | | |
| Level water on strike: | | | | | |
| Water Level after 20mins: | | | | | |

Remarks

- 1: No groundwater strike recorded.
- 2: Borehole terminated at 2mbgl due to equipment refusal.
- 3:
- 4:

| Type | Depth (mbgl) | Sample or Tests | | | | | | | Legend | Strata | | Strata Description | Installation |
|---------------------------------------|--------------|-----------------|----|----|----|----|----|----|--------|--------------|--|--------------------|--------------|
| | | Result | | | | | | | | Depth (mbgl) | Water Strikes (mbgl) | | |
| | | 75 | 75 | 75 | 75 | 75 | 75 | N | | | | | |
| | | | | | | | | | | | | | |
| ES | 0.25 | | | | | | | | 0.00 | | Concrete. (MADE GROUND) | | |
| | | | | | | | | | 0.20 | | Brown grey sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-angular flint and concrete. (MADE GROUND) | | |
| ES | 0.75 | | | | | | | | 0.50 | | Brown silty slightly gravelly clay. Gravel consists of fine to coarse, angular to rounded flint, concrete and sandstone. (MADE GROUND) | | |
| SPT | 1.00 | 2 | 3 | 3 | 2 | 3 | 3 | 11 | 1.00 | | | | |
| ES | 1.50 | | | | | | | | 1.20 | | Medium dense becoming very dense orange red SAND. Sand is fine to medium. (REDCLIFFE SANDSTONE MEMBER) | | |
| SPT | 2.00 | 9 | 13 | 16 | 34 | | | 50 | 2.00 | | | | |
| 50 blows for 130mm total penetration. | | | | | | | | | | | | | |
| | | | | | | | | | 2.50 | | | | |
| | | | | | | | | | 3.00 | | | | |
| | | | | | | | | | 3.50 | | | | |
| | | | | | | | | | 4.00 | | | | |
| | | | | | | | | | 4.50 | | | | |
| | | | | | | | | | 5.00 | | | | |



Exploratory Hole No:

WS2

| | | | |
|---------------------------------|---|-----------------|------------|
| Site Address: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Project No: | P4639J2633 |
| Client: | Dominvs Project Company 23 Limited | Ground Level: | 12.241 |
| Logged By: | JRO | Date Commenced: | 30/08/2022 |
| Checked By: | JLW | Date Completed: | 30/08/2022 |
| Type and diameter of equipment: | Windowless Sampler Rig | Sheet No: | 1 Of 1 |

| Water levels recorded during boring, m | | | | | | |
|--|--|--|--|--|--|--|
| Date: | | | | | | |
| Hole depth: | | | | | | |
| Casing depth: | | | | | | |
| Level water on strike: | | | | | | |
| Water Level after 20mins: | | | | | | |

Remarks

1: No groundwater strike recorded.

2: Borehole terminated at 1.7mbgl due to equipment refusal.

3:

4:

| Type | Depth (mbgl) | Sample or Tests | | | | | | | Legend | Strata | | Strata Description | Installation |
|--------------------------------------|--------------|-----------------|----|----|----|----|----|----|--------|--------------|---|--------------------|--------------|
| | | Result | | | | | | | | Depth (mbgl) | Water Strikes (mbgl) | | |
| | | 75 | 75 | 75 | 75 | 75 | 75 | N | | | | | |
| | | | | | | | | | | | | | |
| ES | 0.25 | | | | | | | | 0.00 | | Concrete. (MADE GROUND) | | |
| | | | | | | | | | 0.20 | | Brown grey slightly clayey sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-angular flint and concrete. (MADE GROUND) | | |
| | | | | | | | | | 0.50 | | Brown black silty slightly gravelly clay. Gravel consists of coarse, angular flint and sandstone. (MADE GROUND) | | |
| ES | 1.00 | | | | | | | | 1.00 | | | | |
| SPT | | 2 | 4 | 3 | 4 | 4 | 3 | 14 | 1.10 | | | | |
| ES | 1.50 | | | | | | | | 1.50 | | Medium dense becoming very dense light brown gravelly SAND. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded flint. (REDCLIFFE SANDSTONE MEMBER) | | |
| SPT | 1.70 | 12 | 17 | 31 | 19 | | | 50 | 1.70 | | | | |
| 50 blows for 90mm total penetration. | | | | | | | | | 2.00 | | | | |
| | | | | | | | | | 2.50 | | | | |
| | | | | | | | | | 3.00 | | | | |
| | | | | | | | | | 3.50 | | | | |
| | | | | | | | | | 4.00 | | | | |
| | | | | | | | | | 4.50 | | | | |
| | | | | | | | | | 5.00 | | | | |



Exploratory Hole No:

WS3

| | | | |
|---------------------------------|---|-----------------|------------|
| Site Address: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Project No: | P4639J2633 |
| Client: | Dominvs Project Company 23 Limited | Ground Level: | 12.610 |
| Logged By: | JRO | Date Commenced: | 30/08/2022 |
| Checked By: | JLW | Date Completed: | 30/08/2022 |
| Type and diameter of equipment: | Windowless Sampler Rig | Sheet No: | 1 Of 1 |

| Water levels recorded during boring, m | | | | | | |
|--|--|--|--|--|--|--|
| Date: | | | | | | |
| Hole depth: | | | | | | |
| Casing depth: | | | | | | |
| Level water on strike: | | | | | | |
| Water Level after 20mins: | | | | | | |

Remarks

1: No groundwater strike recorded.

2: Borehole terminated at 1.9mbgl due to equipment refusal.

3:

4:

| Type | Depth (mbgl) | Sample or Tests | | | | | | | Legend | Strata | | Strata Description | Installation |
|------|---------------------------------------|-----------------|----|----|----|----|----|----|--------|--------------|--|--------------------|--------------|
| | | Result | | | | | | | | Depth (mbgl) | Water Strikes (mbgl) | | |
| | | 75 | 75 | 75 | 75 | 75 | 75 | N | | | | | |
| | | | | | | | | | 0.00 | | Concrete. (MADE GROUND) | | |
| ES | 0.25 | | | | | | | | 0.10 | | Light brown mottled dark brown clayey sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular concrete. (MADE GROUND) | | |
| ES | 0.50 | | | | | | | | 0.30 | | | | |
| | | | | | | | | | 0.50 | | Brown black mottled red clayey sandy gravel with medium cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-angular brick and concrete. Cobbles consist of angular concrete and brick. (MADE GROUND) | | |
| SPT | 1.00 | 2 | 3 | 3 | 3 | 4 | 4 | 14 | 1.00 | | | | |
| ES | 1.25 | | | | | | | | 1.10 | | Black brown slightly gravelly clay. Gravel consists of medium to coarse, angular concrete and sandstone. (MADE GROUND) | | |
| | | | | | | | | | 1.50 | | | | |
| ES | 1.75 | | | | | | | | 1.50 | | Very dense light brown gravelly SAND. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to rounded flint. (REDCLIFFE SANDSTONE MEMBER) | | |
| SPT | 2.00 | 10 | 12 | 27 | 23 | | | 50 | 1.90 | | | | |
| | 50 blows for 140mm total penetration. | | | | | | | | | 2.00 | | | |
| | | | | | | | | | 2.50 | | | | |
| | | | | | | | | | 3.00 | | | | |
| | | | | | | | | | 3.50 | | | | |
| | | | | | | | | | 4.00 | | | | |
| | | | | | | | | | 4.50 | | | | |
| | | | | | | | | | 5.00 | | | | |



Exploratory Hole No:

WS4

| | | | |
|---------------------------------|---|-----------------|------------|
| Site Address: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Project No: | P4639J2633 |
| Client: | Dominvs Project Company 23 Limited | Ground Level: | 12.316 |
| Logged By: | JRO | Date Commenced: | 30/08/2022 |
| Checked By: | JLW | Date Completed: | 30/08/2022 |
| Type and diameter of equipment: | Windowless Sampler Rig | Sheet No: | 1 Of 1 |

Water levels recorded during boring, m

| | | | | | |
|---------------------------|--|--|--|--|--|
| Date: | | | | | |
| Hole depth: | | | | | |
| Casing depth: | | | | | |
| Level water on strike: | | | | | |
| Water Level after 20mins: | | | | | |

Remarks

- 1: No groundwater strike recorded.
- 2: Borehole terminated at 2mbgl due to equipment refusal.
- 3:
- 4:

| Type | Depth (mbgl) | Sample or Tests | | | | | | | Legend | Strata | | Strata Description | Installation |
|---------------------------------------|--------------|-----------------|----|----|----|----|----|----|--------|--------------|----------------------|---|--------------|
| | | Result | | | | | | | | Depth (mbgl) | Water Strikes (mbgl) | | |
| | | 75 | 75 | 75 | 75 | 75 | 75 | N | | | | | |
| | | | | | | | | | | | | | |
| ES | 0.25 | | | | | | | | 0.00 | 0.20 | | Concrete. (MADE GROUND) | |
| ES | 1.00 | | | | | | | | 0.50 | | | Red brown mottled black silty slightly gravelly clay. Gravel consists of fine to coarse, angular sandstone and flint. (MADE GROUND) | |
| SPT | | 2 | 3 | 3 | 5 | 4 | 5 | 17 | 1.00 | | | | |
| ES | 1.75 | | | | | | | | 1.50 | 1.50 | | Very dense orange red SAND. Sand is fine to medium. (REDCLIFFE SANDSTONE MEMBER) | |
| SPT | 2.00 | 8 | 14 | 22 | 28 | | | 50 | 2.00 | 2.00 | | | |
| 50 blows for 110mm total penetration. | | | | | | | | | | | | | |
| | | | | | | | | | 2.50 | | | | |
| | | | | | | | | | 3.00 | | | | |
| | | | | | | | | | 3.50 | | | | |
| | | | | | | | | | 4.00 | | | | |
| | | | | | | | | | 4.50 | | | | |
| | | | | | | | | | 5.00 | | | | |



Exploratory Hole No:

WS5

| | | | |
|---------------------------------|---|-----------------|------------|
| Site Address: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Project No: | P4639J2633 |
| Client: | Dominvs Project Company 23 Limited | Ground Level: | 12.731 |
| Logged By: | JRO | Date Commenced: | 30/08/2022 |
| Checked By: | JLW | Date Completed: | 30/08/2022 |
| Type and diameter of equipment: | Windowless Sampler Rig | Sheet No: | 1 Of 1 |

| Water levels recorded during boring, m | | | | | | |
|--|--|--|--|--|--|--|
| Date: | | | | | | |
| Hole depth: | | | | | | |
| Casing depth: | | | | | | |
| Level water on strike: | | | | | | |
| Water Level after 20mins: | | | | | | |

Remarks

1: No groundwater strike recorded.

2: Borehole terminated at 2.9mbgl due to equipment refusal.

3:

4:

| Type | Depth (mbgl) | Sample or Tests | | | | | | | Strata | Legend | Depth (mbgl) | Water Strikes (mbgl) | Strata Description | Installation |
|-----------|---------------------------------------|-----------------|----|----|----|----|----|----|--------|--------|--------------|---|--------------------|--------------|
| | | Result | | | | | | | | | | | | |
| | | 75 | 75 | 75 | 75 | 75 | 75 | N | | | | | | |
| | | | | | | | | | | 0.00 | | Concrete. (MADE GROUND) | | |
| ES | 0.50 | | | | | | | | | 0.50 | | Grey mottled brown sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded concrete and flint. (MADE GROUND) | | |
| ES SPT | 1.00 | 1 | 2 | 2 | 3 | 2 | 3 | 10 | | 1.00 | | Black mottled red clayey sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-angular concrete, brick and flint. (MADE GROUND) | | |
| ES | 1.75 | | | | | | | | | 1.50 | | Brown sandy slightly gravelly clay. Sand is fine to coarse. Gravel consists of medium to coarse, angular to sub-angular sandstone and flint. (MADE GROUND) | | |
| SPT | 2.00 | 3 | 4 | 5 | 6 | 6 | 5 | 22 | | 2.00 | | | | |
| | | | | | | | | | | 2.50 | | | | |
| D | 2.80 | | | | | | | | | 2.70 | | Very dense orange red SAND. Sand is fine to medium. (REDCLIFFE SANDSTONE MEMBER) | | |
| SPT | 2.80 | 6 | 7 | 13 | 37 | | | 50 | | 2.90 | | | | |
| | 50 blows for 100mm total penetration. | | | | | | | | | 3.00 | | | | |
| | | | | | | | | | | 3.50 | | | | |
| | | | | | | | | | | 4.00 | | | | |
| | | | | | | | | | | 4.50 | | | | |
| | | | | | | | | | | 5.00 | | | | |

APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS



JLW
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

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

t: 01923 225404
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e: reception@i2analytical.com

e: Jomas Associates -

Analytical Report Number : 22-82240

| | | | |
|----------------------|---|--|------------|
| Project / Site name: | Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA | Samples received on: | 02/09/2022 |
| Your job number: | JJ2633 | Samples instructed on/ Analysis started on: | 02/09/2022 |
| Your order number: | P4639JJ2633.6 | Analysis completed by: | 12/09/2022 |
| Report Issue Number: | 1 | Report issued on: | 12/09/2022 |
| Samples Analysed: | 8 soil samples | | |

Izabela Wójcik
Signed: _____

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

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

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

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

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

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

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

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | 2414150 | | 2414151 | | 2414152 | | 2414153 | | 2414154 | |
|--------------------------------------|---------------|-------|---------------|-----|---------------|-----|---------------|-------|---------------|-------|
| Sample Reference | WS1 | | WS1 | | WS2 | | WS2 | | WS3 | |
| Sample Number | None Supplied | | None Supplied | | None Supplied | | None Supplied | | None Supplied | |
| Depth (m) | 0.25 | | 0.75 | | 0.25 | | 1.00 | | 0.50 | |
| Date Sampled | 30/08/2022 | | 30/08/2022 | | 30/08/2022 | | 30/08/2022 | | 30/08/2022 | |
| Time Taken | None Supplied | | None Supplied | | None Supplied | | None Supplied | | None Supplied | |
| Analytical Parameter (Soil Analysis) | | | | | | | | | | |
| Stone Content | % | 0.1 | NONE | 49 | < 0.1 | 25 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 2.3 | 16 | 4.9 | 9.9 | 12 | 12 | 12 |
| Total mass of sample received | kg | 0.001 | NONE | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |

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

General Inorganics

| pH - Automated | pH Units | N/A | MCERTS | 10.9 | 8.3 | 9.2 | 8.2 | 9.4 |
|--|----------|---------|--------|-------|-------|-------|-------|-------|
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphate as SO4 | mg/kg | 50 | MCERTS | 540 | 540 | 1200 | 350 | 4300 |
| Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction | g/l | 0.00125 | MCERTS | 0.038 | 0.023 | 0.048 | 0.012 | 0.99 |
| Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction | mg/kg | 2.5 | MCERTS | 76 | 46 | 97 | 24 | 2000 |
| Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction | mg/l | 1.25 | MCERTS | 38 | 22.9 | 48.4 | 12.2 | 992 |
| Total Organic Carbon (TOC) - Automated | % | 0.1 | MCERTS | - | 1.3 | - | - | 1.6 |

Total Phenols

| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| | | | | | | | | |

Speciated PAHs

| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
|------------------------|-------|------|--------|--------|--------|--------|--------|--------|
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.54 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.53 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | 0.52 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | 0.43 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | MCERTS | 0.44 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | MCERTS | 0.18 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | 0.48 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.24 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | 0.27 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

Total PAH

| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 3.63 | < 0.80 | < 0.80 | < 0.80 | < 0.80 |
|-----------------------------|-------|-----|--------|------|--------|--------|--------|--------|
| | | | | | | | | |

Analytical Report Number: 22-82240
 Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA
 Your Order No: P4639JJ2633.6

| Lab Sample Number | 2414150 | 2414151 | 2414152 | 2414153 | 2414154 |
|--------------------------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference | WS1 | WS1 | WS2 | WS2 | WS3 |
| Sample Number | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m) | 0.25 | 0.75 | 0.25 | 1.00 | 0.50 |
| Date Sampled | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | |

| Heavy Metals / Metalloids | | | | | | | | |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 9.9 | 46 | 7.4 | 39 | 59 |
| Boron (water soluble) | mg/kg | 0.2 | MCERTS | 0.6 | 1.5 | 0.2 | 0.7 | 1.4 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | 0.6 | < 0.2 | 0.5 | < 0.2 | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.3 | 44 | 5.7 | 33 | 16 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.6 | 38 | 12 | 19 | 240 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 24 | 140 | 39 | 78 | 400 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 4.6 | 41 | 4.5 | 30 | 21 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 46 | 160 | 68 | 94 | 590 |

| Monoaromatics & Oxygenates | | | | | | | | |
|------------------------------------|-------|---|--------|-------|-------|---|-------|-------|
| Benzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Toluene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Ethylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| p & m-xylene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| o-xylene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |

| Petroleum Hydrocarbons | | | | | | | | |
|---|-------|-----|--------|---|---|-------|---|---|
| Petroleum Range Organics (C6 - C10) HS_1D_TOTAL | mg/kg | 0.1 | MCERTS | - | - | < 0.1 | - | - |

| | | | | | | | | |
|---|-------|-------|--------|---------|---------|---|---------|---------|
| TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL | mg/kg | 2 | MCERTS | < 2.0 | < 2.0 | - | < 2.0 | < 2.0 |
| TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL | mg/kg | 8 | MCERTS | < 8.0 | < 8.0 | - | < 8.0 | < 8.0 |
| TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL | mg/kg | 8 | MCERTS | < 8.0 | < 8.0 | - | < 8.0 | < 8.0 |
| TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL | mg/kg | 10 | MCERTS | < 10 | < 10 | - | < 10 | < 10 |

| | | | | | | | | |
|--|-------|-------|--------|---------|---------|---|---------|---------|
| TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | - | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR | mg/kg | 1 | MCERTS | 1.4 | < 1.0 | - | < 1.0 | < 1.0 |
| TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR | mg/kg | 2 | MCERTS | 2.1 | < 2.0 | - | < 2.0 | < 2.0 |
| TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR | mg/kg | 10 | MCERTS | < 10 | < 10 | - | < 10 | < 10 |
| TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR | mg/kg | 10 | MCERTS | 13 | < 10 | - | < 10 | < 10 |
| TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR | mg/kg | 10 | MCERTS | 23 | < 10 | - | < 10 | < 10 |

| | | | | | | | | |
|--------------------------------|-------|----|--------|---|---|-------|---|---|
| TPH (C10 - C12) EH_CU_1D_TOTAL | mg/kg | 2 | MCERTS | - | - | < 2.0 | - | - |
| TPH (C12 - C16) EH_CU_1D_TOTAL | mg/kg | 4 | MCERTS | - | - | < 4.0 | - | - |
| TPH (C16 - C21) EH_CU_1D_TOTAL | mg/kg | 1 | MCERTS | - | - | < 1.0 | - | - |
| TPH (C21 - C40) EH_CU_1D_TOTAL | mg/kg | 10 | MCERTS | - | - | < 10 | - | - |

| VOCs | | | | | | | | |
|------------------------|-------|---|-----------|-------|-------|---|-------|-------|
| Chloromethane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Chloroethane | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Bromomethane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Vinyl Chloride | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Trichlorofluoromethane | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | | | | 2414150 | 2414151 | 2414152 | 2414153 | 2414154 |
|---|-------|---|-----------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference | | | | WS1 | WS1 | WS2 | WS2 | WS3 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 0.25 | 0.75 | 0.25 | 1.00 | 0.50 |
| Date Sampled | | | | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | | | | |
| 1,1-Dichloroethene | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1,2-Trichloro 1,2,2-Trifluoroethane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Cis-1,2-dichloroethene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1-Dichloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 2,2-Dichloropropane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Trichloromethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1,1-Trichloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2-Dichloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1-Dichloropropene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Trans-1,2-dichloroethene | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Benzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Tetrachloromethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2-Dichloropropane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Trichloroethene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Dibromomethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Bromodichloromethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Cis-1,3-dichloropropene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Trans-1,3-dichloropropene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Toluene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1,2-Trichloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,3-Dichloropropane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Dibromochloromethane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Tetrachloroethene | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2-Dibromoethane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Chlorobenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1,1,2-Tetrachloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Ethylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| p & m-Xylene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Styrene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Tribromomethane | µg/kg | 1 | NONE | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| o-Xylene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,1,1,2-Tetrachloroethane | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Isopropylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Bromobenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| n-Propylbenzene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 2-Chlorotoluene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 4-Chlorotoluene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,3,5-Trimethylbenzene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| tert-Butylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2,4-Trimethylbenzene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| sec-Butylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,3-Dichlorobenzene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| p-Isopropyltoluene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2-Dichlorobenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,4-Dichlorobenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Butylbenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2-Dibromo-3-chloropropane | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2,4-Trichlorobenzene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| Hexachlorobutadiene | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |
| 1,2,3-Trichlorobenzene | µg/kg | 1 | ISO 17025 | < 1.0 | < 1.0 | - | < 1.0 | < 1.0 |

Analytical Report Number: 22-82240
 Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA
 Your Order No: P4639JJ2633.6

| | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|
| Lab Sample Number | 2414150 | 2414151 | 2414152 | 2414153 | 2414154 |
| Sample Reference | WS1 | WS1 | WS2 | WS2 | WS3 |
| Sample Number | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m) | 0.25 | 0.75 | 0.25 | 1.00 | 0.50 |
| Date Sampled | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | |

PCBs by GC-MS

| | | | | | | | | |
|------------------|-------|-------|--------|---|---|---|---|---------|
| PCB Congener 28 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 52 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 101 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 118 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 138 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 153 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |
| PCB Congener 180 | mg/kg | 0.001 | MCERTS | - | - | - | - | < 0.001 |

Total PCBs by GC-MS

| | | | | | | | | |
|------------|-------|-------|--------|---|---|---|---|---------|
| Total PCBs | mg/kg | 0.007 | MCERTS | - | - | - | - | < 0.007 |
|------------|-------|-------|--------|---|---|---|---|---------|

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

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | | | | 2414155 | 2414156 | 2414157 |
|--------------------------------------|----|-------|------|---------------|---------------|---------------|
| Sample Reference | | | | WS4 | WS5 | WS5 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 1.00 | 0.50 | 1.00 |
| Date Sampled | | | | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | | |
| Stone Content | % | 0.1 | NONE | < 0.1 | 38 | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 14 | 1.1 | 10 |
| Total mass of sample received | kg | 0.001 | NONE | 1.2 | 1.2 | 1.2 |

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

General Inorganics

| pH - Automated | pH Units | N/A | MCERTS | 8.4 | 9.1 | 11.1 |
|--|----------|---------|--------|-------|-------|-------|
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphate as SO ₄ | mg/kg | 50 | MCERTS | 240 | 320 | 5200 |
| Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction | g/l | 0.00125 | MCERTS | 0.021 | 0.012 | 1.1 |
| Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction | mg/kg | 2.5 | MCERTS | 42 | 24 | 2300 |
| Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction | mg/l | 1.25 | MCERTS | 21 | 11.8 | 1140 |
| Total Organic Carbon (TOC) - Automated | % | 0.1 | MCERTS | 0.2 | - | 1.4 |

Total Phenols

| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |
|----------------------------|-------|---|--------|-------|-------|-------|
| | | | | | | |

Speciated PAHs

| | | | | | | |
|------------------------|-------|------|--------|--------|--------|--------|
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.73 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.28 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 2 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.33 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 3.2 |
| Pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 2.9 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 2.1 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.7 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 2.5 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.97 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.8 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.2 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.31 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.5 |

Total PAH

| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | < 0.80 | < 0.80 | 21.5 |
|-----------------------------|-------|-----|--------|--------|--------|------|
| | | | | | | |

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | | | | 2414155 | 2414156 | 2414157 |
|--------------------------------------|-------|-----|--------|---------------|---------------|---------------|
| Sample Reference | | | | WS4 | WS5 | WS5 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 1.00 | 0.50 | 1.00 |
| Date Sampled | | | | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | | |
| Heavy Metals / Metalloids | | | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 | 4.8 | 27 |
| Boron (water soluble) | mg/kg | 0.2 | MCERTS | 2.2 | 0.3 | 0.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 | 0.6 | 2.1 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | 3 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 29 | 4.8 | 26 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 11 | 2.9 | 62 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 25 | 15 | 370 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 20 | 2.4 | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 62 | 39 | 470 |

Monoaromatics & Oxygenates

| | | | | | | |
|------------------------------------|-------|---|--------|---|-------|---|
| Benzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Toluene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Ethylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| p & m-xylene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| o-xylene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 1 | MCERTS | - | < 1.0 | - |

Petroleum Hydrocarbons

| | | | | | | |
|---|-------|-----|--------|-------|---|-------|
| Petroleum Range Organics (C6 - C10) HS_1D_TOTAL | mg/kg | 0.1 | MCERTS | < 0.1 | - | < 0.1 |
|---|-------|-----|--------|-------|---|-------|

| | | | | | | |
|---|-------|-------|--------|---|---------|---|
| TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL | mg/kg | 1 | MCERTS | - | < 1.0 | - |
| TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL | mg/kg | 2 | MCERTS | - | < 2.0 | - |
| TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL | mg/kg | 8 | MCERTS | - | < 8.0 | - |
| TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL | mg/kg | 8 | MCERTS | - | < 8.0 | - |
| TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL | mg/kg | 10 | MCERTS | - | < 10 | - |

| | | | | | | |
|--|-------|-------|--------|---|---------|---|
| TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR | mg/kg | 1 | MCERTS | - | < 1.0 | - |
| TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR | mg/kg | 2 | MCERTS | - | < 2.0 | - |
| TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR | mg/kg | 10 | MCERTS | - | < 10 | - |
| TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR | mg/kg | 10 | MCERTS | - | < 10 | - |
| TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR | mg/kg | 10 | MCERTS | - | < 10 | - |

| | | | | | | |
|--------------------------------|-------|----|--------|-------|---|-------|
| TPH (C10 - C12) EH_CU_1D_TOTAL | mg/kg | 2 | MCERTS | < 2.0 | - | < 2.0 |
| TPH (C12 - C16) EH_CU_1D_TOTAL | mg/kg | 4 | MCERTS | < 4.0 | - | < 4.0 |
| TPH (C16 - C21) EH_CU_1D_TOTAL | mg/kg | 1 | MCERTS | < 1.0 | - | 9.9 |
| TPH (C21 - C40) EH_CU_1D_TOTAL | mg/kg | 10 | MCERTS | < 10 | - | 65 |

VOCs

| | | | | | | |
|------------------------|-------|---|-----------|---|-------|---|
| Chloromethane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Chloroethane | µg/kg | 1 | NONE | - | < 1.0 | - |
| Bromomethane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Vinyl Chloride | µg/kg | 1 | NONE | - | < 1.0 | - |
| Trichlorofluoromethane | µg/kg | 1 | NONE | - | < 1.0 | - |

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | | | | 2414155 | 2414156 | 2414157 |
|---|-------|---|-----------|---------------|---------------|---------------|
| Sample Reference | | | | WS4 | WS5 | WS5 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 1.00 | 0.50 | 1.00 |
| Date Sampled | | | | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | | |
| 1,1-Dichloroethene | µg/kg | 1 | NONE | - | < 1.0 | - |
| 1,1,2-Trichloro 1,2,2-Trifluoroethane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Cis-1,2-dichloroethene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1-Dichloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 2,2-Dichloropropane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Trichloromethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1,1-Trichloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,2-Dichloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1-Dichloropropene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Trans-1,2-dichloroethene | µg/kg | 1 | NONE | - | < 1.0 | - |
| Benzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Tetrachloromethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,2-Dichloropropane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Trichloroethene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Dibromomethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Bromodichloromethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Cis-1,3-dichloropropene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Trans-1,3-dichloropropene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Toluene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1,2-Trichloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,3-Dichloropropane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Dibromochloromethane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Tetrachloroethene | µg/kg | 1 | NONE | - | < 1.0 | - |
| 1,2-Dibromoethane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| Chlorobenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1,1,2-Tetrachloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Ethylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| p & m-Xylene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Styrene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Tribromomethane | µg/kg | 1 | NONE | - | < 1.0 | - |
| o-Xylene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,1,1,2-Tetrachloroethane | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Isopropylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Bromobenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| n-Propylbenzene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| 2-Chlorotoluene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 4-Chlorotoluene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,3,5-Trimethylbenzene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| tert-Butylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,2,4-Trimethylbenzene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| sec-Butylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,3-Dichlorobenzene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| p-Isopropyltoluene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| 1,2-Dichlorobenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,4-Dichlorobenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Butylbenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,2-Dibromo-3-chloropropane | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |
| 1,2,4-Trichlorobenzene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| Hexachlorobutadiene | µg/kg | 1 | MCERTS | - | < 1.0 | - |
| 1,2,3-Trichlorobenzene | µg/kg | 1 | ISO 17025 | - | < 1.0 | - |

Analytical Report Number: 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Your Order No: P4639JJ2633.6

| Lab Sample Number | | | | 2414155 | 2414156 | 2414157 |
|---|-------|-------|--------|---------------|---------------|---------------|
| Sample Reference | | | | WS4 | WS5 | WS5 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 1.00 | 0.50 | 1.00 |
| Date Sampled | | | | 30/08/2022 | 30/08/2022 | 30/08/2022 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | | | | | | |
| PCBs by GC-MS | | | | | | |
| PCB Congener 28 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 52 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 101 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 118 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 138 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 153 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| PCB Congener 180 | mg/kg | 0.001 | MCERTS | - | < 0.001 | - |
| Total PCBs by GC-MS | | | | | | |
| Total PCBs | mg/kg | 0.007 | MCERTS | - | < 0.007 | - |

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

Analytical Report Number : 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

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

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

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|-------------------|------------------|---------------|-----------|--|
| 2414150 | WS1 | None Supplied | 0.25 | Brown sand with concrete and stones. |
| 2414151 | WS1 | None Supplied | 0.75 | Brown clay and sand. |
| 2414152 | WS2 | None Supplied | 0.25 | Brown gravelly loam with chalk and stones. |
| 2414153 | WS2 | None Supplied | 1 | Brown clay and sand with concrete. |
| 2414154 | WS3 | None Supplied | 0.5 | Brown loam and clay with gravel and brick. |
| 2414155 | WS4 | None Supplied | 1 | Brown sandy clay. |
| 2414156 | WS5 | None Supplied | 0.5 | Light brown sand with concrete and stones. |
| 2414157 | WS5 | None Supplied | 1 | Brown loam and sand with concrete and brick. |

Analytical Report Number : 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Water matrix abbreviations:

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|--|---|---|---------------|--------------------|----------------------|
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent). | In house method. | L038-PL | D | MCERTS |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES. | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil. | L038-PL | D | MCERTS |
| Asbestos identification in soil | Asbestos identification with the use of polarised light microscopy in conjunction with dispersion staining techniques. | In house method based on HSG 248 | A001-PL | D | ISO 17025 |
| Boron, water soluble, in soil | Determination of water soluble boron in soil by hot water extract followed by ICP-OES. | In-house method based on Second Site Properties version 3 | L038-PL | D | MCERTS |
| Moisture Content | Moisture content, determined gravimetrically. (30 oC) | In house method. | L019-UK/PL | W | NONE |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry. | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL | W | MCERTS |
| Speciated EPA-16 PAHs in soil | Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. | In-house method based on USEPA 8270 | L064-PL | D | MCERTS |
| PCB's By GC-MS in soil | Determination of PCB by extraction with acetone and hexane followed by GC-MS. | In-house method based on USEPA 8082 | L027-PL | D | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement. | In house method. | L099-PL | D | MCERTS |
| PRO (Soil) | Determination of hydrocarbons C6-C10 by headspace GC-MS. | In-house method based on USEPA8260 | L088-PL | W | MCERTS |
| Total sulphate (as SO4 in soil) | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES. | In house method. | L038-PL | D | MCERTS |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight. | In-house method based on British Standard Methods and MCERTS requirements. | L019-UK/PL | D | NONE |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry. | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL | W | MCERTS |
| Total organic carbon (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate. | In house method. | L009-PL | D | MCERTS |
| Volatile organic compounds in soil | Determination of volatile organic compounds in soil by headspace GC-MS. | In-house method based on USEPA8260 | L073B-PL | W | MCERTS |
| BTEX and MTBE in soil (Monoaromatics) | Determination of BTEX in soil by headspace GC-MS. | In-house method based on USEPA8260 | L073B-PL | W | MCERTS |
| TPHCWG (Soil) | Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. | In-house method with silica gel split/clean up. | L088/76-PL | W | MCERTS |

Analytical Report Number : 22-82240

Project / Site name: Units 1-15 Premier Estates, Sussex Street, Bristol, BS2 0RA

Water matrix abbreviations:

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|--|---------------|--------------------|----------------------|
| TPH in (Soil) | Determination of TPH bands by HS-GC-MS/GC-FID | In-house method, TPH with carbon banding and silica gel split/cleanup. | L076-PL | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry. | In-house method | L080-PL | W | MCERTS |
| Sulphate, water soluble, in soil (1hr extraction) | Sulphate, water soluble, in soil (1hr extraction) | In-house method | L038-PL | D | MCERTS |

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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



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Environmental Science

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Analytical Report Number : 22-83851

| | | | |
|-----------------------------|---|--|------------|
| Project / Site name: | Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA | Samples received on: | 02/09/2022 |
| Your job number: | JJ2633 | Samples instructed on/ Analysis started on: | 12/09/2022 |
| Your order number: | P4639JJ2633 7 | Analysis completed by: | 19/09/2022 |
| Report Issue Number: | 1 | Report issued on: | 19/09/2022 |
| Samples Analysed: | 3 leachate samples | | |



Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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



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Analytical Report Number: 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Your Order No: P4639JJ2633 7

| | | | | |
|---|--|---------------|---------------|---------------|
| Lab Sample Number | | 2423233 | 2423234 | 2423235 |
| Sample Reference | | WS1 | WS3 | WS5 |
| Sample Number | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | 0.75 | 0.50 | 1.00 |
| Date Sampled | | Deviating | Deviating | Deviating |
| Time Taken | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Leachate Analysis) | | | | |

General Inorganics

| | | | | | | |
|-----------------------------|----------|-----|-----------|------|-------|-------|
| pH (automated) | pH Units | N/A | ISO 17025 | 7.7 | 7.7 | 8.7 |
| Total Cyanide | µg/l | 10 | ISO 17025 | < 10 | < 10 | < 10 |
| Sulphate as SO ₄ | µg/l | 100 | ISO 17025 | 7910 | 92800 | 11100 |

Total Phenols

| | | | | | | |
|----------------------------|------|----|-----------|------|------|------|
| Total Phenols (monohydric) | µg/l | 10 | ISO 17025 | < 10 | < 10 | < 10 |
|----------------------------|------|----|-----------|------|------|------|

Speciated PAHs

| | | | | | | |
|------------------------|------|------|-----------|--------|--------|--------|
| Naphthalene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Acenaphthylene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Acenaphthene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Fluorene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Phenanthrene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Anthracene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Fluoranthene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Pyrene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(a)anthracene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Chrysene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(b)fluoranthene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(k)fluoranthene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(a)pyrene | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 |
| Indeno(1,2,3-cd)pyrene | µg/l | 0.01 | NONE | < 0.01 | < 0.01 | < 0.01 |
| Dibenz(a,h)anthracene | µg/l | 0.01 | NONE | < 0.01 | < 0.01 | < 0.01 |
| Benzo(ghi)perylene | µg/l | 0.01 | NONE | < 0.01 | < 0.01 | < 0.01 |

Total PAH

| | | | | | | |
|-------------------|------|-----|------|-------|-------|-------|
| Total EPA-16 PAHs | µg/l | 0.2 | NONE | < 0.2 | < 0.2 | < 0.2 |
|-------------------|------|-----|------|-------|-------|-------|

Heavy Metals / Metalloids

| | | | | | | |
|-----------------------|------|------|-----------|--------|--------|--------|
| Arsenic (dissolved) | µg/l | 1 | ISO 17025 | < 1.0 | 6.7 | 6.6 |
| Boron (dissolved) | µg/l | 10 | ISO 17025 | 30 | 85 | 10 |
| Cadmium (dissolved) | µg/l | 0.08 | ISO 17025 | < 0.08 | < 0.08 | < 0.08 |
| Chromium (hexavalent) | µg/l | 5 | ISO 17025 | < 5.0 | < 5.0 | < 5.0 |
| Chromium (dissolved) | µg/l | 0.4 | ISO 17025 | < 0.4 | 0.7 | 5.6 |
| Copper (dissolved) | µg/l | 0.7 | ISO 17025 | 2.2 | 5.3 | 14 |
| Lead (dissolved) | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | 62 |
| Mercury (dissolved) | µg/l | 0.5 | ISO 17025 | < 0.5 | < 0.5 | < 0.5 |
| Nickel (dissolved) | µg/l | 0.3 | ISO 17025 | < 0.3 | 0.5 | 2.4 |
| Selenium (dissolved) | µg/l | 4 | ISO 17025 | < 4.0 | < 4.0 | < 4.0 |
| Zinc (dissolved) | µg/l | 0.4 | ISO 17025 | 2 | 11 | 41 |

Monoaromatics & Oxygenates

| | | | | | | |
|------------------------------------|------|----|-----------|-------|-------|-------|
| Benzene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| Toluene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| Ethylbenzene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| p & m-xylene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| o-xylene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/l | 10 | NONE | < 10 | < 10 | < 10 |



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Environmental Science

Analytical Report Number: 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Your Order No: P4639JJ2633 7

| | | | |
|---|---------------|---------------|---------------|
| Lab Sample Number | 2423233 | 2423234 | 2423235 |
| Sample Reference | WS1 | WS3 | WS5 |
| Sample Number | None Supplied | None Supplied | None Supplied |
| Depth (m) | 0.75 | 0.50 | 1.00 |
| Date Sampled | Deviating | Deviating | Deviating |
| Time Taken | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Leachate Analysis) | | | |

Petroleum Hydrocarbons

| | | | | | | |
|--|------|----|-----------|-------|-------|-------|
| TPH-CWG - Aliphatic >C5 - C6 _{HS_1D_AL} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aliphatic >C6 - C8 _{HS_1D_AL} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aliphatic >C8 - C10 _{HS_1D_AL} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aliphatic >C10 - C12 _{EH_1D_AL_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aliphatic >C12 - C16 _{EH_1D_AL_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aliphatic >C16 - C21 _{EH_1D_AL_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aliphatic >C21 - C35 _{EH_1D_AL_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aliphatic (C5 - C35) _{HS+EH_1D_AL_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |

| | | | | | | |
|---|------|----|-----------|-------|-------|-------|
| TPH-CWG - Aromatic >C5 - C7 _{HS_1D_AR} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aromatic >C7 - C8 _{HS_1D_AR} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aromatic >C8 - C10 _{HS_1D_AR} | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aromatic >C10 - C12 _{EH_1D_AR_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aromatic >C12 - C16 _{EH_1D_AR_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aromatic >C16 - C21 _{EH_1D_AR_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aromatic >C21 - C35 _{EH_1D_AR_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |
| TPH-CWG - Aromatic (C5 - C35) _{HS+EH_1D_AR_#1_#2_MS} | µg/l | 10 | NONE | < 10 | < 10 | < 10 |



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Environmental Science

Analytical Report Number: 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Your Order No: P4639JJ2633 7

| Lab Sample Number | 2423233 | 2423234 | 2423235 |
|---|---------------|---------------|---------------|
| Sample Reference | WS1 | WS3 | WS5 |
| Sample Number | None Supplied | None Supplied | None Supplied |
| Depth (m) | 0.75 | 0.50 | 1.00 |
| Date Sampled | Deviating | Deviating | Deviating |
| Time Taken | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Leachate Analysis) | | | |

VOCs

| Compound | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
|---------------------------------------|------|---|-----------|-------|-------|-------|
| Chloromethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Chloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Bromomethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Vinyl Chloride | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1-dichloroethene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1,2-Trichloro 1,2,2-Trifluoroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Cis-1,2-dichloroethene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1-dichloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 2,2-Dichloropropane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Trichloromethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1,1-Trichloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2-dichloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1-Dichloropropene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Trans-1,2-dichloroethene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Benzene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| Tetrachloromethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2-dichloropropane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Trichloroethene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Dibromomethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Bromodichloromethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Cis-1,3-dichloropropene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Trans-1,3-dichloropropene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Toluene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| 1,1,2-Trichloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,3-Dichloropropane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Dibromochloromethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Tetrachloroethene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2-Dibromoethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Chlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,1,1,2-Tetrachloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Ethylbenzene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| p & m-xylene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| Styrene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Tribromomethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| o-xylene | µg/l | 1 | ISO 17025 | < 1.0 | < 1.0 | < 1.0 |
| 1,1,2,2-Tetrachloroethane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Isopropylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Bromobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| n-Propylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 2-Chlorotoluene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 4-Chlorotoluene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,3,5-Trimethylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| ter-Butylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2,4-Trimethylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| sec-Butylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,3-dichlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| P-Isopropyltoluene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2-dichlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,4-dichlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Butylbenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| 1,2-Dibromo-3-chloropropane | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |



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Analytical Report Number: 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Your Order No: P4639JJ2633 7

| Lab Sample Number | | | | 2423233 | 2423234 | 2423235 |
|---|------|-----|------|---------------|---------------|---------------|
| Sample Reference | | | | WS1 | WS3 | WS5 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied |
| Depth (m) | | | | 0.75 | 0.50 | 1.00 |
| Date Sampled | | | | Deviating | Deviating | Deviating |
| Time Taken | | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Leachate Analysis) | | | | | | |
| 1,2,4-Trichlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |
| Hexachlorobutadiene | µg/l | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 |
| 1,2,3-Trichlorobenzene | µg/l | 1 | NONE | < 1.0 | < 1.0 | < 1.0 |

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

Analytical Report Number : 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Water matrix abbreviations:

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|--|---|---|---------------|--------------------|----------------------|
| NRA Leachate Prep | 10:1 extract with de-ionised water shaken for 24 hours then filtered. | In-house method based on National Rivers Authority | L020-PL | W | NONE |
| Metals by ICP-OES in leachate | Determination of metals in leachate by acidification followed by ICP-OES. | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil. | L039-PL | W | ISO 17025 |
| Boron in leachate | Determination of boron in leachate. Sample acidified and followed by ICP-OES. | In-house method based on MEWAM | L039-PL | W | ISO 17025 |
| Hexavalent chromium in leachate | Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry. | In-house method | L080-PL | W | ISO 17025 |
| Monohydric phenols in leachate | Determination of phenols in leachate by distillation followed by colorimetry. | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL | W | ISO 17025 |
| Speciated EPA-16 PAHs in leachate | Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. | In-house method based on USEPA 8270 | L102B-PL | W | ISO 17025 |
| pH at 20oC in leachate (automated) | Determination of pH in leachate by electrometric measurement. | In house method. | L099B | W | ISO 17025 |
| Sulphate in leachates | Determination of sulphate in leachate by acidification followed by ICP-OES. | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil. | L039-PL | W | ISO 17025 |
| TPHCWG (Leachates) | Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS. | In-house method | L070-PL | W | ISO 17025 |
| Total cyanide in leachate | Determination of total cyanide by distillation followed by colorimetry. | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL | W | ISO 17025 |
| Volatile organic compounds in leachate | Determination of volatile organic compounds in leachate by headspace GC-MS | In-house method based on USEPA8260 | L073B-PL | W | ISO 17025 |
| BTEX and MTBE in leachates (Monoaromatics) | Determination of BTEX and MTBE in leachates by headspace GC-MS. | In-house method based on USEPA8260 | L073B-PL | W | ISO 17025 |

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

Analytical Report Number : 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

Water matrix abbreviations:

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|

List of HWOL Acronyms and Operators

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

Sample Deviation Report



Analytical Report Number : 22-83851

Project / Site name: Units 1 15 Premier Estates Sussex Street Bristol BS2 0RA

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

| Sample ID | Other ID | Sample Type | Lab Sample Number | Sample Deviation | Test Name | Test Ref | Test Deviation |
|-----------|---------------|-------------|-------------------|------------------|---------------|---------------|----------------|
| WS1 | None Supplied | L | 2423233 | a | None Supplied | None Supplied | None Supplied |
| WS3 | None Supplied | L | 2423234 | a | None Supplied | None Supplied | None Supplied |
| WS5 | None Supplied | L | 2423235 | a | None Supplied | None Supplied | None Supplied |
| WS5 | None Supplied | S | 2423232 | a | None Supplied | None Supplied | None Supplied |

APPENDIX 4 – SOIL GAS MONITORING TEST RESULTS

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