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Tier 2 Contamination Assessment

Proposed Development

Rikkyo School, Horsham

July 2024



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Project Details

Site:	Rikkyo School, Horsham
Document Title:	Tier 2 Contamination Assessment
Document no.:	STV6107-R02-Rev_A
Date:	July 2024
Client:	Rikkyo School
Issuing office:	Soiltechnics Ltd Cedar Barn, White Lodge, Walgrave, Northampton. NN6 9PY Tel: 01604 781 877 E-mail: mail@soiltechnics.net

Document history and status

Revision	Date	Description	Author	Checker	Reviewer
A	July 2024	First Issue	LE	KB	SD

Registered to ISO 9001:2015
ISO 14001:2015 & ISO 45001:2018

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Title	Produced by	Date	Reference
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Ground Floor Plan	Walters & Cohen Architects	August 2023	PD-1010
Landscape Concept	Walters & Cohen Architects	-	-

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Non-technical Summary

Topic	Commentary
Site description	The site is currently a car park, surrounding woodland and soft landscaping, and access road within the grounds of Rikkyo School, Horsham. The investigation area was limited to the existing car park.
Development proposals	The development comprises the construction of a 2-storey boarding house with surrounding soft landscaping.
Ground conditions	Ground conditions comprise Made Ground to varying depth (between 0.35-1.4m) over Weald Clay Formation. The Made Ground comprises subbase and a granular Made Ground to depths of up to 0.6m over reworked natural cohesive soils. Weald Clay Formation comprises light grey, mottled orangish brown clay. Minor groundwater inflows were observed at around 0.8m depth in two locations.
Chemical contamination and remedial requirements	Laboratory testing has identified sporadic, low-level asbestos fibres and PAH within the granular Made Ground. Based on the development proposals, it is recommended that in areas of proposed soft landscaping within the area of the existing car park, either granular Made Ground is fully removed or a capping layer is introduced (likely 300mm of topsoil/subsoil). Alternatively, further testing could be undertaken to refine the risk. Capping may be the preferred option due to the requirement to import soils anyway as none is currently present on site. Remedial action is not required beneath proposed buildings and hardstanding. Within existing landscaped areas (outside of the existing car park), it is considered unlikely that the same granular Made Ground will be present and so the risk in these areas is low and no additional remediation (outside the car park area) is necessary. Due to the presence of PAH within the Made Ground, it is advised to consult the water company for confirmation on whether protective pipe is necessary or if further assessment and investigation works are warranted.
Recommendation for further works	Remedial measures will be required (subject to further testing) and therefore a Remediation Strategy should be produced. A subsequent Verification Report will be required on completion of the remedial works. A Discovery Strategy should be in place in the event of encountering unexpected contamination. A Materials Management Plan could be produced to facilitate the reuse of Made Ground materials on site. WAC testing may be required if materials are to be sent off site for disposal. The Principal Contractor should liaise with the statutory undertaker to confirm the requirement for barrier pipe installation.

1 Introduction

1.1 Scheme Outline

1.1.1 The development proposal comprises the construction of a new two-storey boarding house in an area currently occupied by a car park. Drawings of the proposed scheme are presented within Appendix A.

1.1.2 It is understood that the development will be controlled under the Horsham District Council planning regime under the planning application DC/23/1912.

1.1.3 The report is based on the project proposals and information outlined above; should the scheme change then it will be necessary to review the conclusions and recommendations presented in this report.

1.2 Site Setting

1.2.1 Rikkyo School lies within a predominantly rural area, approximately mid-way between the villages of Alford Crossways and Bucks Green. The post code for the site is RH12 3BE, and the school is accessed from Horsham Road (A281) which lies adjacent to the northern boundary.

1.2.2 The planning application area comprises an existing asphalt surfaced car park and access road and surrounding soft landscaping/woodland, which will be retained. Our investigation area was restricted to the existing car park area, which will be redeveloped.

1.2.3 An aerial image showing the approximate planning boundary and the investigation area ('the site') is presented below.



Figure 1-A: Aerial Image of the planning boundary (in red) and the investigation area (in blue).

1.3 Brief

1.3.1 This report has been prepared following instructions received through DowsettMayhew Planning Partnership on behalf of our mutual Client, Rikkyo School.

1.3.2 The overall brief of works is to undertake a ground investigation at the site to investigate Potential Contaminant Linkages (PCL) identified in the Preliminary Investigation Report previously produced for the site (STV6107-R01 Rev A – September 2023). This is required to discharge planning condition 7 of the planning application.

1.3.3 The objectives of this report are outlined below:

i) Summarise the intrusive investigation works undertaken and associated laboratory testing.
ii) Undertake a land contamination Tier 2 generic quantitative risk assessment.
iii) Provide recommendations to inform an Options Appraisal and Remediation Strategy, should they be required.

1.4 Definition of Scope

1.4.1 The phasing and scope of the ground investigation works is broadly defined by the following documents.

Title	Document Reference	Publisher	Investigation Scope
Code of practice for ground investigations	BS 5930: 2015	British Standards Institution	Phase 2: Preliminary investigation
Investigation of potentially contaminated sites – Code of practice	BS 10175: 2011+A2:2017	British Standards Institution	Exploratory Investigation
Land contamination risk management	Online resource, updated April 2021	Environment Agency	Stage 1 Risk Assessment: Tier 2: Generic quantitative risk assessment

Table 1-A: Definition of Investigation Scope

1.5 Limitations

1.5.1 Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the resources, investigations and testing devoted to it by agreement with our Client. This report is confidential to our Client and Soiltechnics accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

2 Summary of Tier 1 Preliminary Contamination Risk Assessment

2.1 Overview

2.1.1 A Tier 1 Preliminary Contamination Risk Assessment was undertaken by Soiltechnics under report reference STV6273-R01 Rev B, issued in September 2023. We recommend this report is read in conjunction with the previous report.

2.1.2 The assessment comprised the following steps:

- Identify potential contaminant linkages (PCLs) between sources, pathways and receptors based on desk study information and produce an initial Conceptual Site Model (iCSM).
- Update the identified PCLs (if required) based on intrusive works subsequently undertaken as part of a geotechnical investigation to produce an updated Conceptual Site Model (uCSM).
- To provide data to assist in the design of potential further exploratory and detailed intrusive investigations and to give an early indication of possible remedial requirements, if necessary.

2.1.3 This report sets out investigations to refine the conceptual site model (based on desk study information and intrusive works), which is presented below for ease of reference.

2.1.4 No laboratory testing for chemical contaminants was undertaken as part of the Tier 1 risk assessment, with the exception of coal tar testing on the existing asphalt surfacing.

2.1.5 The table below presents our approach to the assessment of risks associated with PCLs. The categories below are based upon the definitions within CIRIA C552 (2001), with the addition of a 'negligible likelihood' scenario, which is to be used where there is no realistic scenario in which harm could occur.

2.1.6 The Tier 1 conceptual site model (CSM) is presented within the following tables overleaf.

		Consequence of harm			
		Severe	**Medium**	**Mild**	**Minor**
Probability of harm	**High likelihood**	**Risk: Very high** (high – severe)	**Risk: High** (high – medium)	**Risk: Moderate** (high – mild)	**Risk: Moderate/Low** (high – minor)
	Likely	**Risk: High** (likely – severe)	**Risk: Moderate** (likely – medium)	**Risk: Moderate/Low** (likely – mild)	**Risk: Low** (likely - minor)
	Low Likelihood	**Risk: Moderate** (low – severe)	**Risk: Moderate/Low** (low – medium)	**Risk: Low** (low – mild)	**Risk: Very low** (low – minor)
	Unlikely	**Risk: Moderate/Low** (unlikely – severe)	**Risk: Low** (unlikely – medium)	**Risk: Very low** (unlikely – mild)	**Risk: Very low** (unlikely – minor)
	Negligible Likelihood	**Risk: Low** (negligible– severe)	**Risk: Very Low** (negligible– medium)	**Risk: Very Low** (negligible– mild)	**Risk: Negligible** (negligible– minor)

Table 2-A: CSM Risk Ratings

RECEPTOR: PROPOSED END USERS				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Metals, PAHs, asbestos	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Low** (unlikely – medium)	Made Ground has been identified on site consistent with topography and slopes. Made Ground generally comprised reworked natural material with rare anthropogenic materials. No visual or olfactory evidence of contamination (including ACMs) was noted. On this basis, the risk of contaminants being present at levels that could pose a risk to proposed end users is considered unlikely.
		Permeation into drinking water pipes	**Risk: Moderate** (likely – medium)	Based on desk study information, no likely source of TPH, VOCs or SVOCs has been identified. Made Ground is present in some areas at likely pipe depths and some rare asphalt was present. It is advised to consult the water company for advice to determine if protective pipe is necessary or if further assessment and investigation works are warranted.
Asphalt	Coal tar (PAHs)	Ingestion, inhalation and contact with dusts	**Risk: Low** (unlikely – medium)	Laboratory testing has confirmed the absence of coal tar.
Unexploded Ordnance	UXO	Direct contact / explosion	**Risk: Low** (negligible– severe)	Unlikely to come into contact with UXO during use of the site.

Table 2-B: CSM – Proposed End Users

RECEPTOR: CONSTRUCTION WORKERS				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Asbestos fibres and ACMs	Inhalation of dusts	**Risk: Low** (unlikely – medium)	Made Ground has been identified to the north and north-east of the site. The Made Ground generally comprised reworked natural material with rare anthropogenic materials. There was no visual evidence of the presence of ACMs/asbestos being present although a quantitative assessment would be required to confirm this.
	Metals, PAHs	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Low** (low – mild)	No gross contamination of high-risk contaminants anticipated (e.g. cyanide, benzene, and vinyl chloride). Standard PPE and hygiene protocols for working on brownfield sites are likely to be sufficient to the mitigate risk.
Asphalt	Coal tar	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Low** (unlikely – medium)	Testing has not identified the presence of coal tar.
Unexploded Ordnance	UXO	Direct contact / explosion	**Risk: Moderate** (low – severe)	The Preliminary Risk Assessment indicates there is a credible risk of encountering UXO during ground investigation works. A project specific UXO Detailed Risk Assessment is recommended, or alternatively that site supervision, briefings and watching brief by EOD engineer during construction works provided.

Table 2-C: CSM – Acute Exposure to Construction Workers

RECEPTOR: ADJACENT SITE USERS FOLLOWING COMPLETION				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Metals, PAHs, asbestos	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Low** (unlikely – medium)	Based on the exposure pathways that would be present from the developed site, and on the anticipated levels of contamination, it is considered unlikely that a pollutant linkage could pose an unacceptable risk to off-site receptors.
Asphalt	Coal tar	Inhalation of dusts and vapours	**Risk: Low** (unlikely – medium)	Laboratory testing has confirmed the absence of coal tar.

Table 2-D: CSM – Chronic Exposure to Adjacent Site Users

RECEPTOR: ADJACENT SITE USERS DURING THE CONSTRUCTION PHASE				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Metals, PAHs, asbestos	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Low** (unlikely – medium)	Based on the desk study information, unlikely any Made Ground will contain contaminants at concentrations high enough to pose an acute risk to adjacent site users. There was no visual evidence of the presence of ACMs/asbestos being present although a quantitative assessment would be required to confirm this.
Asphalt	Coal tar	Inhalation of dusts and vapours	**Risk: Low** (unlikely – medium)	Laboratory testing has confirmed the absence of coal tar.

Table 2-E: CSM – Acute Exposure to Adjacent Site Users

RECEPTOR: PROPOSED PLANTING				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Contaminants within topsoil and the shallow sub-surface	Metals, pH and inorganics	Direct contact and root uptake	**Risk: Very low** (low – minor)	No current soil resources are present on site, therefore a suitable growing medium will need to be imported for any proposed landscaping scheme.

Table 2-F: CSM – Phytotoxic Risk to Proposed Planting Scheme

RECEPTOR: CONTROLLED WATERS				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 1 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Metals, PAH	Leaching and lateral migration (Surface water)	**Risk: Low** (unlikely – medium)	Made Ground unlikely to contain contaminants at concentrations capable of posing a risk to surface waters and nearby pond is not considered a sensitive receptor. No viable pathway to off-site controlled waters has been identified.

Table 2-G: CSM – Controlled Waters Risk

2.1.7 The risk to identified receptors from the proposed developments under the planning regime are assessed under a 'minimal risk' approach. Whereas the risk to receptors under the current and continued use of the site is dealt with under the regulatory framework of the Part IIA regime, where Soiltechnics consider if there is a reasonable chance of a 'significant potential of significant harm' (SPOSH) occurring. This is not equivalent to a due diligence assessment for the continued use of the site to aid in determining potential contaminated land liabilities or land valuations.

2.1.8 The following table sets out the risk to current users considering a SPOSH approach:

Receptor	**Potential Source**	**Contaminants of Concern**	**Pathway**	**Preliminary Assessment: Is their reasonable evidence of SPOSH?**	**Discussion**
Human Health (Current and adjacent site users)	All potential contaminant sources identified above	Various Contaminants	Inhalation, ingestion and contact with soils, dusts and vapours.	**No**	Soiltechnics have not encountered any evidence which indicates there could be a significant possibility of significant harm to human health occurring from contamination on site.
Controlled Waters (Surface water and groundwater)	All potential contaminant sources identified above	Various Contaminants	Mobilisation and migration	**No**	Soiltechnics have not encountered any evidence which indicates there could be a significant possibility of significant harm to controlled waters occurring from contamination on site.
Ecosystems	All potential contaminant sources identified above	Various Contaminants	Direct contact and root uptake	**No**	The site does not fall within a relevant designation for environmentally sensitive land (e.g. SSSI, NRA, Ramsar).
Property	All potential contaminant sources identified above	Various Contaminants	Various pathways	**No**	Through undertaking the desk study, no evidence of potentially significant harm occurring to property has been identified.

Table 2-H: CSM – Current Site Risks (Part IIA)

3 Ground Investigation

3.1 Objectives

3.1.1 The ground investigation scope and location of exploratory holes was determined by Soiltechnics Ltd, based upon our overall brief outlined in Section 1.

3.2 Fieldwork Summary

3.2.1 Fieldwork was undertaken on the 11th June 2024.

3.2.2 A summary of the works completed is set out in the table below, along with the location of the exploratory logs. The exploratory hole location plan is presented within Appendix A.

Exploratory Hole Logs	Method	Qty	Final Depth Range (m bgl)	Comments
Appendix B	Hand Pits	4	0.52-1.00	HP01 & HP02 Terminated at scheduled depth

Table 3-A: Summary of fieldwork undertaken

3.2.3 All soils encountered were described in accordance with BS EN ISO 14688 '*Identification and Classification of soil'.*

3.3 Sampling

3.3.1 Samples collected for chemical analysis have been taken and handled in accordance with BS ISO 18400-105:2017 *'Soil quality — Sampling Part 105: Packaging, transport, storage and preservation of samples'.*

3.3.2 Various sampling and sub-sampling methodologies have been adopted as appropriate, with the primary aim of obtaining the highest quality sample class practicable.

3.3.3 Untested chemical samples will be held for a period of 4 weeks from the date of the first report issue, after which they will be disposed of.

3.4 In-situ Testing

3.4.1 The following table summarises the field testing carried out. The results are summarised on individual exploratory hole logs where appropriate.

Tests	Qty	Applicable standard / guidance	Location of Results
Pocket penetrometer	4	Manufacturer's instructions	Included within logs.

Table 3-B: Summary of field testing undertaken

3.5 Investigation Constraints

3.5.1 No significant constraints were encountered which limited the design of the scope of works or the undertaking of fieldworks.

3.6 Laboratory testing

3.6.1 Samples obtained from exploratory holes were sent to independent accredited laboratories for chemical testing.

3.6.2 The testing schedule was prepared by Soiltechnics using a targeted and judgemental approach, based upon the conceptual site model presented in Section 2 and fieldwork observations from this phase of works. This is further elaborated on within subsequent report sections.

3.6.3 Laboratory test results are presented in Appendix C, and the total number of chemical tests undertaken is summarised below:

Sample Type	Qty	Testing	Suite Name
Soils	4	Metals, cyanides, PAHs, phenol, banded TPH & asbestos	Basic Classification Suite
Soils	1	Asbestos Quantification	-

Table 3-C: Summary of chemical laboratory testing

4 Ground Investigation Findings

4.1 Overview

4.1.1 All trial pits completed as part of this investigation were located within the existing car park (investigation area).

4.1.2 Ground conditions were broadly similar to those previously identified and generally comprised an asphalt hardstanding over Made Ground (subbase over general Made Ground) and Weald Clay Formation.

4.2 Made Ground - Subbase

4.2.1 Made Ground - Subbase was encountered in all positions and generally extended to depths between 0.5m and 0.6m depth.

4.2.2 The subbase general comprised a pinkish brown, sandy, slightly clayey, gravel of igneous rock and flint extending to 0.2-0.3m.

4.2.3 A photograph of the typical Made Ground - Subbase deposits encountered is presented below.

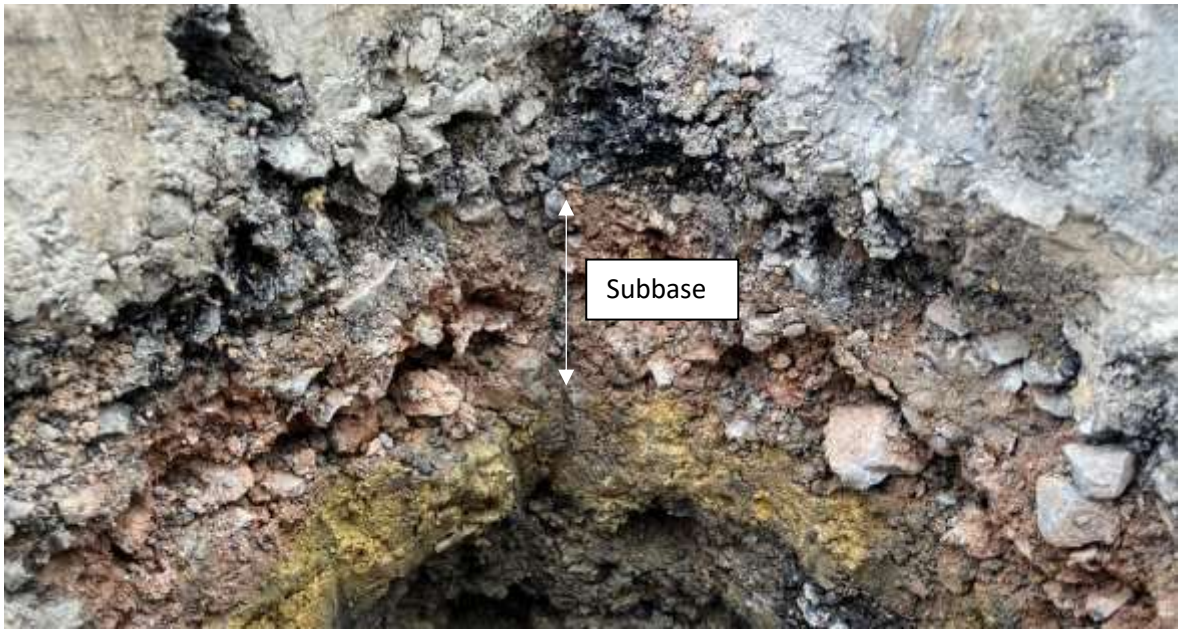

Figure 4-A: Insitu Made Ground encountered in HP03

4.3 Made Ground

4.3.1 Beneath the gravel subbase, Made Ground generally comprised two types.

4.3.2 Immediately below the subbase, soils comprised a dark greyish brown, cream or yellowish brown, slightly sandy to sandy, slightly clayey to clayey, gravel of concrete, brick, flint and igneous rock. Occasional cobbles of brick and concrete were also present. In the northwestern corner (HP04), these soils included a greater proportion of anthropogenic material and included rubber, metal and timber. The granular Made Ground extended to depths between 0.38m and 0.6m bgl.

4.3.3 Beneath the gravels, Made Ground comprised greenish grey, mottled orange, slightly sandy, clay with occasional relic rootlets and pockets of organic matter, considered to be reworked natural soils. The cohesive Made Ground extended beyond the termination depths of all trial pits except HP03, undertaken to the southwest, where the base was encountered at 0.5m. This is consistent with the topography and slopes around the site.

4.3.4 A geotextile membrane was observed within HP02 to HP04 between the coarse-grained and fine-grained Made Ground. Within HP04, two geotextile membranes were recorded at 0.4m and 0.5m, both within the coarse-grained materials.

4.3.5 Slight organic odours were noted sporadically within the Made Ground soils and a hydrocarbon odour was noted in HP03, to the southwest of the site, between 0.25m and 0.5m.



Figure 4-B: Coarse-grained Made Ground excavated from HP04.



Figure 4-C: Fine-grained Made Ground excavated from HP04

4.4 Weald Clay Formation

4.4.1 The Weald Clay Formation was encountered in one location only and comprised firm, light grey mottled orange, slightly sandy clay with rare relic rootlets and gravel-sized fragments of decayed organic matter.

4.4.2 A photograph of the Weald Clay Formation encountered is presented below.



Figure 4-D: Weald Clay Formation excavated from HP03

4.5 Groundwater

4.5.1 Groundwater seepages were encountered in two exploratory hole locations, between depths of 0.8m-0.85m.

4.6 Evidence of Possible Contamination

4.6.1 During the ground investigation works, slight organic (HP02 and HP04) and hydrocarbon (HP03) odours were noted within the Made Ground soils. In addition, fragments of anthropogenic materials were contained within the coarse-grained Made Ground, particularly towards the northwest (brick, concrete, rubber, metal and timber).

5 Tier 2 Generic Quantitative Risk Assessment

5.1 Objectives

5.1.1 The objective of this generic quantitative risk assessment (GQRA) is to further assess the potential contaminant linkages (PCLs) identified by the preliminary risk assessment using the following:

- The findings of the supplementary intrusive site investigation.
- Laboratory analysis of soils.

5.1.2 With reference to the CSMs produced in the Tier 1 risk assessment, the only identified sources within the initial CSM were Made Ground and asphalt surfacing.

5.1.3 The asphalt was tested as part of the previous investigation and coal tar was absent. On this basis, the risk was considered low.

5.1.4 Based on visual and olfactory evidence, the risk from the Made Ground was also considered low due to it being predominantly reworked natural soils, although no testing was undertaken to confirm this assessment.

5.2 Fieldwork Observations

5.2.1 There had been no change to the site layout since the completion of the Tier 1 report in 2023 and therefore no additional potential contamination sources have been identified.

5.2.2 While previous fieldwork observations did not identify any visual or olfactory evidence of contamination onsite, the supplementary works identified a slight hydrocarbon odour within the shallow Made Ground in HP03 (southwest corner of the site). In addition, during excavation of the supplementary hand pits, Made Ground within HP04 was observed to have a greater proportion of anthropogenic fragments than encountered elsewhere. These had not been noted in previous boreholes undertaken in similar areas.

5.2.3 Based on the above, there are indications that sporadic/localised low levels of contamination could be present within near surface Made Ground and therefore the potential contaminant linkage has been updated as follows.

Source	Pathways	Receptor	Preliminary Risk Assessment *(probability of harm x consequence)*
Granular Made Ground	Ingestion, inhalation and contact with soils, dusts and vapours	Proposed site users	**Risk: Moderate/Low** (low – medium)
		Construction operatives	**Risk: Moderate/Low** (low – medium)

Table 5-A: Fieldwork update to conceptual site model

5.3 Laboratory Testing Rationale

5.3.1 Laboratory testing has been scheduled by targeting potential contaminant linkages identified within the iCSM and observations made during fieldworks. The sampling and testing strategy is based on a judgemental approach.

5.3.2 The testing of the Made Ground deposits was undertaken across various locations to gain spatial coverage over the site while targeting areas of proposed soft landscaping, and to characterise the strata encountered. Testing included a broad suite of analysis due to the potential for unknown contamination to be present.

5.4 Generic Assessment Criteria

5.4.1 Assessment of laboratory test data has been carried out using published generic assessment criteria (GACs). The GACs act as screening values to provide a 'trigger' to an assessor that soil concentrations above these limits might present an unacceptable risk.

5.4.2 Various GAC sources are used within this report. Key assumptions are made in the derivation of screening values in regard to their use and application, and exposure modelling is based on precautionary national scenarios. This generic approach can result in an overly conservative assessment; therefore, the assessor is required to review the outcome of the GQRA screening in the context of the site specific CSM and identified potential contaminant linkages.

5.4.3 Asbestos does not currently have published GACs which can be used for generic assessment purposes, at this stage a present/absent trigger limit has been adopted.

5.4.4 Specific details regarding the published GAC sources chosen and any parameter refinements made are summarised within Appendix D, along with the order of preference where multiple GAC sources are available. The exposure models adopted are discussed in the relevant sections below.

5.5 Human Health GQRA (soils and vapour)

5.5.1 The results of the human health screening assessment for soils and vapours are detailed Appendix D. The following table outlines the exposure models adopted, along with summarising the outcome of each screening assessment.

Receptor	Exposure Model	Outcome
All human health receptors	Presence of asbestos	Asbestos fibres (chrysotile) detected in 1 of 4 Made Ground samples: HP04 (0.45m). Quantified at 0.002%.
Proposed users	Public Open Space (residential)	Exceedance of dibenzo(a,h)anthracene in 1 of 4 Made Ground samples: HP03 (0.35m).
Construction operatives	Acute occupational exposure (assumed no PPE worn)	No exceedances.
Adjacent site users and the public	Acute off-site public exposure during construction phase	No exceedances.

Table 5-B: Human health GQRA models and outcomes

5.5.2 The table below summarises the instances where contaminants have exceeded the generic screening criteria.

Receptor	Strata	Contaminant	Location & Depths	Test Result	GAC (mg/kg)
Proposed Users	Made Ground	Dibenzo(a,h)anthracene	HP03	5.1mg/kg	0.58
		Asbestos fibres - chrysotile	HP04	0.002%	-

Table 5-C: Human Health GQRA exceedances

5.6 Proposed Site Users Risk Assessment (soils and vapour)

5.6.1 One sample of the cohesive Made Ground was tested, and no elevated concentrations of contaminants were present.

5.6.2 Three samples of the granular Made Ground were tested which has identified an exceedance of dibenzo(a,h)anthracene in HP03 although all other PAHs are below guideline values for POS(residential). In addition, asbestos fibres were detected in the granular Made Ground in HP04 and was quantified at 0.002%. While not above guideline values, a total TPH concentration of 690mg/kg was also recorded in HP03, likely the source of the slight hydrocarbon odour. No free phase or significant odours have been identified on site so the risk from vapour phase contamination is considered to be low.

5.6.3 No investigations have been undertaken outside of the car park area. However, it is considered likely that the granular Made Ground is associated with the formation of the car park and therefore would be absent in the existing soft landscaped areas and woodland.

5.6.4 Due to the presence of asbestos, risk assessments have been undertaken using the JIWG Decision Support Tool (see Appendix D). It is noted that only three samples of granular Made Ground have been tested and 1 of the 3 samples produced a positive result. It is therefore anticipated that concentrations will be variable throughout such Made Ground. Nevertheless, inputting the data to the JIWG Decision Support Tool suggests that the hazard ranking for asbestos at the site is low.

5.6.5 The elevated PAH identified in HP03 is likely associated with the organic odour encountered at this location. Such odours have not been identified elsewhere in either phase of the investigations and so is likely to very localised. Nevertheless, the concentration is an order of 10 above the guidance value and has been encountered in 1 of 3 samples, so there is potential for variability (and potentially higher levels) across the site.

5.6.6 Based on the above, there are contaminants present in the Made Ground, which could pose a risk to end users. Such contamination is associated with the granular Made Ground rather than the cohesive reworked natural soils below and contaminants are likely to be low-level and sporadic.

5.6.7 In areas of proposed buildings/hardstanding no pathway for contamination to affect identified end users exists. Further works or remedial measures are however required in areas of proposed soft landscaping within the existing car park area, to minimise risk to end users. Options to limit risk could entail location specific testing, removal of coarse grained Made Ground and/or provision of a clean capping of Topsoil.

5.6.8 It is considered unlikely the granular Made Ground extends significantly beyond the existing car park. Furthermore, the existing woodland/landscape areas have a surface covering of Topsoil and no granular Made Ground was exposed at surface. On this basis the risk of harm from soils outside the car park area remains to be considered low and no further testing or remedial action is considered necessary in these areas.

5.7 Construction Workers Risk Assessment

5.7.1 Asbestos fibres have been identified within the granular Made Ground and a risk assessment has been undertaken using the JIWG Decision Support Tool to support this assessment (see Appendix D). The JIWG assessment indicates there may be a moderate risk to construction workers at the site and therefore FFP3 disposable face masks and dust suppression measures are recommended. However, testing is limited and although the currently measured concentrations are "low-level" (<0.001-0.01%), concentrations are at the lower end of the range and only on one sample. If further testing were undertaken throughout the Made Ground, refinement of the analysis could be undertaken, and it is possible that concentrations would be considered "trace" and accordingly that no special measures would be required.

5.7.2 Overall, at this stage, based on the development proposals and the potential extent of impacted soils, there is not considered to be a significant risk to construction workers at the site and this would be further lowered providing good working practices for working on brownfield sites and for dust mitigation are adhered to at all times. These include.

- Asbestos awareness training.
- A watching brief during enabling works.
- A site-specific asbestos awareness briefing as part of the site inductions.
- Establishing an appropriate action plan in the event of encountering unexpected contamination and suspected asbestos containing materials.
- Control of material movements to minimise dust generation, for example by reducing drop heights and ensuring buckets are not over-loaded.
- Materials should be dampened down.
- Blading or covering short-term stockpiles.
- Covering or seeding long-term stockpiles.

5.7.3 In addition, RPE in the form of FFP3 disposable face masks and manual dust suppression should be considered while excavating through the near surface granular Made Ground. Alternatively, further testing of the Made Ground could be undertaken to refine the risk from asbestos and potentially negate the need for specific protection measures.

5.7.4 As with any brownfield site, there is the potential to encounter further asbestos containing materials, and a discovery strategy should be in place as standard.

5.7.5 With the exception of asbestos, analysis indicates that chemical contaminant levels do not pose an acute risk to construction workers. On this basis, the risk posed to construction workers from contaminants in the ground is considered low and providing standard PPE and hygiene protocols are maintained for working on brownfield sites, no further special precautions are required.

5.8 Adjacent Site Users Risk Assessment

5.8.1 Asbestos fibres have been detected in the near surface soils. The risk assessment undertaken using the JIWG Decision Support Tool for end users of the site (see Appendix D), is considered to also be appropriate for adjacent site users (given the same land use) and therefore the risk is considered low. Further, measures undertaken to mitigate the risk to construction operatives will also mitigate risk to adjacent users during construction works.

5.9 Water Supply Pipes

5.9.1 A full site investigation as set out in the UK Water Industry Research (UKWIR) document *'Guidance for the selection of Water supply pipes to be used in Brownfield sites'* has not been undertaken.

5.9.2 The UKWIR document advises a trigger concentration of 0.125mg/kg for the 'extended VOC (volatile organic compounds) suite', which includes the PAH (polycyclic aromatic hydrocarbons) suite that has been included in the soil analysis during this investigation.

5.9.3 One sample of Made Ground (reworked natural) has been tested from likely pipe depth (0.50-1.50m bgl). The maximum summed concentration of PAH congeners does not exceed the trigger concentration of 0.125mg/kg. Granular soils encountered at shallower depth do contain concentrations of PAH above the trigger concentration.

5.9.4 Generally, the cohesive Made Ground was encountered at pipe depth although in places, the granular material may be present. Overall, based on conditions encountered to date, barrier pipe is not considered necessary providing it is laid only in the reworked natural soils and that where granular soils are present, service trenches are over-dug and backfilled with suitable clean materials. Alternatively, barrier pipe can be adopted as a precaution.

5.9.5 In all instances, it is advised to consult the water company for advice to determine if protective pipe is necessary or if further assessment and investigation works are warranted. Irrespective of the assessment made here, water companies may insist on barrier pipe being installed. Once the initial consultation has taken place, Soiltechnics can support you in any further assessments that may be required.

5.10 Updated Conceptual Site Model (uCSM)

5.10.1 Following on from the discussions above, an updated conceptual site model has been tabulated.

RECEPTOR: PROPOSED END USERS				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 2 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Asbestos and PAH	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Moderate/Low** (low – medium)	Low-level, potentially sporadic contamination has been identified within the near surface granular Made Ground. Pathway will be severed where buildings/hardstanding are present. In areas of proposed soft landscaping within the area of the existing car park, based on current testing, it is recommended that either these soils are fully removed, or a capping layer is introduced (likely 300mm clean Topsoil/subsoil). Alternatively, further testing could be undertaken, which may negate the need for remedial action although Topsoil will still require importing as a growing medium. Remedial action in existing landscaping outside the footprint of the car park is not likely to be required.
	PAH	Permeation into drinking water pipes	**Risk: Moderate/Low** (low – medium)	Made Ground is present across site at likely pipe depths. The reworked natural soils, generally encountered at pipe depth, are considered unlikely to pose a risk of future contamination, but in places, granular soils may be present which will require removal and replacement where in contact with pipes. Alternatively, barrier pipe could be adopted. In any case it is advised to consult the water company for their requirement on whether protective pipe is necessary or if further assessment and investigation works are warranted.

Table 5-D: uCSM – Proposed End Users

RECEPTOR: CONSTRUCTION WORKERS				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 2 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Asbestos	Ingestion, inhalation and contact with soils, dusts and vapours	**Risk: Moderate/Low** (low – medium)	In accordance with the risk assessment undertaken using the JIWG Decision Support Tool and at the concentrations/quantities observed, there is considered to be a low risk to construction workers at the site. However, FFP3 disposable face masks should be adopted while excavating through the near surface granular Made Ground and good practices for working on brownfield sites and for dust mitigation should be adhered to at all times.

Table 5-E: uCSM – Acute Exposure to Construction Workers

RECEPTOR: ADJACENT SITE USERS DURING THE CONSTRUCTION PHASE				
Potential Source	**Contaminants of Concern**	**Pathway**	**Tier 2 Risk Assessment (probability of harm x consequence)**	**Discussion**
Made Ground	Asbestos	Inhalation of dusts	**Risk: Low** (unlikely – medium)	Low-level, potentially sporadic contamination has been identified within the near surface Made Ground but risk assessment indicates the risk to adjacent site users is low. Measures undertaken to mitigate the risk to construction operatives will also mitigate risk to adjacent users during construction works

Table 5-F: iCSM – Acute Exposure to Adjacent Site Users

5.11 Risk Assessment Conclusions

5.11.1 The updated CSM has identified potential contaminant linkages which exceed the low-risk threshold and require further investigation, mitigation, or remediation. These are discussed in further detail below.

Contaminant Source	Receptor	Recommended Action	Discussion
Asbestos fibres and PAH in Made Ground.	Proposed end users	Remediation	Where buildings/hardstanding are proposed and within areas of existing landscaping outside the car park footprint, no remedial action is required. Due to the presence of sporadic asbestos fibres and localised PAH contamination within the near surface granular Made Ground within the car park area, location specific testing, removal of coarse grained Made Ground and/or provision of a clean capping of Topsoil should be undertaken. Any capping layer should be a minimum of 0.3m depth. Importation of Topsoil will likely be required as part of the development in any case as the car park area is currently fully surfaced, which may influence the works to be undertaken. It is advised to consult the water company for advice to determine if protective pipe is necessary or if further assessment and investigation works are warranted.
Asbestos fibres	Construction Operatives	Mitigation	RPE in the form of disposable face masks is required during excavations through granular Made Ground. Standard good working practices for brownfield sites and for dust mitigation should be adhered to at all times.

Table 5-G: GQRA Risk Assessment Conclusions

5.11.2 A Remediation Strategy is likely to be required to detail the measures to be taken, along with including the verification plan for all necessary works.

5.11.3 Anticipated remedial requirements of the project are not inherently complex, and therefore an Options Appraisal is unlikely to be required.

5.11.4 Once all investigations and remedial works are completed, a Verification Report will also be required.

5.12 Unexpected and Previously Unencountered Contamination

5.12.1 With the development of any site, there is a residual risk of contamination being found that is unexpected or has not been encountered during investigation or other siteworks.

5.12.2 Should any previously unencountered and unexpected contamination be encountered, works should be temporarily halted and Soiltechnics informed. The Consultant should then assess the situation to determine what remedial action is required and inform the Local Authority at the earliest opportunity.

5.12.3 It is often a requirement of Local Authority planning conditions that the building/demolition contractor has a contamination discovery/contingency strategy in place for dealing with unexpected contamination. Soiltechnics are pleased to provide advice on such a strategy if required.

6 Recommendations for further works

6.1.1 The following table summarises the additional works which should be undertaken following demolition works but prior to commencement of any construction works and in support of the planning conditions.

Aspect	Delivered By	Description	Necessity
Discovery Strategy	Principal Contractor	The Principal Contractor should have a discovery strategy in place in the event of exposing unexpected or previously unencountered contamination. Soiltechnics should be informed at the earliest opportunity to undertake an assessment, and to inform the Local Authority as appropriate.	**REQUIRED**
Remediation Strategy	Soiltechnics	A Remediation Strategy is required to detail the requirements and verification plan for all remedial works. Subject to any supplementary works carried out as set out above.	**REQUIRED (though subject to further works)**
Soil/waste management	Soiltechnics	A Materials Management Plan (MMP) is recommended if it is proposed to reuse excess soils on site or to transfer materials off-site. Waste classification testing will be required if it is proposed to dispose of waste soils off site.	**OPTIONAL**
Water pipes	3rd Party/ Soiltechnics	The Principal Contractor should liaise with the statutory undertaker to confirm the requirement for barrier pipe installation or if further assessment and investigation works are warranted.	**RECOMMENDED**

Table 6-A: Recommended Further Works

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Appendix A Drawings



Key:

- Hand Pit
- Investigation Area Boundary
- Planning Boundary

Notes

1) Base image provided by Google.

2) All drawn features are approximate.

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Map data © 2024 Google

REV	DATE	COMMENT ON VARIATION
A	July 2024	First issue

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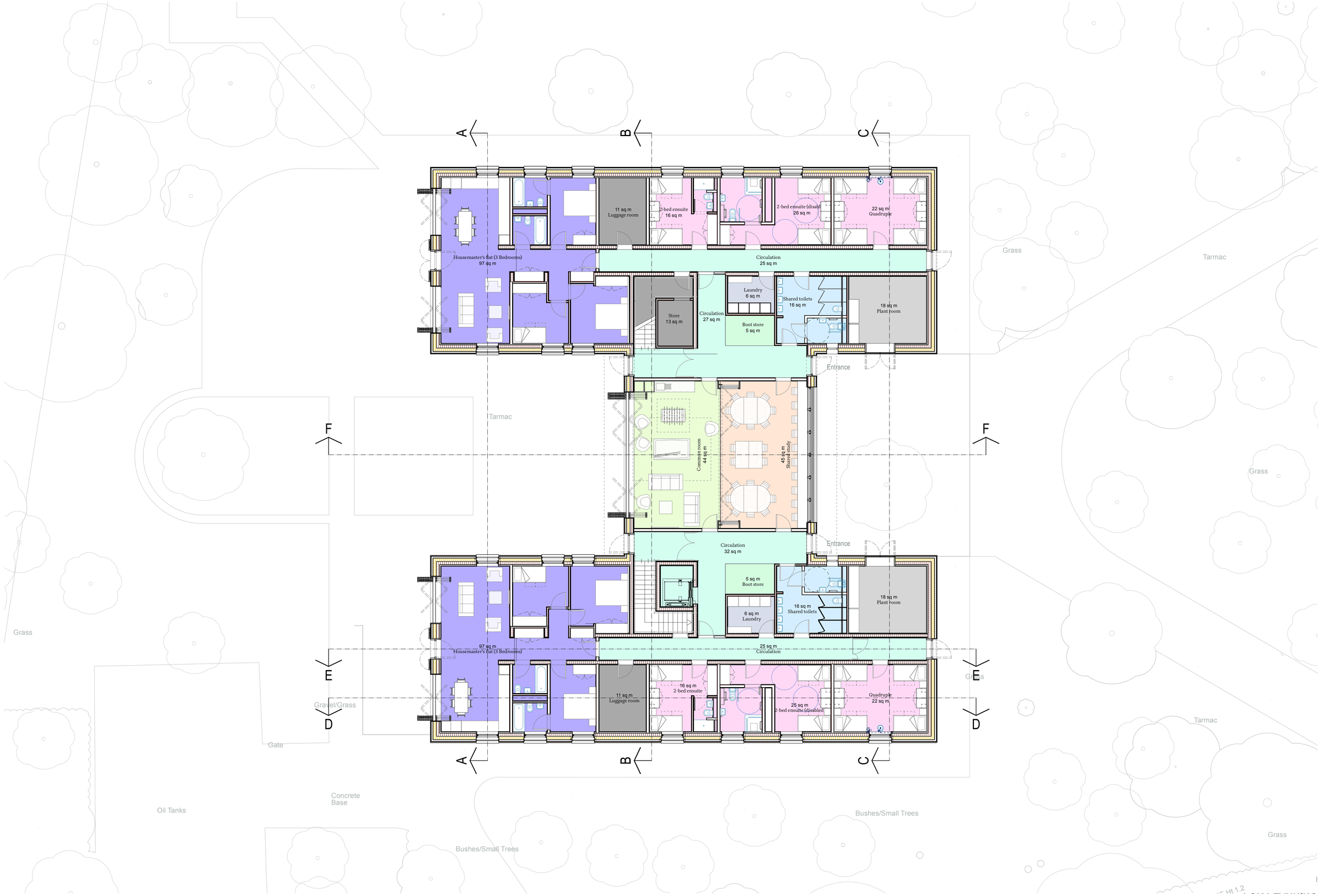
PROJECT
Rikkyo School, Horsham

TITLE
Exploratory Hole Plan Location

DRAWING No.
STV6107-D04-A



Notes

N

0 1 4 7 10 M

Rev	Date	Amendment
-	13.10.2023	Issued for planning

WALTERS & COHEN ARCHITECTS

2 Wilkin Street
London
NW5 3NL

Telephone 020 7428 9751
mail@waltersandcohen.com

Rikkyo School

Ground Floor Plan

Checked by	Scale	Date Drawn	Job No.	Drawing No.	Revision
GB	1:100 @A1	13.10.2023	2219	PD-1010	-

© This drawing is copyright. Do not scale. Check dimensions on site



Landscape concept

Appendix B Exploratory Hole Logs: Hand Pits

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Key to legends

Composite materials, soils and lithology							
	Topsoil		Made Ground		Boulders		Chalk
	Clay		Coal		Cobbles		Concrete
	Gravel		Limestone		Mudstone		Peat
	Sand		Sandstone		Silt		Siltstone

Note: Composite soil types are signified by combined symbols.

Key to 'test results' and 'sampling' columns

Test result	
Depth	Records depth that the test was carried out (i.e.: at 2.10m or between 2.10m and 2.55m)
Result	PP – Pocket penetrometer result reported as an equivalent undrained shear strength (kN/m²) by applying a factor of 50. SV – Hand held shear vane result reported as an undrained shear strength (kN/m²). Where multiple readings are taken at the same level the average value is shown on the log. * Signifies that instrument limit reached.

Sampling		
From (m) To (m)	Records depth of sampling	
Type	D	Disturbed sample
	B	Bulk disturbed sample
	ES	Environmental sample
	W	Water sample
	U	Undisturbed thick-walled sample 100mm diameter sampler
	UT	Undisturbed thin walled sample 100mm diameter sampler
	UTF	Failed undisturbed sample

Water observations

Described at foot of log and shown in the 'water strike' column.

▼ Water level observed after specified delay in drilling

▽ Water strike

Density

Density recorded in brackets determined by qualitative field assessment or inferred from density testing and soil descriptions from across the site (i.e.: [Medium dense]).

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STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
ASPHALT (ASPHALT)							0.05		ES
Pinkish brown sandy slightly clayey fine to coarse angular to subrounded GRAVEL of flint and igneous rock. (MADE GROUND - SUBBASE)	0.10						0.20		ES
CONCRETE SLAB. (CONCRETE)	0.28								
Greyish brown slightly sandy clayey fine to coarse angular to subangular GRAVEL of brick, flint, and igneous rock. (MADE GROUND)	0.38						0.45		ES
TRIAL PIT TERMINATED AT 0.52m	0.52								

Notes Trial pit sides remained upright and stable upon completion. Terminated due to concrete obstruction.	**Title** Trial pit record	**Dimensions (w x l)** 0.25m x 0.25m	**Date(s)** 12/07/2024
	Method Hand excavated	**Logged by** LE	**Sheet number** Sheet 1 of 1
Groundwater observations No groundwater encountered.	**Level (m OD)** -	**Compiled by** AM	**Revision** A
	Co-ordinates -	**Checked by** KB	**HP01**

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STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
ASPHALT (ASPHALT)							0.05		ES
Pinkish brown sandy slightly clayey fine to coarse angular to subrounded GRAVEL of flint and igneous rock. (MADE GROUND - SUBBASE)	0.15						0.20		ES
Greyish brown slightly sandy clayey fine to coarse angular to subangular GRAVEL of brick, flint, and igneous rock. (MADE GROUND)	0.30						0.40		ES
Firm greenish grey mottled orange slightly sandy CLAY with occasional relict rootlets and medium gravel sized pockets of organic matter. Organic odour noted throughout strata. (MADE GROUND) *...at 0.45m depth, geotextile membrane.*	0.45				PP 0.53	PP=117	0.55		ES
Firm light grey mottled orange slightly gravelly slightly sandy CLAY with occassional relict rootlets and occassional medium gravel sized pockets of organic matter. Gravel is medium to coarse subangular weak sandstone. (MADE GROUND) *...at 0.8m depth, reddish brown mottling present.*	0.60				PP 0.75	PP=117	0.75		ES
Firm reddish brown slightly gravelly CLAY with rare relict rootlets. Gravel is fine subangular flint. (MADE GROUND)	0.86				PP 0.90	PP=125	0.90		ES
TRIAL PIT TERMINATED AT 1.00m	1.00								

Notes Trial pit sides remained upright and stable upon completion. Terminated at scheduled depth.	**Title** Trial pit record	**Dimensions (w x l)** 0.25m x 0.25m	**Date(s)** 12/07/2024
	Method Hand excavated	**Logged by** LE	**Sheet number** Sheet 1 of 1
Groundwater observations No groundwater encountered.	**Level (m OD)** -	**Compiled by** AM	**Revision** A
	Co-ordinates -	**Checked by** KB	**HP02**

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STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
ASPHALT (ASPHALT)							0.05		ES
	0.12								
Pinkish brown sandy slightly clayey fine to coarse angular to subrounded GRAVEL of flint and igneous rock. (MADE GROUND - SUBBASE)							0.15		ES
	0.22								
[Dense] Yellow slightly sandy slightly clayey fine to coarse angular to subangular GRAVEL of brick with occasional cobbles of brick (MADE GROUND)	0.25								
Dark grey slightly sandy clayey fine to coarse angular to subangular GRAVEL of brick, flint, asphalt and igneous rock with occasional cobbles of brick. Hydrocarbon odour noted throughout (MADE GROUND)							0.35		ES
	0.50								
Firm light grey mottled orange slightly gravelly sandy CLAY with rare relict rootlets. Gravel is medium to coarse subrounded weak sandstone. (WEALD CLAY FORMATION) *...at 0.5m depth, geotextile membrane.*					PP 0.55	PP=129			
							0.80		ES
	0.85								
TRIAL PIT TERMINATED AT 0.85m									

Notes Trial pit sides remained upright and stable upon completion. Terminated at scheduled depth.	**Title** Trial pit record	**Dimensions (w x l)** 0.25m x 0.25m	**Date(s)** 12/07/2024
	Method Hand excavated	**Logged by** LE	**Sheet number** Sheet 1 of 1
Groundwater observations Very slow water seepage at the base of the pit standing at 0.82m upon completion	**Level (m OD)** -	**Compiled by** AM	**Revision** A
	Co-ordinates -	**Checked by** KB	**HP03**

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STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
ASPHALT (ASPHALT)							0.05		ES
Pinkish brown sandy slightly clayey fine to coarse angular to subrounded GRAVEL of flint and igneous rock. (MADE GROUND - SUBBASE)	0.10						0.10		ES
Dark grey slightly sandy clayey GRAVEL of fine to coarse angular to subrounded flint, brick, concrete, asphalt, and igneous rock with occasional cobbles of brick, flint, metal, rubber and timber. (MADE GROUND)	0.20								
...at 0.4m depth, geotextile membrane.							0.45		ES
Firm greenish grey slightly gravelly slightly sandy CLAY with occasional relict rootlets. Gravel is medium subrounded weak sandstone. Organic odour noted throughout. (MADE GROUND)	0.60								
...at 0.6m depth, geotextile membrane.							0.70		ES
TRIAL PIT TERMINATED AT 0.80m	0.80								

Notes Trial pit sides remained upright and stable upon completion. Terminated at scheduled depth.	**Title** Trial pit record	**Dimensions (w x l)** 0.25m x 0.25m	**Date(s)** 12/07/2024
	Method Hand excavated	**Logged by** LE	**Sheet number** Sheet 1 of 1
Groundwater observations Water encountered at the base of the pit, rising to 0.5m after 40 minutes	**Level (m OD)** -	**Compiled by** AM	**Revision** A
	Co-ordinates -	**Checked by** KB	**HP04**

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Appendix C Geoenvironmental Laboratory Test Results

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

Final Report

Report No.:	24-19010-1
Initial Date of Issue:	27-Jun-2024
Re-Issue Details:	
Client	Soiltechnics Limited
Client Address:	1st Floor Unit 9 Westpoint Enterprise Park Clarence Avenue Trafford Park Manchester M17 1QS
Contact(s):	Admin
Project	STV1607 Rikkyo School, Horsham

Quotation No.:		**Date Received:**	17-Jun-2024
Order No.:	POR018969	**Date Instructed:**	17-Jun-2024
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	21-Jun-2024
Date Approved:	27-Jun-2024		

Approved By:



Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Soil

Project: STV1607 Rikkyo School, Horsham

Client: Soiltechnics Limited				**Chemtest Job No.:**		24-19010	24-19010	24-19010	24-19010
Quotation No.:				**Chemtest Sample ID.:**		1821749	1821750	1821751	1821752
Order No.: POR018969				Client Sample Ref.:		2	4	3	3
				Client Sample ID.:		HP01-0.2-2	HP02-0.55-4	HP03-0.35-3	HP04-0.45-3
				Sample Location:		HP01	HP02	HP03	HP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.20	0.55	0.35	0.45
				Date Sampled:		11-Jun-2024	11-Jun-2024	11-Jun-2024	11-Jun-2024
				Time Sampled:		10:40	11:21	11:42	11:55
				Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type		U	2192		N/A	-	-	-	Fibres/Clumps
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile
Moisture		N	2030	%	0.020	1.8	13	7.8	11
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones and Roots	Stones and Roots	Stones and Roots
Soil Texture		N	2040		N/A	Loam	Clay	Loam	Loam
pH at 20C		M	2010		4.0	9.1	8.0	8.1	9.2
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	< 0.40	< 0.40	0.88	1.3
Cyanide (Complex)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic		M	2455	mg/kg	0.5	5.3	1.8	14	6.6
Beryllium		U	2455	mg/kg	0.5	< 0.5	< 0.5	0.5	< 0.5
Cadmium		M	2455	mg/kg	0.10	0.75	< 0.10	0.50	0.59
Chromium		M	2455	mg/kg	0.5	6.8	26	22	12
Copper		M	2455	mg/kg	0.50	5.9	12	14	12
Mercury		M	2455	mg/kg	0.05	< 0.05	< 0.05	0.05	0.05
Nickel		M	2455	mg/kg	0.50	10	8.8	23	16
Lead		M	2455	mg/kg	0.50	53	21	75	51
Selenium		M	2455	mg/kg	0.25	< 0.25	0.32	0.66	0.41
Vanadium		U	2455	mg/kg	0.5	6.6	34	39	19
Zinc		M	2455	mg/kg	0.50	170	27	110	200
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter		M	2625	%	0.40	9.8	0.56	4.5	11
TPH >C5-C6	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	1.1	< 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	13	5.2
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	92	28
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	150	54
TPH >C21-C35	EH_1D_Total	N	2670	mg/kg	1.0	75	< 1.0	430	180
Total TPH >C5-C35		N	2670	mg/kg	10	75	< 10	690	270
Naphthalene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: STV1607 Rikkyo School, Horsham

Client: Soiltechnics Limited				**Chemtest Job No.:**		24-19010	24-19010	24-19010	24-19010
Quotation No.:				**Chemtest Sample ID.:**		1821749	1821750	1821751	1821752
Order No.: POR018969				Client Sample Ref.:		2	4	3	3
				Client Sample ID.:		HP01-0.2-2	HP02-0.55-4	HP03-0.35-3	HP04-0.45-3
				Sample Location:		HP01	HP02	HP03	HP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.20	0.55	0.35	0.45
				Date Sampled:		11-Jun-2024	11-Jun-2024	11-Jun-2024	11-Jun-2024
				Time Sampled:		10:40	11:21	11:42	11:55
				Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	8.0	4.4
Anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	2.1	1.2
Fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	13	5.6
Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	10	4.6
Benzo[a]anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	4.6	2.0
Chrysene		M	2800	mg/kg	0.10	< 0.10	< 0.10	4.6	1.6
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	7.0	2.9
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	3.1	1.1
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	6.5	2.5
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	6.9	1.7
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	< 0.10	5.1	0.46
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10	< 0.10	5.8	1.5
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0	< 2.0	77	30
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

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

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None of the results in this report have been recovery corrected.
All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at ≤ 30°C prior to analysis.
All Asbestos testing is performed at the indicated laboratory .
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

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

Sample Retention and Disposal

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

Water Sample Category Key for Accreditation

DW - Drinking Water
GW - Ground Water
LE - Land Leachate
NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

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

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

Amended Report

Report No.:	24-19010-2		
Initial Date of Issue:	27-Jun-2024	**Date of Re-Issue:**	03-Jul-2024
Re-Issue Details:	This report has been revised and directly supersedes 24-19010-1 in its entirety		
Client	Soiltechnics Limited		
Client Address:	1st Floor Unit 9 Westpoint Enterprise Park Clarence Avenue Trafford Park Manchester M17 1QS		
Contact(s):	Admin		
Project	STV1607 Rikkyo School, Horsham		
Quotation No.:		**Date Received:**	17-Jun-2024
Order No.:	POR018969	**Date Instructed:**	28-Jun-2024
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	04-Jul-2024
Date Approved:	03-Jul-2024		
Approved By:			
Details:	David Smith, Technical Director		

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Soil

Project: STV1607 Rikkyo School, Horsham

Client: Soiltechnics Limited				**Chemtest Job No.:**		24-19010	24-19010	24-19010	24-19010
Quotation No.:				**Chemtest Sample ID.:**		1821749	1821750	1821751	1821752
Order No.: POR018969				Client Sample Ref.:		2	4	3	3
				Client Sample ID.:		HP01-0.2-2	HP02-0.55-4	HP03-0.35-3	HP04-0.45-3
				Sample Location:		HP01	HP02	HP03	HP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.20	0.55	0.35	0.45
				Date Sampled:		11-Jun-2024	11-Jun-2024	11-Jun-2024	11-Jun-2024
				Time Sampled:		10:40	11:21	11:42	11:55
				Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type		U	2192		N/A	-	-	-	Fibres/Clumps
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile
Asbestos by Gravimetry		U	2192	%	0.001				0.002
Total Asbestos		U	2192	%	0.001				0.002
Moisture		N	2030	%	0.020	1.8	13	7.8	11
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones and Roots	Stones and Roots	Stones and Roots
Soil Texture		N	2040		N/A	Loam	Clay	Loam	Loam
pH at 20C		M	2010		4.0	9.1	8.0	8.1	9.2
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	< 0.40	< 0.40	0.88	1.3
Cyanide (Complex)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	[B] < 0.50
Cyanide (Free)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	[B] < 0.50
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	[B] < 0.50
Arsenic		M	2455	mg/kg	0.5	5.3	1.8	14	6.6
Beryllium		U	2455	mg/kg	0.5	< 0.5	< 0.5	0.5	< 0.5
Cadmium		M	2455	mg/kg	0.10	0.75	< 0.10	0.50	0.59
Chromium		M	2455	mg/kg	0.5	6.8	26	22	12
Copper		M	2455	mg/kg	0.50	5.9	12	14	12
Mercury		M	2455	mg/kg	0.05	< 0.05	< 0.05	0.05	0.05
Nickel		M	2455	mg/kg	0.50	10	8.8	23	16
Lead		M	2455	mg/kg	0.50	53	21	75	51
Selenium		M	2455	mg/kg	0.25	< 0.25	0.32	0.66	0.41
Vanadium		U	2455	mg/kg	0.5	6.6	34	39	19
Zinc		M	2455	mg/kg	0.50	170	27	110	200
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter		M	2625	%	0.40	9.8	0.56	4.5	11
TPH >C5-C6	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	[B] < 1.0
TPH >C6-C7	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	[B] < 1.0
TPH >C7-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	[B] < 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	1.1	[B] < 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	13	[B] 5.2
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	92	[B] 28
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	150	[B] 54
TPH >C21-C35	EH_1D_Total	N	2670	mg/kg	1.0	75	< 1.0	430	[B] 180

Results - Soil

Project: STV1607 Rikkyo School, Horsham

Client: Soiltechnics Limited				**Chemtest Job No.:**		24-19010	24-19010	24-19010	24-19010
Quotation No.:				**Chemtest Sample ID.:**		1821749	1821750	1821751	1821752
Order No.: POR018969				Client Sample Ref.:		2	4	3	3
				Client Sample ID.:		HP01-0.2-2	HP02-0.55-4	HP03-0.35-3	HP04-0.45-3
				Sample Location:		HP01	HP02	HP03	HP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.20	0.55	0.35	0.45
				Date Sampled:		11-Jun-2024	11-Jun-2024	11-Jun-2024	11-Jun-2024
				Time Sampled:		10:40	11:21	11:42	11:55
				Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
Total TPH >C5-C35		N	2670	mg/kg	10	75	< 10	690	[B] 270
Naphthalene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	8.0	4.4
Anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	2.1	1.2
Fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	13	5.6
Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	10	4.6
Benzo[a]anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	4.6	2.0
Chrysene		M	2800	mg/kg	0.10	< 0.10	< 0.10	4.6	1.6
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	7.0	2.9
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	3.1	1.1
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	6.5	2.5
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	6.9	1.7
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	< 0.10	5.1	0.46
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10	< 0.10	5.8	1.5
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0	< 2.0	77	30
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1821752	3	HP04-0.45-3	HP04	11-Jun-2024	B	Amber Glass 250ml
1821752	3	HP04-0.45-3	HP04	11-Jun-2024	B	Plastic Tub 1000g

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

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EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

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

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Appendix D Contamination Assessment Screening

GQRA Screening

Assessments	Status	Date	Created by	Reviewed By
Acute human health risk - Soils	x2 scenarios completed	July 2024	LE	KB
Chronic human health risk - Soils	Completed	July 2024	LE	KB
Chronic human health risk - Groundwater vapour	*Not undertaken*			
Controlled waters risk - Surface water	*Not undertaken*			
Controlled waters risk - Drinking water	*Not undertaken*			
Controlled waters - Free phase indicator	*Not undertaken*			
Phytotoxicity	*Not undertaken*			
Ecotoxicity	*Not undertaken*			

Key

Assessment	Abbr.	GQRA Source (in order of preference)	Last Update
All	NGA	No guideline value available	-
Acute human health risk - Soils	AGAC	Acute Generic Assessment Criteria (SoBRA)	April 2019
	sat.	Contaminant poses a low acute risk unless the soil saturation limit is exceeded and a free oil phase is present.	April 2019
Chronic human health risk - Soils	C4SL	Category 4 Screening Levels (DEFRA)	May 2021
	S4UL	Suitable 4 Use Levels (LQM)	August 2015
	ATK	Atrisk Soil Screening Values (Atkins)	June 2017
	CL:AIRE	Generic Assessment Criteria (CL:AIRE)	Jan 2010

Chronic human health risk (soils)

Scenario	
End user	Current and proposed site user
Receptor	POS (Residential)
SOM	6.00%
GAC Preference	C4SLs over S4ULs
Unspeciated TPH GAC	Worst-case aliphatic/aromatic

Contaminant	Guideline source	Guideline value (mg/kg)	Max value (mg/kg)	Location	HP01	HP02	HP03	HP04
				Depth (m)	0.20	0.55	0.35	0.45
				Date	11/06/24	11/06/24	11/06/24	11/06/24
Inorganics - Metals								
Arsenic	C4SL	79	14		5.3	1.8	14	6.6
Beryllium	S4UL	2.2	0.5		< 0.5	< 0.5	0.5	< 0.5
Boron	S4UL	21000	1.3		< 0.40	< 0.40	0.88	1.3
Cadmium	C4SL	220	0.75		0.75	< 0.10	0.5	0.59
Chromium (III)	S4UL	1500	26		6.8	26	22	12
Chromium (VI)	C4SL	21	<LoD		< 0.50	< 0.50	< 0.50	< 0.50
Copper	S4UL	12000	14		5.9	12	14	12
Cyanide - Free	-	-	<LoD		< 0.50	< 0.50	< 0.50	< 0.50
Lead	C4SL	630	75		53	21	75	51
Mercury	S4UL	120	0.05		< 0.05	< 0.05	0.05	0.05
Nickel	S4UL	230	23		10	8.8	23	16
Selenium	S4UL	1100	0.66		< 0.25	0.32	0.66	0.41
Vanadium	S4UL	2000	39		6.6	34	39	19
Zinc	S4UL	81000	200		170	27	110	200
Inorganics - Asbestos								
Asbestos Type		N/A			-	-	-	Fibres/Clumps
Asbestos Screen		N/A			No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile
Asbestos Quantification (%)		N/A	0.002					0.002
Inorganics - Soil Parameters								
Organic matter		N/A			9.8	0.56	4.5	11
Organics - PAH & Phenol								
Acenaphthene	S4UL	15000	<LoD		< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	S4UL	15000	<LoD		< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	S4UL	74000	2.1		< 0.10	< 0.10	2.1	1.2
Benzo(a)anthracene	S4UL	29	4.6		< 0.10	< 0.10	4.6	2
Benzo(a)pyrene	C4SL	10	6.5		< 0.10	< 0.10	6.5	2.5
Benzo(b)fluoranthene	S4UL	7.2	7		< 0.10	< 0.10	7	2.9
Benzo(ghi)perylene	S4UL	640	5.8		< 0.10	< 0.10	5.8	1.5
Benzo(k)fluoranthene	S4UL	190	3.1		< 0.10	< 0.10	3.1	1.1
Chrysene	S4UL	57	4.6		< 0.10	< 0.10	4.6	1.6
Dibenz(a,h)anthracene	S4UL	0.58	5.1		< 0.10	< 0.10	5.1	0.46
Fluoranthene	S4UL	3100	13		< 0.10	< 0.10	13	5.6
Fluorene	S4UL	9900	<LoD		< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	S4UL	82	6.9		< 0.10	< 0.10	6.9	1.7
Naphthalene	C4SL	17000	<LoD		< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	S4UL	3100	8		< 0.10	< 0.10	8	4.4
Phenol	S4UL	1300	<LoD		< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	S4UL	7400	10		< 0.10	< 0.10	10	4.6
Organics - Banded TPH (unspeciated)								
EC >5-EC6 (unspeciated)	S4UL	56000	<LoD		< 1.0	< 1.0	< 1.0	< 1.0
EC >6-EC7 (unspeciated)	S4UL	56000	<LoD		< 1.0	< 1.0	< 1.0	< 1.0
EC >7-EC8 (unspeciated)	S4UL	56000	<LoD		< 1.0	< 1.0	< 1.0	< 1.0
EC >08-EC10 (unspeciated)	S4UL	5000	1.1		< 1.0	< 1.0	1.1	< 1.0
EC >10-EC12 (unspeciated)	S4UL	5000	13		< 1.0	< 1.0	13	5.2
EC >12-EC16 (unspeciated)	S4UL	5000	92		< 1.0	< 1.0	92	28
EC >16-EC21 (unspeciated)	S4UL	3800	150		< 1.0	< 1.0	150	54
EC >21-EC35 (unspeciated)	S4UL	3800	430		75	< 1.0	430	180

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Acute human health risk (soils)

Scenario	Off-site public exposure
Critical receptor	Young female child (1 to 2 years old)
Oral exposure	N/A
Demal exposure	N/A
Inhalation exposure	30 mins exposure to a child off-site, from dusts and vapours generated during excavation

Contaminant	Guideline source	Principal pathway	Guideline value (mg/kg)	Max value (mg/kg)	Location	HP02	HP01	HP03	HP04
					Depth (m)	0.55	0.20	0.35	0.45
					Date	11/06/24	11/06/24	11/06/24	11/06/24
Inorganics									
Arsenic	AGAC	Inhalation	7,000,000	14		1.8	5.3	14	6.6
Cadmium	AGAC	Inhalation	1,800,000	0.75		*< 0.10*	0.75	0.5	0.59
Cyanide - Free	AGAC	Inhalation	380	<LoD		*< 0.50*	*< 0.50*	*< 0.50*	*< 0.50*
Organics									
Phenol	AGAC	**sat.**	**sat.**	<LoD		*< 0.10*	*< 0.10*	*< 0.10*	*< 0.10*

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Acute human health risk (soils)

Scenario	Occupational exposure (construction worker)
Critical receptor	Adult female worker
Oral exposure	Ingestion of soil and dusts over a single working day
Demal exposure	Soil being left on the skin for several hours, assumed no PPE worn
Inhalation exposure	30 mins exposure - worker standing adjacent to active excavation (assumed no RPE)

Contaminant	Guideline source	Principal pathway	Guideline value (mg/kg)	Max value (mg/kg)	Location	HP02	HP01	HP03	HP04
					Depth (m)	0.55	0.20	0.35	0.45
					Date	11/06/24	11/06/24	11/06/24	11/06/24
Inorganics									
Arsenic	AGAC	Oral	7,000	14		1.8	5.3	14	6.6
Cadmium	AGAC	Oral	12,000	0.75		*< 0.10*	0.75	0.5	0.59
Cyanide - Free	AGAC	Oral & Inhalation	1,400	<LoD		*< 0.50*	*< 0.50*	*< 0.50*	*< 0.50*
Organics									
Phenol	AGAC	**sat.**	**sat.**	<LoD		*< 0.10*	*< 0.10*	*< 0.10*	*< 0.10*

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Joint Industry Working Group
Asbestos in Soil and Construction & Demolition Materials

Decision Support Tool for the Qualitative Risk Ranking of Work Activities and Receptors Involved in or Exposed to Asbestos in Soil and Construction & Demolition Materials

VERSION 2

February 2017

CL:AIRE

This spreadsheet tool provides the user with a decision support platform designed by the Joint Industry Working Group for Asbestos in Soil and Construction & Demolition Materials (JIWG) to assist in the risk-rank activities and receptors as part of a preliminary risk assessment under CLR11. The aim of developing this tool is to provide industry with a consistent decision making format that is aligned with UK health & safety and environmental regulatory policies, and is consistent with the wider objectives of the JIWG.

This is Version 2 of this tool, and has been amended following industry feedback on the BETA version released in 2016. The JIWG would welcome feedback from users of this version on its applicability and validity to the wide range of scenarios that may be encountered when assessing the potential risk from asbestos and asbestos-containing materials in the ground.

ISBN 978-1-905046-29-4

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Acknowledgements

CL:AIRE and the JIWG would like to gratefully acknowledge Simon Cole - AECOM, Stephen Forster - Remedia Group and Garry Burdett - Health and Safety Laboratory for the design and development of this decision support tool.

Disclaimer

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Asbestos in Soil and Construction & Demolition Materials

Decision Support Tool for Receptor Risk Ranking

Stage 1

Hazard Identification		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		**10**
Hazard ranking		**Low**

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Asbestos in Soil and Construction & Demolition Materials

Stage 2

Emission Factors		Score
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - 0.001 to 0.01 %wt/wt	1
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Low disturbance, minimal deterioration expected	2
Best description of primary host material matrix	Coarse to Fine Gravel	3
Sub-total		9
Exposure ranking		Low

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Stage 3

Pathway and Receptor Sensitivity		Score	
Receptor category	Residential	No score required	
Age of Receptor	School age (>5 and <16)	3	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		6	Medium
Combined hazard, exposure and receptor ranking			Low
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material present near the surface, potential to be disturbed during non-construction/routine use of land	D	
Pathway ranking		4D	Medium
Overall ranking			Low

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Asbestos in Soil and Construction & Demolition Materials

Project Reference	STV6107
Site Name	Rikkyo School, Horsham
Client	Rikkyo School, Horsham
Run by	Lauren Edens
Date	5th July 2024
Reviewed by	Karen Boothby
Characterisation of scenario being evaluated	Residential end use with areas of soft landscaping (boarding house within a school).
Interpretation of scenario ranking by DST	One positive reesult for chrysotile at 0.002%. No ACMs observed and overall, asbestos is considered likely to be sporadic and at trace to low level concentrations. Proposed building is residential (school boarding house) with surrounding soft landscaping/public open space but no productive gardens. Overall, the risk to proposed site users is considered low.

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Asbestos in Soil and Construction & Demolition Materials

Decision Support Tool for the Categorisation of Work Activities Involving Asbestos in Soil and Construction & Demolition Materials in accordance with the Control of Asbestos Regulations 2012.

VERSION 2.1

March 2017

CL:AIRE

This spreadsheet tool provides the user with a decision support platform designed by the Joint Industry Working Group for Asbestos in Soil and Construction & Demolition Materials (JIWG) to assist in the categorisation of work with asbestos under CAR2012, and supports the JIWG Industry Guidance on the Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition Materials (CAR-SOIL™, 2016). The spreadsheet should be used by **competent persons** in conjunction with the guidance in this publication.

The tool, which has been refined as part of the development of the JIWG CAR-SOIL™ guidance and incorporates changes based on comments received on the earlier BETA version, has been made available to industry practitioners for the purpose of applying its use on real-life situations.

The JIWG would welcome feedback from users of this version on its applicability and validity to the wide range of scenarios that may be encountered when assessing the potential risk from and asbestos licensing status of work with asbestos and asbestos-containing materials in the ground.

ISBN 978-1-905046-28-7

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Asbestos in Soil and Construction & Demolition Materials

Project Reference	STV6107
Site Name	Rikkyo School, Horsham
Client	Rikkyo School, Horsham
Run by	LE
Date	05-Jul-24
Scenario details	Construction workers

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs at outset of work	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - <0.001 to 0.01 %wt/wt	1
Sub-total		**11**

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking **Medium**

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It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Stage 2

Exposure Factors

		Score
Anticipated airborne fibre concentration - Control Limit or SALI?	<0.01 fibres/ml	1
Anticipated duration of exposure to asbestos	> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)	4
Activity type and effect on deterioration of ACMs during work	Low intensity, no or minimal deterioration expected	0
Best description of primary host material matrix (soil/made ground)	Coarse to Fine Gravel	3
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Very low	1
Sub-total		**9**
Exposure ranking		Low
Combined hazard and exposure ranking	**20**	Low

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Stage 3

Risk Assessment Outputs

Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.
**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)
***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

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