Tier 2 Contamination Assessment

John Crank Building Redevelopment

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6528409-SWE-XX-XX-D-GE-0001 Exploratory Hole Location Plan

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Appendix C – Generic Screening Levels

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1 Executive Summary

Details	Summary of Main Text
Introduction	This report has been prepared for Fusion Management Ltd on behalf of Brunel University. It presents the results of a ground investigation and contamination assessment for a parcel of land within Brunel University for proposed open space usage for students.
Site description	The 0.3-hectare site is generally flat, level, and surfaced with gravel other than a paved area at the site access. Frequent vegetation, predominantly buddleia, was growing through the gravel. Block paving was noted near to site boundaries which extended off site.
Geology and site setting	The published geology comprises Langley Silt (superficial) underlain by London Clay (bedrock). Both superficial and bedrock geology are classified as unproductive strata. The site is not within a groundwater Source Protection Zone. The nearest surface water feature is the River Pinn located 42m to the east.
Ground Investigation	
Ground Conditions Encountered	Made Ground (maximum proven depth 2.0m bgl) Superficial deposit (maximum proven depth 3.0m bgl) London Clay (maximum proven depth 3.1m bgl)
Groundwater	Perched groundwater was encountered as fast ingresses or seepages.
Contamination Observations	Made ground was present across the site. A historic report indicated bonded asbestos cement fragments had been encountered in surface and near surface soils.
Contamination	
Human health	No contamination was encountered across the site in samples analysed in this investigation. Asbestos fragments have been encountered from previous investigations.

Details	Summary of Main Text
Remediation and risk management	Based on the generic contamination assessments undertaken, remediation is required in relation to asbestos. A remediation strategy will be required. Site levels are proposed to be cut by 600mm which would remove the source. Clean imported materials are recommended for soft landcapings. Installation of underground services in corridors of clean soil such that installation and future maintenance can take place in 'clean' soils. Protection of site workers and the general public during construction.

2 Limitations and Exceptions

1. This report and its findings should be considered in relation to the terms and conditions proposed and scope of works agreed between Sweco and the Client.
2. The Executive Summary, Conclusions and Recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon until considered in the context of the whole report and the development, if any, proposed.
3. The assessment and interpretation of contamination and associated risks are based on the scope of work agreed with the Client and the report may not be sufficient to fully address contaminations or to allow detailed remediation design to proceed without further investigation and analysis.
4. Any assessments made in this report are based on the ground conditions as revealed by the exploratory holes and pits, together with the results of any field or laboratory testing undertaken and, where appropriate, other relevant data which may have been obtained for the sites including previous site investigation reports. There may be special conditions appertaining to the site, however, which have not been revealed by the investigation and which have not, therefore, been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.
5. Interpretations and recommendations contained in the report represent our professional opinions, which were arrived at in accordance with currently accepted industry practices at the time of reporting and based on current legislation in force at that time.
6. Where the data available from previous site investigation reports, supplied by the Client, have been used, it has been assumed that the information is correct. No responsibility can be accepted by Sweco for inaccuracies within the data supplied.
7. Whilst the report may express an opinion of possible configuration of strata between or beyond exploratory hole or pit locations, or on the possible presence of features based on visual, verbal or published evidence, this is for guidance only and no liability can be accepted for the accuracy.
8. Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted that groundwater levels can vary due to seasonal or other effects.
9. The copyright in this report and other plans and documents prepared by Sweco is owned by them and no such report, plan or document may be reproduced, published or adapted without their written consent. Complete copies of this report may, however, be made and distributed by the Client as an expedient in dealing with matters related to its commission.
10. This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context.

Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to us for re-assessment and, if necessary, re-appraisal.

3 Introduction

3.1 General

This report has been prepared by Sweco for Fusion Management Ltd on behalf of Brunel University, which is proposing to develop a parcel of land for open function space for students.

3.2 Terms of Reference

The terms of reference for the work were set out in the Sweco proposal ref. 65208409-SWE-XX-XX-T-GE-2001 dated 16 November 2023.

3.3 Technical Approach

The ground investigation and reporting has been undertaken in general accordance with BS5930:2015+A1:2020 Code of Practice for Ground Investigations and BS10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of Practice. All site work was undertaken under the supervision of a qualified geoenvironmental engineer.

The process of contamination assessment adopted in the report satisfies the Environment Agency guidance, Land Contamination Risk Management (LCRM, 2020) for a Tier 2 generic quantitative risk assessment. Competent persons have been involved in the preparation and/or checking and approval of the report.

3.4 Objectives

The objective of the investigation and contamination assessment is to support a planning submission and to identify potential contamination risks.

3.5 Scope of Report

The scope of this report is as follows:

- Details the site conditions and proposed development
- Summarises the findings of previous assessments
- Describes the scope of ground investigation undertaken
- Describes the ground and groundwater conditions encountered
- Presents an updated conceptual site model and generic quantitative risk assessment of contamination risks
- Provides a summary and recommendations for the above items.

3.6 Proposed Development

It is understood that the proposed development will comprise a new open ‘civic square’ capable of supporting two marquees and an open space for students. Current proposals include a large central paved area, two lawns, open seating and tree/planter areas.

Details of the proposed layout are shown on within the ‘Landscape Design Feasibility Study’ titled ‘Axial Approach-Rev B’ issued by Ireland Albrecht Landscape Architects.

4 The Site

4.1 Location

The site is located within the centre of the Brunel University campus, Kingston Lane, Uxbridge UB8 3PH.

The National Grid Reference for the site is 506071, 182721 and a location plan is presented as Figure 1.

4.2 Site Description

The site covers an approximate area of 0.3 hectares and is generally flat and level. The site access gate is at the western extent of the southern boundary and secure wooden hoarding demarcated the site perimeter.

The site was surfaced with gravel other than a paved area at the site access. Frequent vegetation, predominantly buddleia, was growing through the gravel. Block paving was noted near to site boundaries which extended off site.

Metal gate sections and metal grids were located on the surface near to the site entrance, left over from when the hoarding was constructed.

No buildings were present on site.

4.3 Site History

The site was previously part of a larger horticultural nursery between 1914 to 1969. By 1972, the site and surrounding area was redeveloped and became part of the Brunel University campus. A single university building occupied the site (John Crank building), which was demolished in 2019-2020 after which the site was left vacant to the present day.

4.4 Geology, Hydrogeology and Hydrology

Geological information has been sourced from Groundsure Geo-insight, BGS (British Geological Survey) GeoIndex Onshore (including borehole search) and BGS 1:50,000 series solid and drift geology.

Table 4.1 Geology

Aspect	Geological Unit	Description
Superficial Geology	Langley Silt Member	Varies between silts and clays.
Bedrock Geology	London Clay Formation	Blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.
Radon	Less than 1% of (estimated) properties are affected by radon and no radon protection measures are required.	

Table 4.2 Hydrogeology

Aspect	Description	
Superficial Aquifer*	Unproductive strata (Langley Silt Member)	Largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them. Note: 27m east off-site localised alluvium deposits are mapped following the River Pinn which are classed as a Secondary A aquifer.
Bedrock Aquifer	Unproductive strata (London Clay Formation):	Largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.
Source Protection Zone (SPZ)	No SPZ	The site is not within a catchment area where groundwater is discharged to a source.
Confining Layers	Yes	Both the superficial and bedrock geology are Unproductive Strata and are protecting deeper aquifer layers.
Contribution to Baseflow	Highly unlikely	Both the Langley Silt Member and London Clay Formation are typically low impermeability.
Groundwater Abstraction	Public water supply boreholes	The nearest active groundwater abstraction is located 997m southeast and used by Hillingdon Hospital NHS trust for drinking, cooking and washing purposes.
	Private abstractions	The nearest active private abstraction is located 1757m east and used for laundry use by Blue Dragon (Hillingdon) Ltd.

Table 4.3 Hydrology

Aspect	Description
Surface water features	At the closest point the River Pinn is 42m northeast from site.
Surface water abstraction	No active surface water abstractions within 2km.

4.5 Radon

Based on BRE Digest 211, the site is located in an area where no radon protective measures are required.

5 Previous Reports

Previous reports produced for the site and provided to Sweco are summarised in Table 5.1.

Table 5.1 Previous Reports

Company (Date) Title	Findings
REC (2017) Phase I and II Geo-Environmental Assessment. Ref: 1CO102981P1R0	The REC report covered a wider site area but did include exploration locations located on site and within 10m of the subject site, prior to the demolition of the John Crank building. Potential contaminant sources comprised made ground, associated with historic demolition of nurseries, historic tramway sidings, unspecified commercial/industrial land use and the construction of the university buildings. The ground conditions comprised made ground underlain by superficial deposits up to a maximum depth of 3.1m bgl. The deposits were described as a medium dense, orangish brown, slightly clayey, sandy GRAVEL or a firm to stiff orange brown slightly sandy slightly gravelly CLAY. The underlying bedrock comprised London Clay proven at a depth of 16.6 m bgl and described as a firm to stiff grey CLAY. This was subsequently underlain by the Lambeth Group. Groundwater was encountered at seven exporatory locations, four of which were located on site or within 10m of the site boundaries. BH1A located in the northwestern corner of the site encountered groundwater at a depth of 23.5m within the Lambeth Group (clays) which rose to 10.20m overnight. The remaining locations WS04 (10m West from western boundary), WS05 (adjacent to southern boundary) and WS06 (northeast corner of site) encountered groundwater at 2.0m to 2.5m within the superficial deposits (clayey sandy gravels). Polycyclic aromatic hydrocarbon (PAH) exceedances were recorded in shallow made ground (approximately 50m north from the subject site) under a POS(Resi) scenario.

Geotechnical Interpretative Report on ground Investigation (2018). Ref: 34460	The report focused on the area adjacent (west) to the current site area with the intrusive ground investigation comprising three trial pits and two DCPs (dynamic cone penetration tests) located approximately 30m west of the western boundary. Ground conditions comprised grass surfaced made ground (greyish brown very clayey slightly gravelly medium to coarse SAND) to 0.25m bgl. Minor consituents included brick, concrete and slate fragments. The made ground was underlain by alluvial deposits comprising a brown to orangish brown, clayey sandy, medium to coarse flint gravel. Four soil samples were subjected to chemical analysis. There were no exceedances of screening levels residential use (without homegrown produce). Two samples were also subjected to WAC (waste acceptance critieria testing). The results indicated that the made ground could be classed inert waste for disposal to landfill.
Wareham & Associates, Civil and Structual Engineering Material & Workmanship Specification For Demotition of the John Crank Building at Brunel University London Ref: 16-1299-SP1 Tender Issue T2C November 2018	The John Crank Building (demolished in 2019) was a reinforced concrete framed building with a podium structure on the ground and first floors. A tower block rising to six floors was present over the southern part of the building. Any voids created by demolition associated with grubbing out of former foundations and slabs were backfilled. Foundations comprised reinforced concrete isolated pads supporting reinforced concrete columns. On completion of the works, the report states all excavations and ground disturbed by excavation were reinstated using imported MOT Type 1 material.
Asbestos Solution Providers (2020), Asbestos Sample Analysis and Findings Ref: J003033	An asbestos survey was carried out on shallow post-demolition soils. A total of 39 surface and near surface samples were collected across the current site area on a 4m x 4m grid (within each grid 2-3 samples were taken). Five samples were found to contain asbestos cement (chrysotile and amosite) as visible bonded fragments. The occurances were not localised but were distributed near to the northern boundary and southwestern area of the site.

6 Ground Investigation

6.1 Site Work

Site work was carried out on the 19 January 2023 and included the following.

Table 6.1 Summary of Exploratory Holes

Type	Ref.	Depth Range (m bgl)
Trial pits	TP01 – TP09	2.20 – 3.10

The exploratory holes were set out by a Sweco engineer targeting the building footprint in order to maximise the available data and chance of encountering infilled voids where previous building foundations were ‘grubbed out’. To maximise the chance of encountering these ‘suspected infilled voids’, slit trenches were undertaken.

The engineer’s logs of the exploratory holes are presented in Appendix A.

6.2 Investigation Rationale

The intrusive investigation has been undertaken to provide sufficient site coverage to identify depth of made ground soils.

The former building was overlain on a plan, targeting the building corners in order to understand the material that has been used to backfilled excavations.

Table 6.2 Rationale for Contamination Sampling and Testing

Target/Source	Exploratory Holes	Potential Contaminants
Whole site	All	Metals, speciated PAH, TPHCWG, total phenols, total cyanide and asbestos

The locations of all the exploratory holes are presented on drawing 65208409-SWE-XX-XX-D-GE-0001-C01.

6.3 Restrictions on Ground Investigation

Exploratory trial pit location ‘TP07’ was relocated eastwards due to metal fencing/materials blocking original proposed position.

6.4 Soil Sampling

Soil samples were recovered from the exploratory holes during the ground investigation and stored/transported in containers appropriate for the laboratory testing undertaken.

Sample types and depths are recorded on the relevant exploratory hole records.

6.5 Geoenvironmental Laboratory Analysis

The following chemical analysis was scheduled on soil samples recovered from the exploratory holes.

Table 6.3 Summary of Chemical Analysis – Soil

Test	No.
Standard suite : metals (As, B, Cd, Cr, Cu, Ni, Pb, Hg, Se, Zn), speciated polycyclic aromatic hydrocarbons (USEPA16), aliphatic/aromatic hydrocarbons (TPHCWG), total cyanide and total phenols	14
Soil Organic Matter	8
Asbestos identification	8

Chemical analysis was undertaken by a UKAS-accredited laboratory and the results are presented in Appendix B.

7 Ground and Groundwater Conditions

7.1 General

The following sections include data from the previous investigation by REC (2017) Phase I and II Geo-Environmental Assessment. Ref: 1CO102981P1R0 and Asbestos Solution Providers (2020), Asbestos Sample Analysis and Findings Ref: J003033

During the current phase of ground investigation, the following general strata sequence was encountered across the site. Interpolation between exploratory hole positions has been undertaken based on visual observations and subsequent laboratory testing.

Table 7.1 Generalised Strata Sequence

Stratum	Depth range (m bgl)		Level at Base Range (m OD)	Proven Thickness range (m)
	Top	Base		
Made Ground	GL	0.7 – 2.0	30.85 - 32.04	0.7 – 2.0
Superficial Deposits*	0.7 – 2.0	2.9 – 3.0	29.74 – 30.56	1.0 – 2.3
London Clay Formation*	2.9 – 3.0	3.1*	29.64 – 29.81	0.1 – 0.2

* Base of stratum not proven in all holes

The description of soils and rocks was undertaken in accordance with BS EN ISO 14688-1: 2002+A1:2013 and BS EN ISO 14689-1: 2003.

Features, structures or certain ground conditions may be present between exploratory hole locations, which are different to those encountered during the investigation, but which may impact upon construction.

The findings of the ground investigation generally match the published geology for the area with the exception of the superficial deposits. Difference was noted in the classification of the superficial deposits with published BGS mapping labelling the superficial deposits as the Langley Silt Member (comprising clays and silts). However, in the current phase of the investigation as well as previous investigations the superficial deposits comprised of sands and gravels. For the purpose of this report the superficial deposits are considered as part of the Lynch Hill Gravel Member or Boyn Hill Gravel Member.

7.2 Made Ground

Made ground was present in all exploratory holes across the site and can be divided into two separate units. The upper made ground unit ranging from ground level to depths of 0.58m were typically comprised of a brown silty very gravelly fine to coarse sand. The gravels comprised of fine to coarse angular to rounded flint and a variable mixture of anthropogenic fragments of varying quantity at each exploratory location.

These fragments comprised of tile, metal, glass, plastics and brick fragments and occasional clinker.

The lower made ground unit reached depths of up to 2.0m and varied between a brown sandy gravelly silty clay and a clayey sandy gravel with occasional brick, tile and concrete fragments. Concrete cobbles were identified at locations TP03, TP04 and TP05 which could be remnants of the building's eastern foundations. The lower made ground unit contained notably less anthropogenic material when compared to the upper made ground unit.

The 2020 Asbestos Solution Providers report did record positive asbestos detections from surface and near surface samples in the form of bonded cement debris.

7.3 Superficial Deposits

Underlying the made ground across site, a light brown slightly clayey very sandy fine to coarse subangular to rounded flint GRAVEL was encountered. Exploratory hole TP08 was terminated within these soils. Locally this unit was described as a sandy very gravelly silty CLAY.

7.4 London Clay Formation

Underlying the superficial deposits across site, a stiff dark grey silty CLAY was encountered. These deposits are considered to represent the London Clay Formation. All remaining exploratory holes were terminated within these soils.

7.5 Groundwater Conditions

Groundwater was encountered during the investigation as either seepages or a fast ingress within the superficial granular material. This groundwater is considered perched within the superficial deposits on top of the impermeable London Clay, however, due to the close proximity of the River Pinn, these may be in hydrologically connected.

These results are consistent with the findings of the 2017 RAC investigation which encountered groundwater at depths around 2.0m within the superficial granular deposits. These locations were located in the northeast corner of site and adjacent to the southern boundary (under the current site boundaries).

7.6 Evidence of Contamination

Made ground and soils containing fragments of tile, glass, brick, metals, plastic and clinker were present in exploratory holes. These observations may be an indicator of potential contamination. Wood fragments were also identified in TP07 which may have been treated.

7.7 Underground Obstructions

Buried construction was not encountered during the ground investigation, however, cobble sized concrete fragments were identified at three locations (TP03, TP04 & TP05). Evidence of former underground utilities have been found at locations TP03 and TP07 comprising plastic ducting with wires and terracotta pipe fragments,

respectively. These are likely remnants of previously disconnected services belonging to the former John Crank building which was demolished.

8 Assessment of Soil Chemical Data

This section presents a human health generic risk assessment to identify potential sources of soil contamination requiring further evaluation. The assessment involves a comparison of chemical laboratory test results to screening levels that are considered to be appropriate to the site based on a Conceptual Site Model (CSM).

It includes information from the previous investigations by Asbestos Solution Providers (2020), asbestos sample analysis and findings Ref: J003033

8.1 Selection of Assessment Criteria

The soil screening values used in this assessment are primarily drawn from the Suitable for Use Levels (S4ULs) published in 2015 by Land Quality Management (LQM) Ltd and the Chartered Institute of Environmental Health (CIEH). The Category 4 Screening Level (C4SL) published in 2014 by Defra has been used for lead. A full list of screening levels used is included in Appendix C.

The future development will be a civic square with two lawns and tree/planter areas which is capable of accommodating students and two marquees. For the purpose of this assessment the intended land use scenario is considered to be public open space near residential housing (POS_{resi}).

Eleven samples of made ground and three samples of shallow natural material were analysed. Screening levels for certain organic contaminants were selected based on soil organic matter (SOM) content. A SOM of 1% was considered appropriate based on the range recorded by laboratory testing within the made ground samples (0.3-2.9% and average 1.45%).

Appropriately sensitive testing methods have been adopted throughout and, on this basis, where contaminants are recorded below detection limits, they are considered to be ‘not present’.

8.2 Generic Screening for Human Health

None of the measured contaminant concentrations are above the chosen screening levels and therefore further assessment of soil contaminants in relation to human health risks is not considered to be necessary.

8.3 Asbestos

Asbestos fibres were not identified in the eight samples of made ground tested, in both the upper and lower made ground units from this investigation. However, the Asbestos Solution Providers report dated 2020 (REF: J003033) did identify 'bound' asbestos within five of 39 surface and near surface samples. The asbestos detections were not localised but were distributed across the northern boundary and southwestern area of the site.

8.4 Discussion of Results

Testing of soil samples of made ground and top of natural soils recovered from site did not record any exceedances above screening levels for intended end use (POS (resi)). The results are consistent with the investigations findings as typically the man-made constituents found within the made ground soils would be mostly made up of typically inert materials (tiles, concrete, brick) and there was no visual or olfactory evidence of contamination.

It can be inferred that the upper layer of made ground which is both visually and constituently distinct from the lower made ground unit originated from different sources. The lower layer is comprised of re-worked natural and made ground soils disturbed during the construction and demolition phases of the John Crank building. Anecdotal evidence suggests the upper layer has been imported onto site after demolition works to 'level-off' the site. The likelihood of more asbestos being found in the upper made ground unit cannot be ruled out given the findings of the 2020 'Asbestos Solution Providers' report.

9 Assessment of Groundwater and Soil Leachate Chemical Data

Due to no significant soil-based sources of contamination being identified in made ground or the immediate underlying natural ground during this investigation or historic investigations, no samples were subjected to leachate testing. Furthermore, the shallow made ground unit will be removed during the proposed reprofiling (600mm cut).

10 Contaminated Land Risk Assessment and Conceptual Site Model

10.1 Introduction

Risk assessment is a process by which the risks posed by identified hazards to specific receptors are estimated. In the context of this study, hazards relate to sources, or potential sources of contamination capable of causing harm (eg. a contaminant concentration exceeding a screening level). Receptors are the entity which may be at risk of adverse effects from the hazard and include human health, surface waters, groundwater, ecological systems, buildings and services. In order for a hazard to present a risk to a receptor they must be linked by an exposure pathway.

This source-pathway-receptor model is considered best practice methodology to evaluate environmental risks arising from potential land contamination, according to the LCRM guidance.

In accordance with the adopted methodology, the classification of potential risk reflects both the probability of an event occurring (likelihood) and the potential consequence (magnitude) of possible effects. Risk definitions are provided in Appendix D.

10.2 Updated Conceptual Site Model

A conceptual site model (CSM) has been developed for the site, based on an evaluation of the information described in the preceding chapters and is presented below. The CSM describes the sources, pathways and receptors which form potentially significant pollutant linkages (SPLs).

Table 11.1 Sources of Contamination Identified from Data Screening

Source	Description
Site wide made ground	Asbestos has been detected from a previous report in surface and near surface soil material.

Table 10.1 Potential Exposure Pathways

Potential pathway	Present	Justification
Direct contact (dermal contact or ingestion) with soil or groundwater – operational phase	No	Development will be comprised of public open space with gardens and landscaping, but no sources of contamination were identified.
Direct contact (dermal contact or ingestion) with soil or groundwater – construction phase	No	Proposed development will involve work in the ground, but no sources of contamination were identified.

Potential pathway	Present	Justification
Plant uptake	Yes	Development will include two lawns and planter areas.
Inhalation of soil dust and fibres	Yes	Development will involve work in the ground and future public use of gardens, and open space. Asbestos has been detected on site highlighted by a historic report.
Leaching from soil down to groundwater	No	No significant soil-based source of contamination has been detected on site.
Migration in groundwater	No	Despite the River Pinn being in close proximity no significant soil-based source of contamination has been detected on site.
Migration in surface runoff	No	The site is level.
Direct contact with new infrastructure and construction	Yes	Development will include new water supply pipes and foundations based on development plans.

Table 10.2 Potential Receptors

Potential receptors	Justification
Future site users	University staff and students could be exposed to asbestos in open areas.
Construction and maintenance workers	Site workers could be exposed to asbestos during groundworks.

10.3 Risk Estimation

Based on the sources, pathways and receptors identified above, table 10.3 summarises all complete pollutant linkages for the site and identifies the level of risk from each

Table 10.3 Risk Estimation

Source	Pathway	Receptor	Likelihood	Justification	Magnitude	Justification	Level of risk
Made Ground (to max depths of 0.58m) containing asbestos (chrysotile) cement. One sample out of the five also contained amosite according to ASP (2020) report.	Inhalation of respirable fibres of asbestos.	Future site users	Low	Localised asbestos has been detected in surface near surface material based on historic data in bonded fragment form	Moderate	Surface material is proposed to be cut by approximately 600mm removing the source. Providing appropriate health and safety procedures are undertaken by contractors whilst handling this material, would significantly reduce the risk of exposure.	Low
		Site construction/ maintenance workers					

11 Remediation and Risk Management

This section provides outline guidance on reducing contamination risks to acceptable levels for the construction and operational phases of development.

11.1 Human Health Protection

11.1.1 Soil Contamination

Based on the ground investigation data and generic risk assessment, soil contamination in the form of localised asbestos has been detected from historic investigations.

11.1.2 Radon Protection

BRE 211 recommends that no radon protection measures are required.

11.1.3 Asbestos

Asbestos fragments were identified on site in surface and near surface material, based on historic data. Any works which disturb asbestos must be undertaken in accordance with the Control of Asbestos Regulations (CAR) 2012. A risk assessment will need to be undertaken and a plan of work for dealing with risks from asbestos prepared and implemented by the Principal Contractor.

Bound asbestos cement identified does potentially pose a risk and hand picking of asbestos cement fragments across site could be an adequate mitigation measure.

Surface material is proposed to be cut to approximately 600mm as part of the groundworks. This would remove most of the source.

In addition to this, much of the site is proposed hardstanding (granite aggregate paving or dark decorative paving). Providing clean imported soil is used for landscaping and for raised planters, the risk of exposure is reduced.

If new services are to be installed the bedding, backfill and surround should be comprised of clean imported materials, so installation and maintenance can be carried out in clean soils mitigating risk of maintenance workers coming into direct contact, disturbing and inhaling asbestos fibres.

11.2 Protection of Controlled Waters

No significant soil-based source has been detected on site that would pose a risk to groundwater. Added to this, groundwater encountered appears discontinuous and therefore there is no plausible pathway to the River Pinn.

11.3 Phytotoxicity

Substances with phytotoxic potential can have an effect on the establishment and healthy growth of planting introduced to areas of gardens and landscaping.

Potentially phytotoxic substances can include metals such as copper, nickel and zinc, however there are other contaminants and ground conditions that should be considered.

A copy of this report is provided to the Landscape Professional to assist in their design of a planting scheme suited to the chemical quality of the soil and any other conditions that could have an effect on plant life.

Further advice is contained in BS3882:2015, Specification for topsoil and BS8602:2013, Specification for subsoil and requirements for use.

11.4 Dewatering and Groundwater Disposal

Groundwater requiring disposal will need to be discharged to sewer under a trade effluent consent. If the contaminants in groundwater are not within prescribed limits then treatment may be necessary prior to disposal.

If the rate of dewatering is more than $20m^3$ per day then an abstraction licence will be required from the Environment Agency.

Disposal may be possible to a nearby watercourse but would require a discharge permit from the Environment Agency and may not be granted.

Water should be passed through a settlement tank prior to discharge to remove suspended solids.

11.5 Water Supply Pipework

Certain contaminants in soil can have an adverse effect on the quality of drinking water in pipework constructed underground.

The UKWIR publication 10/WM/03/21, Guidance for the selection of water supply pipes to be used in brownfield sites, provides developers and water companies with criteria against which the results of soil testing can be compared as part of design. It should be noted that the scope of testing in the guidance exceeds what is required from a contaminated land investigation based on previous site use.

It is advised therefore that this report is provided to the water company who, in turn, will advise on appropriate materials to be used in the water supply network.

In the absence of testing or feedback from the water supply company, it should be assumed that barrier pipe construction is required on all brownfield sites or where pipework will pass through made ground soil whose chemical quality will be compromised compared to natural soil.

11.6 Off Site Disposal

All waste soils which are to be removed from site should be classified in accordance with WM3 Guidance on the classification and assessment of waste (1st edition, version 1.2 GB 2021) prior to disposal.

The receiving landfill or soil treatment facility (STF) should be provided with a copy of the laboratory test results, including the results of any waste acceptance criteria

(WAC) testing in order to confirm the waste classification and that they can accept the waste.

Non-hazardous soils require pre-treatment prior to disposal. Pre-treatment typically involves complex sorting, based on exploratory hole records and test results, to reduce the volume and hazardous nature of some waste materials.

Natural soils from an uncontaminated site (excluding peat and topsoil) would normally be considered suitable for disposal to inert landfill.

11.7 Remediation Documentation

Based on the findings of this report, contamination requiring remediation or mitigation should be considered and, if required by the conditions of planning, a remediation strategy and verification plan should be submitted to the planning authority and agreed with the Environment Agency and/or local authority Environmental Health Officer (EHO).

11.8 Construction Health and Safety

It is recommended that construction and ground workers at the site adopt appropriate personal hygiene precautions at the site and use personal protective equipment as required, particularly provision of welfare facilities, the wearing of gloves and safety glasses and avoidance of hand to mouth contact, especially when working in or near soil or groundwater containing a range of contaminants.

Handling of soil and water should be minimised and dust suppression measures should be implemented, particularly during any excavation through the made ground. Soils should be dampened during excavation and handling to limit dust travelling off site, and lorries suitably sheeted. Surface run-off from vehicle washing, dust suppression or storms, during construction, should be controlled to prevent entry into watercourses and off-site drainage systems.

Gas and vapour monitoring should be carried out before entry into deep excavations or confined spaces.

These precautions are industry standard and further guidance is in the HSE document HSG150 Health and Safety in Construction (2006).

12 Summary and Recommendations

12.1 Site Conditions

The 0.33-hectare site comprises vacant, undeveloped land.

12.2 Ground Conditions

The site is underlain by made ground deposits over typically superficial granular deposits, which in turn overlie bedrock soils identified as silty clays belonging to the London Clay Formation.

Groundwater (perched) was encountered at depths of 1.1m to 2.0m bgl.

12.3 Contamination Risks

12.3.1 Soil

During the most recent investigation human health screening levels are not exceeded in made ground soils and superficial natural deposits, however asbestos cement fragments were found in a recent investigation dating back to 2020. It can be presumed that these fragments are distributed very sporadically across site in very low frequency within the upper made ground unit which reached maximum depths of 0.58m bgl however typically around 0.3-0.4m bgl. Particular concern would be in the two proposed lawn areas located in the south and north-eastern corner of site where potential exposure pathways could be present.

12.3.2 Risk Reduction Measures

Based on the generic contamination assessments undertaken, remediation, mitigation and protection measures could be required for development. Suitable measures could include:

- Capping of made ground soils with clean cover soils in proposed soft landscaping areas. Minimum thicknesses would be 450mm. However, the surface area is proposed to be cut by 600mm which would subsequently remove the source.
- Installation of underground services in corridors of clean soil such that installation and future maintenance can take place in ‘clean’ soils.
- Protection of site workers and the general public during construction.
- Laying of geotextile membrane across site under the aggregate paving.

Soakaways are very unlikely to be suitable due to the shallow water seepages encountered and should not be constructed in made ground soils.

This report should be presented to the water supply company and landscape professionals to assist in their design for supply pipework and landscaping.

The risk reduction measures outlined above should be developed further in a remediation strategy.

12.4 Further Work

A remediation strategy and verification plan should be submitted to the planning authority for agreement with the Environment Agency and/or local authority EHO.

Asbestos is present or suspected in the ground. A plan of work should be prepared for any works which have the potential to disturb asbestos in accordance with CAR (2012). Once the proposed cut has been undertaken, a surface sampling verification report is recommended to confirm source removal in relation to asbestos.

Materials destined for off-site disposal to landfill may require further assessment in accordance with WM3 'Guidance on the classification and assessment of waste' (1st edition version 1.2 GB 2021) to determine their waste classification. Waste acceptance criteria testing may also be required by the receiving landfill site in order to confirm they are suitably licenced to accept the waste. If visible asbestos fragments are present in disposal material, this would be classified as hazardous waste.

If materials are to be re-used on site or imported from another development site, a materials management plan may be required in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice in order to demonstrate that the material is not a waste.

13 References

1. Association of Geotechnical and Geoenvironmental Specialists (2004) A clients guide to site investigations.

2. Association of Geotechnical and Geoenvironmental Specialists (2006) AGS guidelines for good practise in site investigations.

3. Association of Geotechnical and Geoenvironmental Specialists (1999) Code of conduct for site investigations.

4. Association of Geotechnical and Geoenvironmental Specialists (2005) Management of risk associated with the preparation of ground reports.

5. Association of Geotechnical and Geoenvironmental Specialists (2005) Guidelines for the preparation of the ground report.

6. Association of Geotechnical and Geoenvironmental Specialists (2000) Guidelines for combined geoenvironmental and geotechnical investigations.

7. British Standards Institution (2011) Investigation of potentially contaminated sites - code of practice. BS10175:2011.

8. British Standards Institution (2010) Code of practice for site investigation. BS5930:2015.

9. British Standards Institution (2015) Specification for topsoil. BS3882:2015.

10. British Geological Survey (2006) Sheet 256 North London. 1:50,000 scale Geology Map, Solid and Drift Edition.

11. Building Research Establishment (2015) Radon Guidance on protective measures for new buildings BRE Digest 211.

12. Public Health England (PHE) Website – Interactive Radon Affected Area Maps

13. CIRIA (2017) Asbestos in soil and made ground good practice site guide. CIRIA C765

14. CL:AIRE (2016) CAR-SOILTM Control of Asbestos Regulations 2012 Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry Guidance.

15. CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice.

16. Dutch Reference Framework (2001) Circular on target values and intervention values for soil remediation.

17. Environment Agency (2021) WM3 Guidance on the Classification and Assessment of Waste. 1st edition, version 1.2 GB

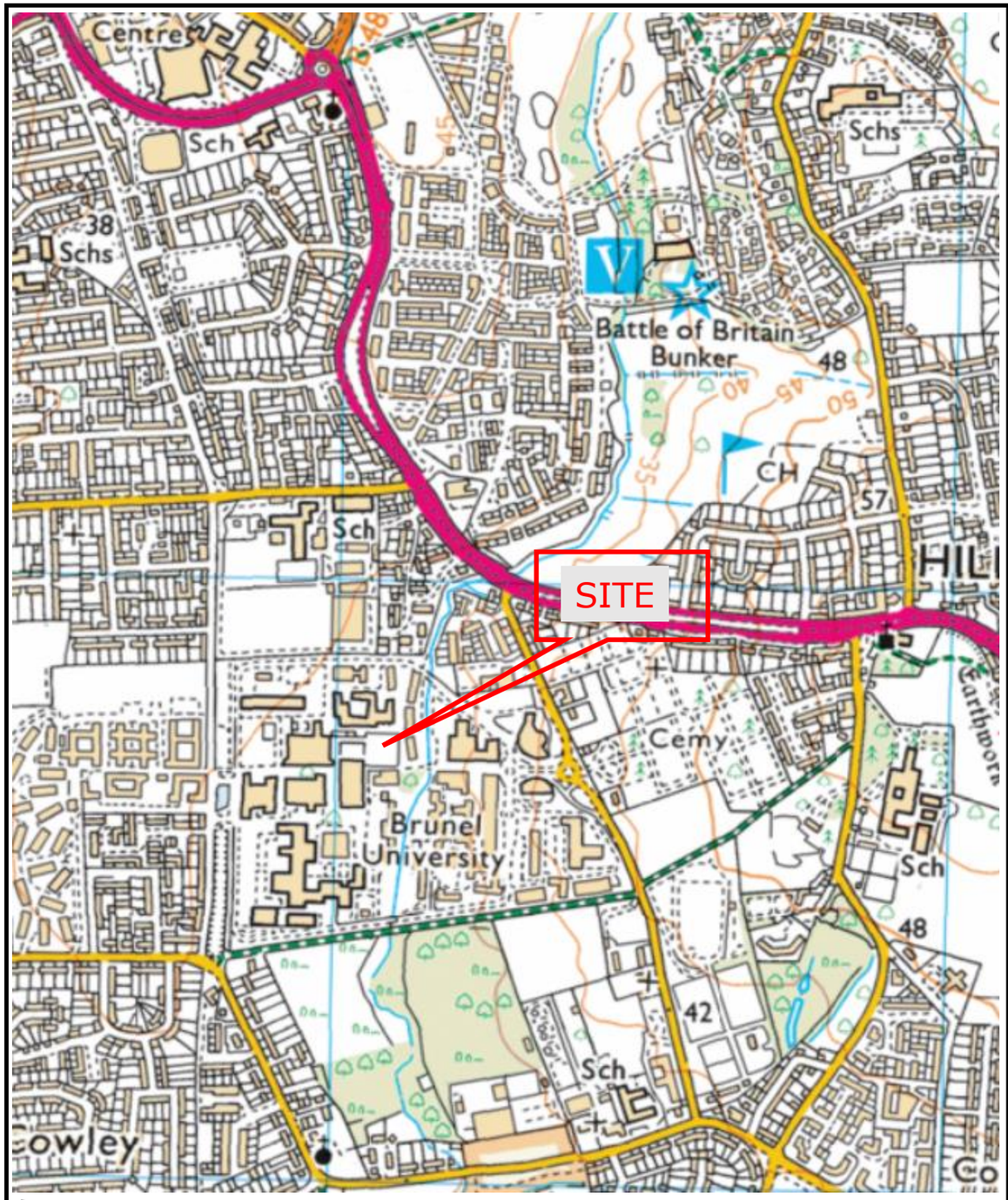
18. Environment Industries Commission, Association of Geotechnical and Geoenvironmental Specialists and Contaminated Land: Applications in Real Environments (2009) The soil generic assessment criteria for human health risk assessment.

19. European Community (1976) Environmental quality standards for List 1 and List 2 dangerous substances (EC Directive 76/464/EEC).

20. Health and Safety Executive (1991) Protection of workers and the general public during the development of contaminated land.

Figures

Figure 1: Site Location Plan



REV	DATE	REVISION	MADE	CHK	APP
C01	01/12/2022	-	PBL	CM	CM

DRAWING STATUS

FINAL ISSUE

SUITABILITY DESCRIPTION

SUITABLE FOR INFORMATION

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SWECO

CLIENT

FUSION PROJECT MANAGEMENT

PROJECT

JOHN CRANK BUILDING REDEVELOPMENT

DRAWING TITLE

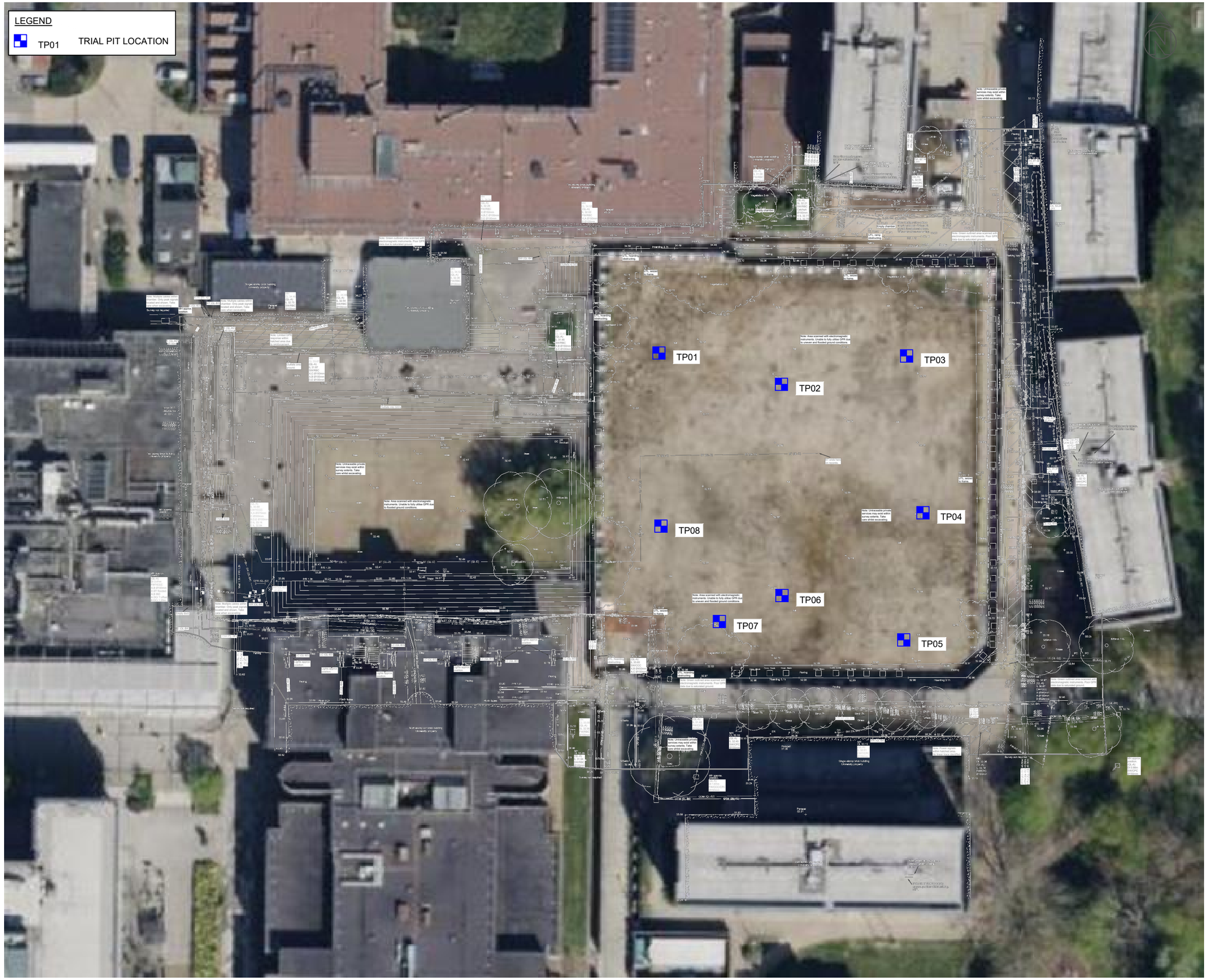
SITE LOCATION PLAN

SCALE	SWECO REF.	STATUS	REVISION
NTS @A3	65208409	S2	C01

PROJECT	ORIGINATOR	VOLUME/ SYSTEM	LEVELS & LOCATIONS	TYPE	ROLE	NUMBER
65208409	SWE	ZZ	XX	DR	J	FIG 1

Drawings

6528409-SWE-XX-XX-D-GE-0001 Exploratory Hole Location Plan



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.
2. DO NOT SCALE FROM THIS DRAWING MANUALLY OR ELECTRONICALLY. WRITTEN PERMISSION MUST BE OBTAINED FROM SWECO PRIOR TO SCALING ELECTRONICALLY OR USING THIS ELECTRONIC FILE.
3. AERIAL BASE PLAN APPROXIMATE ONLY.
4. IMAGE USED AS INDICATIVE SITE LOCATION REF. 45235BWUG BY SURVEY SOLUTIONS PROVIDED BY THE CLIENT.

Rev	Date	Amendment Details	Dr'n	Chk'	App'
C01	15.02.2023	FIRST ISSUE	AT	PBL	CM

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SWECO

Client
FUSION PROJECT MANAGEMENT

Project Title
JOHN CRANK BUILDING DEVELOPMENT

Drawing Title
EXPLORATORY HOLE LOCATION PLAN

Purpose Of Issue
FINAL ISSUE

Status	Status Description
S2	SUITABLE FOR INFORMATION

Designed	Drawn	Checked	Approved
AT	AT	PBL	CM

Sheet Size	Scale	SWECO Ref	Revision
A3	1:500	65208409	C01

Drawing Number
65208409-SWE-XX-XX-D-GE-0001

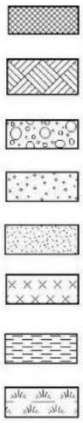
P:\6531\65208409_John_Crank_Building_Development\000\D-Z-0000_Drawings\ 65208409-SWE-XX-XX-D-GE-0001-S2-C01.dwg

Appendix A – Exploratory Hole Logs

KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA



MADE GROUND / FILL

TOPSOIL

COBBLES AND BOULDERS

GRAVEL

SAND

SILT

CLAY

PEAT

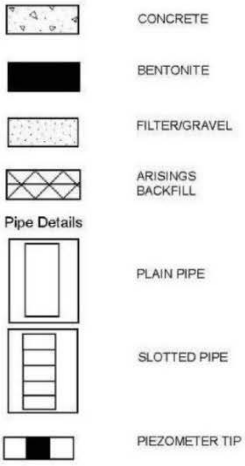
WATER

WATER STRIKE

WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details



CONCRETE

BENTONITE

FILTER/GRAVEL

ARISINGS BACKFILL

Pipe Details

PLAIN PIPE

SLOTTED PIPE

PIEZOMETER TIP

SAMPLES

U100	OPEN DRIVE TUBE SAMPLE (100 mm NOMINAL DIAMETER)
UT100	OPEN DRIVE THIN WALL TUBE SAMPLE (100 mm NOMINAL DIAMETER)
U38	OPEN DRIVE TUBE SAMPLE (38 mm NOMINAL DIAMETER)
P	PISTON SAMPLE (100 mm NOMINAL DIAMETER UNLESS NOTED OTHERWISE)
D	SMALL DISTURBED SAMPLE
B	BULK DISTURBED SAMPLE
BLK	BLOCK SAMPLE
C	ROTARY CORE SAMPLE
G	GAS SAMPLE
U	UNDISTURBED SAMPLE
UT	TUBE SAMPLE
ES	ENVIRONMENTAL SAMPLE
W	WATER SAMPLE
SPTLS	STANDARD PENETRATION TEST LINER SAMPLE

IN SITU TESTING

S	STANDARD PENETRATION TEST USING THE SPLIT SPOON SAMPLER
C	STANDARD PENETRATION TEST USING A SOLID CONE

WHERE A TEST HAS BEEN COMPLETED THE TYPE OF TEST AND THE N-VALUE WILL BE REPORTED.

WHERE THE FULL 300 mm PENETRATION OF THE MAIN DRIVE HAS NOT BEEN COMPLETED, THE NUMBER OF BLOWS (NOT AN N-VALUE) WILL BE REPORTED.

THE FIELD RECORDS COLUMN ON THE LOG WILL SHOW EACH SET OF BLOW COUNTS PER 75 mm OF PENETRATION INCLUDING SEATING BLOWS AND WILL ALSO INDICATE THE PARTIAL PENETRATION ACHIEVED (mm) FOR INCOMPLETE TESTS.

SWECO

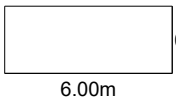
Project:	John Crank Building Development	Method:	TP	TP01	
Project ID:	65208409	Start:	19/01/2023		
Location:	UB8 3PH	Finish:	19/01/2023		
Client:	Fusion Project Management	Level (mOD):	32.81	1:25	
Project Engineer:	Chris McCartney	Co-ordinates:	506058.00E - 182735.00N	Sheet 1 of 1	
				Logged by: P.Bara-Laskowski	

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.15	ES1		32.51	0.30		Brown very silty very gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint with tile, glass, clinker and brick fragments. Abundant rootlets. MADE GROUND	0.30	
0.75	ES2					Reddish brown gravelly sandy CLAY. Gravel is fine to coarse rounded to subrounded flint. MADE GROUND	1.00	
1.50	ES3		31.51	1.30		Light brown slightly clayey sandy fine to coarse rounded to subangular flint GRAVEL. SUPERFICIAL DEPOSITS *From 1.30m bgl, slight water seepage.*	1.65	
3.00	ES4		29.86	2.95		Stiff dark grey silty CLAY. LONDON CLAY FORMATION	0.15	
			29.71	3.10		End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Slight water seepage at 1.30m bgl,. 3. Trial pit collapsed during and after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.74
Project Engineer:	Chris McCartney	Co-ordinates:	506076.00E - 182731.00N

TP02

1:25

Sheet 1 of 1

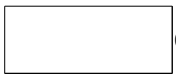
Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	ES1		32.44	0.30		Brown very silty very gravelly fine to coarse SAND. Gravel is fine to course angular to rounded flint with tile, glass, clinker and brick fragments. Abundant rootlets. MADE GROUND	0.30	
0.50	ES2		32.04	0.70		Brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. Frequent concrete, brick and tile fragments. Occasional glass, metal and plastic fragments. MADE GROUND	0.40	
1.20	ES3		31.34	1.40		Brown silty sandy gravelly CLAY. Gravel is fine to coarse subangular to rounded flint. SUPERFICIAL DEPOSITS	0.70	
2.50	ES4		29.74	3.00		Light brown slightly clayey very sandy fine to coarse rounded to subangular flint GRAVEL. SUPERFICIAL DEPOSITS *From 2.00m bgl, water seepage.*	1.60	
			29.64	3.10		Stiff dark grey silty CLAY. LONDON CLAY FORMATION End of trial pit at 3.10 m	0.10	

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Water seepage at 2.0m bgl. 3. Trial pit collapsed shortly after excavation to 1.40m bgl. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.85
Project Engineer:	Chris McCartney	Co-ordinates:	506093.00E - 182735.00N

TP03

1:25

Sheet 1 of 1

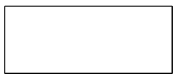
Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	ES1					Brown silty very gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint with tile, marble, glass and brick fragments. Abundant rootlets. MADE GROUND	0.40	
			32.45	0.40		Brown sandy gravelly silty CLAY varying to a gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. Occasional plastic and metal fragments. Rare concrete cobbles and plastic ducting fragments and wires. MADE GROUND		
1.00	ES2			1			1.60	
			30.85	2 2.00		Light brown slightly clayey sandy fine to coarse subangular to rounded flint GRAVEL. SUPERFICIAL DEPOSITS		
2.20	ES3					*From 2.00m bgl, water seepage.*	1.00	
3.00	ES4		29.85	3 3.00		Stiff dark grey (initially brown) silty CLAY.	0.10	
			29.75	3.10		LONDON CLAY FORMATION		
				4		End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Water seepage at 2.0m bgl. 3. Trial pit collapsed shortly after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.81
Project Engineer:	Chris McCartney	Co-ordinates:	506095.00E - 182713.00N

TP04

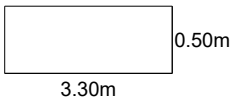
1:25 | Sheet 1 of 1 | Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.15	ES1		32.56	0.25		Brown gravelly very silty fine to coarse SAND. Gravel is fine to course angular to rounded flint with tile, glass and brick fragments. Very rare clinker. Abundant rootlets. MADE GROUND	0.25	
0.30	ES2					Brown silty sandy gravelly CLAY varying to a clayey sandy GRAVEL. Gravel is fine to coarse angular to rounded flint with occasional brick, tile and concrete fragments. Rare concrete cobbles. MADE GROUND	1.55	
1.50	ES3		31.01	1.80		Light brown slightly clayey sandy fine to coarse subangular to rounded flint GRAVEL. Locally a sandy silty very gravelly CLAY. SUPERFICIAL DEPOSITS	1.10	
						From2.10m bgl, water seepage.		
			29.91	2.90		Stiff dark grey silty CLAY.	0.10	
3.00	ES4		29.81	3.00		LONDON CLAY FORMATION		
						End of trial pit at 3.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Water seepage at 2.1m bgl. 3. Trial pit collapsed shortly after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.85
Project Engineer:	Chris McCartney	Co-ordinates:	506093.00E - 182695.00N

TP05

1:25

Sheet 1 of 1

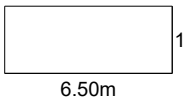
Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	ES1					Brown gravelly very silty fine to coarse SAND. Gravel is fine to course angular to rounded flint with tile and brick fragments. Very rare clinker. Abundant rootlets. MADE GROUND	0.40	
			32.45	0.40				
0.50	ES3					Brown clayey sandy fine to coarse subangular to rounded flint GRAVEL. Locally a firm sandy silty very gravelly CLAY. Frequent concrete, brick and tile fragments. Rare concrete rubble. MADE GROUND	0.80	
1.00	D1			1				
1.00	ES2							
			31.65	1.20		Light brown slightly clayey sandy fine to coarse subangular to rounded flint GRAVEL. SUPERFICIAL DEPOSITS *From 1.20m bgl, water seepage.*		
1.50	ES4							
				2			1.70	
			29.95	2.90		Stiff dark grey silty CLAY. LONDON CLAY FORMATION		
3.00	D2			3			0.20	
			29.75	3.10		End of trial pit at 3.10 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Water seepage at 1.2m bgl. 3. Trial pit collapsed during and after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.78
Project Engineer:	Chris McCartney	Co-ordinates:	506076.00E - 182702.00N

TP06

1:25

Sheet 1 of 1

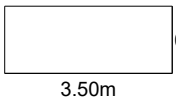
Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.10	ES1					Brown gravelly silty fine to coarse SAND. Gravel is fine to coarse angular to rounded flint with tile, metal, glass, clinker and brick fragments. Abundant rootlets. MADE GROUND	0.58	
			32.20	0.58				
0.80	ES2					Brown sandy clayey GRAVEL varying to a sandy very gravelly CLAY. Gravel is fine to coarse angular to rounded flint with occasional brick, tile and concrete fragments. MADE GROUND	0.67	
				1				
1.30	ES3		31.53	1.25		Firm/stiff brownish grey silty sandy CLAY. Rare fine to coarse rounded flint gravel. SUPERFICIAL DEPOSITS	0.55	
			30.98	1.80		Light brown slightly clayey sandy fine to coarse subangular to rounded flint GRAVEL. SUPERFICIAL DEPOSITS	1.20	
				2		*From 1.80m bgl, water seepage.*		
			29.78	3 3.00		Stiff dark grey silty CLAY.	0.10	
			29.68	3.10		LONDON CLAY FORMATION		
						End of trial pit at 3.10 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Water seepage at 1.8m bgl. 3. Trial pit collapsed after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

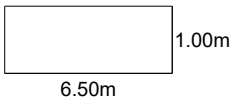
Project:	John Crank Building Development	Method:	TP	TP07	
Project ID:	65208409	Start:	19/01/2023		
Location:	UB8 3PH	Finish:	19/01/2023		
Client:	Fusion Project Management	Level (mOD):	32.77	1:25	
Project Engineer:	Chris McCartney	Co-ordinates:	506067.00E - 182698.00N	Sheet 1 of 1	
				Logged by: P.Bara-Laskowski	

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	ES1		32.27	0.50		Brown gravelly very silty fine to coarse SAND. Gravel is fine to coarse angular to rounded flint with tile, glass, clinker, wood and brick fragments. Abundant rootlets. MADE GROUND	0.50	
0.80	ES2			1		Brown gravelly silty very sandy CLAY. Less clayey with depth. Gravel is fine to coarse angular to rounded flint. MADE GROUND	1.10	
						At 1.40m bgl, pipe fragments (terracotta).		
1.70	ES3		31.17	1.60		Light brown slightly clayey very sandy fine to coarse subangular to rounded flint GRAVEL. SUPERFICIAL DEPOSITS		
						From 1.80m bgl, slight water seepage.		
				2			1.30	
			29.87	2.90		Stiff dark grey silty CLAY. LONDON CLAY FORMATION	0.20	
			29.67	3				
				3.10		End of trial pit at 3.10 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Slight water seepage from 1.80m bgl. Trial pit collapsed during and after excavation. 4. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

SWECO

Project:	John Crank Building Development	Method:	TP
Project ID:	65208409	Start:	19/01/2023
Location:	UB8 3PH	Finish:	19/01/2023
Client:	Fusion Project Management	Level (mOD):	32.76
Project Engineer:	Chris McCartney	Co-ordinates:	506059.00E - 182711.00N

TP08

1:25

Sheet 1 of 1

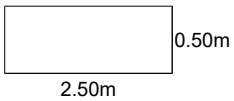
Logged by: P.Bara-Laskowski

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	ES1		32.46	0.30		Brown silty very gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint with tile, glass, clinker, and wood fragments. Abundant rootlets. MADE GROUND	0.30	
1.20	ES2			1		Reddish brown gravelly silty very sandy CLAY varying to a sandy very clayey GRAVEL. Gravel is fine to coarse subangular to rounded flint. MADE GROUND	1.50	
1.90	ES3		30.96	1.80		Light brown slightly clayey sandy fine to coarse subangular to rounded flint GRAVEL. SUPERFICIAL DEPOSITS	0.40	
			30.56	2.20		End of trial pit at 2.20 m		
				2				
				3				
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
1. Location cleared of services prior to excavation. 2. Backfilled upon completion.

Dimensions:



Stability: Unstable
Plant Used:
Mechanical Excavator

Appendix B – Chemical Analysis Results

Philip Bara-Laskowski
Sweco UK Limited
Building 7200
Cambridge Research Park
Cambridge
CB25 9TL

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-00929

Site Reference:	John Crank Building Development
Project / Job Ref:	65208409
Order No:	None Supplied
Sample Receipt Date:	23/01/2023
Sample Scheduled Date:	25/01/2023
Report Issue Number:	1
Reporting Date:	03/02/2023

Authorised by:

Dave Ashworth
Technical Manager

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

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Soil Analysis Certificate						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP01	TP01	TP01	TP02	TP02
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES2	ES3	ES1	ES2
Order No: None Supplied	**Depth (m)**	0.15	0.75	1.50	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629940	629941	629942	629943	629944

Determinand	Unit	RL	Accreditation					
						(n)	(n)	(n)
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected		Not Detected	
pH	pH Units	N/a	MCERTS	7.9	8.3	7.7	8.6	9.4
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	194	326	55	493	1410
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.19	0.33	0.06	0.49	1.41
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
Organic Matter (SOM)	%	< 0.1	MCERTS	1.6	0.8	0.3	2.1	2
Arsenic (As)	mg/kg	< 2	MCERTS	14	14	16	14	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	23	20	19	18	18
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	14	15	14	18	30
Lead (Pb)	mg/kg	< 3	MCERTS	58	24	8	63	65
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	13	32	31	15	14
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	224	88	25	87	76
Total Phenols (monohydric)	mg/kg	< 1	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP03	TP04	TP04	TP05	TP05
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES1	ES2	ES1	ES3
Order No: None Supplied	**Depth (m)**	0.20	0.15	0.30	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629945	629946	629947	629948	629949

Determinand	Unit	RL	Accreditation	(n)	(n)		(n)	(n)
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected		Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.4	8.1	8.2	9.6	8.5
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	349	1250	255	476	260
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.35	1.25	0.25	0.48	0.26
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
Organic Matter (SOM)	%	< 0.1	MCERTS	2.9	2.8	1.7	1.7	0.9
Arsenic (As)	mg/kg	< 2	MCERTS	8	8	14	9	10
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	0.6	< 0.2	< 0.2	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	15	14	21	15	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	16	16	17	18	12
Lead (Pb)	mg/kg	< 3	MCERTS	44	65	56	45	28
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	11	10	24	12	13
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	48	118	54	66	53
Total Phenols (monohydric)	mg/kg	< 1	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: John Crank Building Development	**TP / BH No**	TP05	TP07	TP07	TP07	
Project / Job Ref: 65208409	**Additional Refs**	ES4	ES1	ES2	ES3	
Order No: None Supplied	**Depth (m)**	1.50	0.30	0.80	1.70	
Reporting Date: 03/02/2023	**DETS Sample No**	629950	629951	629952	629953	

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025		Not Detected			
pH	pH Units	N/a	MCERTS	8.4	9.2	8.3	7.9	
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	256	340	125	115	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.26	0.34	0.12	0.11	
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	
Organic Matter (SOM)	%	< 0.1	MCERTS	0.7	1.9	0.4	0.5	
Arsenic (As)	mg/kg	< 2	MCERTS	21	12	21	16	
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	18	19	25	23	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	16	19	16	18	
Lead (Pb)	mg/kg	< 3	MCERTS	21	67	18	15	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	31	14	41	36	
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Zinc (Zn)	mg/kg	< 3	MCERTS	38	79	36	47	
Total Phenols (monohydric)	mg/kg	< 1	NONE	< 2	< 2	< 2	< 2	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP01	TP01	TP01	TP02	TP02
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES2	ES3	ES1	ES2
Order No: None Supplied	**Depth (m)**	0.15	0.75	1.50	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629940	629941	629942	629943	629944

Determinand	Unit	RL	Accreditation			(n)	(n)	(n)
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.13	< 0.1	0.61	1.24	0.53
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.19	0.34	0.15
Fluoranthene	mg/kg	< 0.1	MCERTS	0.45	0.22	1.80	2.27	1.69
Pyrene	mg/kg	< 0.1	MCERTS	0.46	0.19	1.96	2.47	1.87
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.49	0.17	1.48	1.76	1.47
Chrysene	mg/kg	< 0.1	MCERTS	0.35	0.14	1.02	0.99	0.83
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.73	0.27	1.75	1.53	1.31
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.25	< 0.1	0.59	0.49	0.42
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.80	0.27	1.74	1.50	1.28
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.45	0.12	1	0.83	0.89
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.13	0.16	0.15
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.38	0.12	0.70	0.60	0.62
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	4.5	< 1.6	13	14.5	11.2

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP03	TP04	TP04	TP05	TP05
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES1	ES2	ES1	ES3
Order No: None Supplied	**Depth (m)**	0.20	0.15	0.30	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629945	629946	629947	629948	629949

Determinand	Unit	RL	Accreditation	(n)	(n)		(n)	(n)
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.14
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.13
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.14
Phenanthrene	mg/kg	< 0.1	MCERTS	0.34	0.36	< 0.1	0.16	1.08
Anthracene	mg/kg	< 0.1	MCERTS	0.12	< 0.1	< 0.1	< 0.1	0.28
Fluoranthene	mg/kg	< 0.1	MCERTS	1.15	0.96	0.25	0.54	1.46
Pyrene	mg/kg	< 0.1	MCERTS	1.22	0.97	0.23	0.64	1.38
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.07	1.02	0.23	0.58	1.09
Chrysene	mg/kg	< 0.1	MCERTS	0.64	0.55	0.15	0.44	0.77
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.08	1.04	0.27	0.82	1.27
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.34	0.33	< 0.1	0.28	0.48
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1.17	1.08	0.25	0.81	1.29
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.73	0.60	0.14	0.48	0.60
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.11
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.49	0.43	< 0.1	0.33	0.42
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	8.3	7.3	< 1.6	5.1	10.6

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: John Crank Building Development	**TP / BH No**	TP05	TP07	TP07	TP07	
Project / Job Ref: 65208409	**Additional Refs**	ES4	ES1	ES2	ES3	
Order No: None Supplied	**Depth (m)**	1.50	0.30	0.80	1.70	
Reporting Date: 03/02/2023	**DETS Sample No**	629950	629951	629952	629953	

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.96	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.26	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	0.18	2.36	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	0.16	2.28	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.11	1.97	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	1.52	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.15	2.95	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.97	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.16	2.76	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	1.36	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.21	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.96	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	18.6	< 1.6	< 1.6	

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP01	TP01	TP01	TP02	TP02
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES2	ES3	ES1	ES2
Order No: None Supplied	**Depth (m)**	0.15	0.75	1.50	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629940	629941	629942	629943	629944

Determinand	Unit	RL	Accreditation					
						(n)	(n)	(n)
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3	5	< 3
Aliphatic >C16 - C35	mg/kg	< 10	**MCERTS**	< 10	< 10	35	173	31
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	14	132	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	49	310	31
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	**MCERTS**	8	< 3	12	8	6
Aromatic >C21 - C35	mg/kg	< 10	**MCERTS**	43	< 10	61	93	37
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	68	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	51	< 30	73	168	43
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	122	478	74

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP03	TP04	TP04	TP05	TP05
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES1	ES2	ES1	ES3
Order No: None Supplied	**Depth (m)**	0.20	0.15	0.30	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629945	629946	629947	629948	629949

Determinand	Unit	RL	Accreditation	(n)	(n)		(n)	(n)
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	116	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44	mg/kg	< 10	NONE	55	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	171	< 30	< 30	< 30	< 30
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	8	< 3	< 3	< 3	5
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	109	18	< 10	16	< 10
Aromatic >C35 - C44	mg/kg	< 10	NONE	98	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	215	< 30	< 30	< 30	< 30
Total >C5 - C44	mg/kg	< 60	NONE	386	< 60	< 60	< 60	< 60

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: John Crank Building Development	**TP / BH No**	TP05	TP07	TP07	TP07	
Project / Job Ref: 65208409	**Additional Refs**	ES4	ES1	ES2	ES3	
Order No: None Supplied	**Depth (m)**	1.50	0.30	0.80	1.70	
Reporting Date: 03/02/2023	**DETS Sample No**	629950	629951	629952	629953	

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	8	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	30	< 10	< 10	
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	38	< 30	< 30	
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60	

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP01	TP01	TP01	TP02	TP02
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES2	ES3	ES1	ES2
Order No: None Supplied	**Depth (m)**	0.15	0.75	1.50	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629940	629941	629942	629943	629944

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

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	19/01/23
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: John Crank Building Development	**TP / BH No**	TP03	TP04	TP04	TP05	TP05
Project / Job Ref: 65208409	**Additional Refs**	ES1	ES1	ES2	ES1	ES3
Order No: None Supplied	**Depth (m)**	0.20	0.15	0.30	0.20	0.50
Reporting Date: 03/02/2023	**DETS Sample No**	629945	629946	629947	629948	629949

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

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-00929	**Date Sampled**	19/01/23	19/01/23	19/01/23	19/01/23	
Sweco UK Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: John Crank Building Development	**TP / BH No**	TP05	TP07	TP07	TP07	
Project / Job Ref: 65208409	**Additional Refs**	ES4	ES1	ES2	ES3	
Order No: None Supplied	**Depth (m)**	1.50	0.30	0.80	1.70	
Reporting Date: 03/02/2023	**DETS Sample No**	629950	629951	629952	629953	

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

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-00929	
Sweco UK Limited	
Site Reference: John Crank Building Development	
Project / Job Ref: 65208409	
Order No: None Supplied	
Reporting Date: 03/02/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
629940	TP01	ES1	0.15	7.4	Brown sandy clay with stones and rubble
629941	TP01	ES2	0.75	7.7	Brown sandy clay with stones and concrete
629942	TP01	ES3	1.50	7.4	Light brown sandy gravel with stones
629943	TP02	ES1	0.20	9.9	Brown sandy gravel with stones and concrete
629944	TP02	ES2	0.50	12.5	Brown sandy gravel with stones and concrete
629945	TP03	ES1	0.20	7.7	Brown sandy gravel with stones and concrete
629946	TP04	ES1	0.15	11.7	Brown sandy gravel with stones and rubble
629947	TP04	ES2	0.30	11.3	Brown gravelly sand with stones
629948	TP05	ES1	0.20	9.9	Brown sandy gravel with stones and concrete
629949	TP05	ES3	0.50	7.6	Brown sandy gravel with stones and concrete
629950	TP05	ES4	1.50	12.8	Brown gravelly sand with stones
629951	TP07	ES1	0.30	11.3	Brown gravelly sand with stones and concrete
629952	TP07	ES2	0.80	9.4	Brown gravelly sand with stones
629953	TP07	ES3	1.70	13.3	Light brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-00929
Sweco UK Limited
Site Reference: John Crank Building Development
Project / Job Ref: 65208409
Order No: None Supplied
Reporting Date: 03/02/2023

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

D Dried
AR As Received

Appendix C – Generic Screening Levels

Soil Screening Levels

The following generic soil screening levels can be used when assessing risks to human health. They are for guidance and should only be used where they are relevant to the site. If in any doubt, refer to the original reference. The approaches underpinning the screening levels will vary but are considered to be suitable for use until more up to date guidance is published. The preferred order of use is S4UL > C4SL > EIC > SGV > RIVM. If there is no soil screening level listed it does not automatically mean there is no screening level or risk at all. Further research or DQRA using CLEA software may be required. The chemical names below are in current scientific use. Some chemicals may have synonyms and known under other names. Chemical are presented in the order they are reported by Chemtest Ltd. Some screening levels can exceed soil saturation limits and indicate NAPL is present. Risks from NAPL should be considered separately.	S4UL = Suitable for Use Levels [A] Standard land uses are residential (with or without homegrown produce), commercial or public open space (residential or park). Refer to original publication for allotments. C4SL = Category 4 Screening Levels [B] Use for lead in the absence of an S4UL. EIC – Environmental Industries Commission [D] Use for a range of VOCs and SVOCs in the absence of an S4UL/C4SL. SGV – Soil Guideline Value [E] Use for PCBs. RIVM = Dutch Target and Intervention Values [C] Use for a range of SVOC/VOCs and cyanide and pesticide compounds in the absence of an S4UL/C4SL/EIC. Concentrations below a target value indicates soil is uncontaminated and fit for all purposes. Concentrations above an intervention value (in brackets) indicates serious soil contamination with unacceptable risks for health and/or the environment requiring remediation.

Notes and references

A. Nathanail, CP et al (2015) The LQM/CIEH S4ULs for human health risk assessment.
B. Department for Environment, Food and Rural Affairs (2014) SP1010: Development of category 4 screening levels for assessment of land affected by contamination – policy companion document.
C. Dutch National Institute for public health and the environment (RIVM) (2000) Circular on target values and intervention values for soil remediation. Amended 2009 (further amended 2013 but not published online).
D. Environmental Industries Commission, The Association of Geotechnical and Geoenvironmental Specialists and Contaminated Land: Applications in Real Environments (2009) The EIC/AGS/CL:AIRE soil generic assessment criteria for human health risk assessment.
E. Environment Agency (2009) Soil guideline values for dioxins, furans and dioxin-like PCBs in soil. Science report SC050021/Dioxins SGV.

Revision history		
9	02.02.18	New format created and includes all screening levels in common use.
9.1	19.02.18	VOC units changed from mg/kg to µg/kg. Added revision history.
9.2	06.02.18	Free and complex cyanide and thiocyanate added.
9.3	17.04.18	Coal tar surrogate marker S4UL added.
9.4	10.05.18	Total cyanide added.

Table 1 – Sweco standard suite

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
Cyanide (free)	mg/kg	RIVM	-	20	-	-	-	-
Cyanide (complex & total)	mg/kg	RIVM	-	50	-	-	-	-
Thiocyanate	mg/kg	RIVM	-	20	-	-	-	-
Boron	mg/kg	S4UL	-	290	11000	240000	21000	46000
Arsenic	mg/kg	S4UL	-	37	40	640	79	170
Cadmium	mg/kg	S4UL	-	11	85	190	120	532
Chromium (total, III)	mg/kg	S4UL	-	910	910	8600	1500	33000
Copper	mg/kg	S4UL	-	2400	7 100	68000	12000	44000
Mercury	mg/kg	S4UL	-	40	56	1100	120	240
Nickel	mg/kg	S4UL	-	180	180	980	230	3400
Lead	mg/kg	C4SL	-	200	310	2330	630	1300
Selenium	mg/kg	S4UL	-	250	430	12000	1100	1800
Zinc	mg/kg	S4UL	-	3700	40000	730000	81000	170000
Chromium (VI)	mg/kg	S4UL	-	6	6	33	7.7	220
TPH Aliphatic >C5-C6	mg/kg	S4UL	1% 2.5% 6%	42 78 160	42 78 160	3200 5900 12000	570000 590000 600000	95000 130000 180000
TPH Aliphatic >C6-C8	mg/kg	S4UL	1% 2.5% 6%	100 230 530	100 230 530	7800 17000 40000	600000 610000 620000	150000 220000 320000
TPH Aliphatic >C8-C10	mg/kg	S4UL	1% 2.5% 6%	27 65 150	27 65 150	2000 4800 11000	13000	14000 18000 21000
TPH Aliphatic >C10-C12	mg/kg	S4UL	1% 2.5% 6%	130 330 760	130 330 770	9700 23000 47000	13000	21000 23000 24000
TPH Aliphatic >C12-C16	mg/kg	S4UL	1% 2.5% 6%	1100 2400 4300	1100 2400 4400	59000 82000 90000	13000	25000 25000 26000
TPH Aliphatic >C16-C21	mg/kg	S4UL	1% 2.5% 6%	65000 92000 110000	65000 92000 110000	1600000 1700000 1800000	250000	450000 480000 490000
TPH Aliphatic >C21-C35	mg/kg	S4UL	1% 2.5% 6%	65000 92000 110000	65000 92000 110000	1600000 1700000 1800000	250000	450000 480000 490000
TPH Aromatic >C5-C7	mg/kg	S4UL	1% 2.5% 6%	70 140 300	370 690 1400	26000 46000 86000	56000	76000 84000 92000
TPH Aromatic >C7-C8	mg/kg	S4UL	1% 2.5% 6%	130 290 660	860 1800 3900	56000 110000 180000	56000	87000 95000 100000
TPH Aromatic >C8-C10	mg/kg	S4UL	1% 2.5% 6%	34 83 190	47 110 270	3500 8100 17000	5000	7200 8500 9300
TPH Aromatic >C10-C12	mg/kg	S4UL	1% 2.5% 6%	74 180 380	250 590 1200	16000 28000 34000	5000	9200 9700 10000
TPH Aromatic >C12-C16	mg/kg	S4UL	1% 2.5% 6%	140 330 660	1800 2300 2500	36000 37000 38000	5100 5100 5000	10000
TPH Aromatic >C16-C21	mg/kg	S4UL	1% 2.5% 6%	260 540 930	1900	28000	3800	7600 7700 7800
TPH Aromatic >C21-C35	mg/kg	S4UL	1% 2.5% 6%	1100 1500 1700	1900	28000	3800	7800 7800 7900
Naphthalene	mg/kg	S4UL	1% 2.5% 6%	2.3 5.6 13	2.3 5.6 13	190 460 1100	4900	1200 1900 3000

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
Acenaphthylene	mg/kg	S4UL	1% 2.5% 6%	170 420 920	2900 4600 6000	83000 97000 100000	15000	29000 30000 30000
Acenaphthene	mg/kg	S4UL	1% 2.5% 6%	210 510 1100	3000 4700 6000	84000 97000 100000	15000	29000 30000 30000
Fluorene	mg/kg	S4UL	1% 2.5% 6%	170 400 860	2800 3800 4500	63000 68000 71000	9900	20000
Phenanthrene	mg/kg	S4UL	1% 2.5% 6%	95 220 440	1300 1500 1500	22000 22000 23000	3100	6200 6200 6300
Anthracene	mg/kg	S4UL	1% 2.5% 6%	2400 5400 11000	31000 35000 37000	520000 540000 540000	74000	150000
Fluoranthene	mg/kg	S4UL	1% 2.5% 6%	280 560 890	1500 1500 1600	23000	3100	6300 6300 6400
Pyrene	mg/kg	S4UL	1% 2.5% 6%	620 1200 2000	3700 3800 3800	54000	7400	15000
Benzo[a]anthracene	mg/kg	S4UL	1% 2.5% 6%	7.2 11 13	11 14 15	170 170 180	29	49 56 62
Chrysene	mg/kg	S4UL	1% 2.5% 6%	15 22 27	30 31 32	350	57	93 110 120
Benzo[b]fluoranthene	mg/kg	S4UL	1% 2.5% 6%	2.6 3.3 3.7	3.9 4.0 4.0	44 44 45	7.1 7.2 7.2	13 15 16
Benzo[k]fluoranthene	mg/kg	S4UL	1% 2.5% 6%	77 93 100	110	1200	190	370 410 440
Benzo[a]pyrene	mg/kg	S4UL	1% 2.5% 6%	2.2 2.7 3.0	3.2	35 35 36	5.7	11 12 13
Indeno[1,2,3-c,d]pyrene	mg/kg	S4UL	1% 2.5% 6%	27 36 41	45 46 46	500 510 510	82	150 170 180
Dibenz[a,h]anthracene	mg/kg	S4UL	1% 2.5% 6%	0.24 0.28 0.3	0.31 0.32 0.32	3.5 3.6 3.6	0.57 0.57 0.58	1.1 1.3 1.4
Benzo[g,h,i]perylene	mg/kg	S4UL	1% 2.5% 6%	320 340 350	360	3900 4000 4000	640	1400 1500 1600
Coal tar (BaP as surrogate marker)	mg/kg	S4UL	1% 2.5% 6%	0.79 0.98 1.1	1.2	15	2.2	4.4 4.7 4.8
Phenols (total)	mg/kg	S4UL	1% 2.5% 6%	120 200 380	440 690 1200	440 690 1300	440 690 1300	440 690 1300
BTEX								
Benzene	µg/kg	S4UL	1% 2.5% 6%	87 170 370	380 700 1400	27000 47000 90000	72000 72000 73000	90000 100000 110000
Toluene	µg/kg	S4UL	1% 2.5% 6%	130000 290000 660000	880000 1900000 3900000	56000000 110000000 180000000	56000000 56000000 56000000	87000000 95000000 100000000
Ethylbenzene	µg/kg	S4UL	1% 2.5% 6%	47000 110000 260000	83000 190000 440000	5700000 13000000 27000000	24000000 24000000 25000000	17000000 22000000 27000000
m & p-xylene	µg/kg	S4UL	1% 2.5% 6%	56000 130000 310000	79000 180000 430000	5900000 14000000 30000000	41000000 42000000 43000000	17000000 23000000 31000000

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
o-xylene	µg/kg	S4UL	1% 2.5% 6%	60000 140000 330000	88000 210000 480000	660000 15000000 33000000	41000000 42000000 43000000	17000000 24000000 33000000
Volatile Organic Compounds (VOC) – some VOCs will also be considered SVOCs								
Chloromethane	µg/kg	EIC	1% 2.5% 6%	8.3 9.8 13	8.5 9 13	1000 1200 1600	-	-
Vinyl chloride	µg/kg	S4UL	1% 2.5% 6%	0.64 0.87 1.4	0.77 1 1.5	59 77 120	3500	4800 5000 5400
Chloroethane	µg/kg	EIC	1% 2.5% 6%	8300 11000 18000	8400 11000 18000	960000 1300000 2100000	-	-
1,1-Dichloroethene	µg/kg	EIC	1% 2.5% 6%	230 400 820	230 410 820	26000 46000 92000	-	-
Trans 1,2-Dichloroethene	µg/kg	EIC	1% 2.5% 6%	190 340 700	190 350 710	22000 40000 81000	-	-
1,1-Dichloroethane	µg/kg	EIC	1% 2.5% 6%	2400 3900 7400	2500 4100 7700	280000 450000 850000	-	-
Cis 1,2-Dichloroethene	µg/kg	EIC	1% 2.5% 6%	110 190 370	120 20 390	14000 24000 47000	-	-
Trichloromethane	µg/kg	S4UL	1% 2.5% 6%	910 1700 3400	1200 2100 4200	99000 170000 350000	2500000	2600000 2800000 3100000
1,1,1-Trichloroethane	µg/kg	S4UL	1% 2.5% 6%	8800 18000 39000	9000 18000 40000	660000 1300000 3000000	140000000	57000000 76000000 100000000
Tetrachloromethane	µg/kg	S4UL	1% 2.5% 6%	26 56 130	26 56 130	2900 6300 14000	890000 920000 950000	190000 270000 400000
Benzene	µg/kg	S4UL	1% 2.5% 6%	87 170 370	380 700 1400	27000 47000 90000	72000 72000 73000	90000 100000 110000
1,2-Dichloroethane	µg/kg	S4UL	1% 2.5% 6%	7.1 11 19	9.2 13 23	670 970 1700	29000	21000 24000 28000
Trichloroethene	µg/kg	S4UL	1% 2.5% 6%	16 34 75	17 36 80	1200 2600 5700	120000	70000 91000 120000
1,2-Dichloropropane	µg/kg	EIC	1% 2.5% 6%	24 42 84	24 42 85	3300 5900 12000	-	-
Bromodichloromethane	µg/kg	EIC	1% 2.5% 6%	16 30 61	19 34 70	2100 3700 7600	-	-
Toluene	µg/kg	S4UL	1% 2.5% 6%	130000 290000 660000	880000 1900000 3900000	56000000 110000000 180000000	56000000 56000000 56000000	87000000 95000000 100000000
1,1,2-Trichloroethane	µg/kg	EIC	1% 2.5% 6%	600 1200 2700	880 1800 3900	94000 190000 400000	-	-
Tetrachloroethene	µg/kg	S4UL	1% 2.5% 6%	180 390 900	180 400 920	19000 42000 95000	1400000	810000 110000 1500000
Chlorobenzene	µg/kg	S4UL	1% 2.5% 6%	460 1000 2400	460 1000 2400	56000 130000 290000	11000000 13000000 14000000	1300000 2000000 2900000
1,1,1,2-Tetra-chloroethane	µg/kg	S4UL	1% 2.5% 6%	1200 2800 6400	1500 3500 8200	110000 250000 560000	1400000	1500000 1800000 2100000

Ethylbenzene	µg/kg	S4UL	1% 2.5% 6%	47000 110000 260000	83000 190000 440000	5700000 13000000 27000000	24000000 24000000 25000000	17000000 22000000 27000000
m & p-Xylene	µg/kg	S4UL	1% 2.5% 6%	56000 130000 310000	79000 180000 430000	5900000 14000000 30000000	41000000 42000000 43000000	17000000 23000000 31000000
o-Xylene	µg/kg	S4UL	1% 2.5% 6%	60000 140000 330000	88000 210000 480000	660000 15000000 33000000	41000000 42000000 43000000	17000000 24000000 33000000
Styrene	µg/kg	EIC	1% 2.5% 6%	8100 19000 43000	35000 78000 170000	3300000 6500000 11000000	-	-
Isopropylbenzene	µg/kg	EIC	1% 2.5% 6%	11000 27000 64000	12000 28000 67000	1400000 3300000 7700000	-	-
Bromobenzene	µg/kg	EIC	1% 2.5% 6%	870 2000 4700	910 2100 4900	97000 220000 520000	-	-
Propylbenzene	µg/kg	EIC	1% 2.5% 6%	34000 82000 190000	40000 97000 230000	4100000 9700000 21000000	-	-
1,2,4-Trimethylbenzene	µg/kg	EIC	1% 2.5% 6%	350 850 2000	410 990 2300	42000 99000 220000	-	-
1,3-Dichlorobenzene	µg/kg	S4UL	1% 2.5% 6%	400 1000 2300	440 1100 2500	30000 73000 170000	300000	390000 440000 470000
1,4-Dichlorobenzene	µg/kg	S4UL	1% 2.5% 6%	61000 150000 350000	61000 150000 350000	4400000 10000000 25000000	17000000	36000000
1,2-Dichlorobenzene	µg/kg	S4UL	1% 2.5% 6%	23000 55000 130000	24000 57000 130000	2000000 4800000 11000000	90000000 95000000 98000000	24000000 36000000 51000000
1,2,4-Trichlorobenzene	µg/kg	S4UL	1% 2.5% 6%	2600 6400 15000	2600 6400 15000	220000 530000 1300000	15000000 17000000 19000000	1700000 2600000 4000000
Hexachlorobutadiene	µg/kg	S4UL	1% 2.5% 6%	290 700 1600	320 780 1600	31000 66000 120000	25000	48000 50000 51000
1,2,3-Trichlorobenzene	µg/kg	S4UL	1% 2.5% 6%	1500 3600 8600	1500 3700 8800	102000 250000 590000	1800000	770000 1100000 1600000
Methyl tert-butyl ether (MTBE)	µg/kg	EIC	1% 2.5% 6%	49000 84000 160000	73000 120000 220000	7900000 13000000 24000000	-	-
Semi Volatile Organic Compounds (SVOC) – some SVOCs will also be considered VOCs)								
Phenol	mg/kg	S4UL	1% 2.5% 6%	120 200 380	440 690 1200	440 690 1300	440 690 1200	440 690 1300
2-Chlorophenol	mg/kg	S4UL	1% 2.5% 6%	0.87 2 4.5	94 150 210	3500 4000 4300	620	1100
1,3-Dichlorobenzene	mg/kg	S4UL	1% 2.5% 6%	0.4 1 2.3	0.44 1.1 2.5	30 73 170	300	390 440 470
1,4-Dichlorobenzene	mg/kg	S4UL	1% 2.5% 6%	61 150 350	61 150 350	4400 10000 25000	17000	36000
1,2-Dichlorobenzene	mg/kg	S4UL	1% 2.5% 6%	23 55 130	24 57 130	2000 4800 11000	90000 95000 98000	24000 36000 51000
2-Methylphenol	mg/kg	EIC	1% 2.5% 6%	80 180 400	3700 5400 6900	160000 180000 180000	-	-
Hexachloroethane	mg/kg	EIC	1% 2.5% 6%	0.2 0.48 1.1	0.22 0.54 1.3	22 53 120	-	-

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
SVOC (contd.)								
4-Methylphenol	mg/kg	EIC	1% 2.5% 6%	80 180 400	3700 5400 6900	160000 180000 180000	-	-
2,4-Dimethylphenol	mg/kg	EIC	1% 2.5% 6%	19 43 97	210 410 730	16000 24000 30000	-	-
1,2,4-Trichlorobenzene	mg/kg	S4UL	1% 2.5% 6%	2.6 6.4 15	2.6 6.4 15	220 530 1300	15000 17000 19000	1700 2600 4000
Naphthalene	mg/kg	S4UL	1% 2.5% 6%	2.3 5.6 13	2.3 5.6 13	190 460 1100	4900	1200 1900 3000
4-Chloroaniline	mg/kg	RIVM	-	0.005 (50)	-	-	-	-
Hexachlorobutadiene	mg/kg	S4UL	1% 2.5% 6%	0.29 0.7 1.6	0.32 0.78 1.6	31 66 120	25	48 50 51
4-Chloro-3-methylphenol	mg/kg	RIVM	-	- (15)	-	-	-	-
2-Chloronaphthalene	mg/kg	EIC	1% 2.5% 6%	3.7 9.2 22	3.8 9.3 22	390 960 2200	-	-
Acenaphthylene	mg/kg	S4UL	1% 2.5% 6%	170 420 920	2900 4600 6000	83000 97000 100000	15000	29000 30000 30000
2,6-Dinitrotoluene	mg/kg	EIC	1% 2.5% 6%	0.78 1.7 3.9	78 84 87	1900	-	-
Acenaphthene	mg/kg	S4UL	1% 2.5% 6%	210 510 1100	3000 4700 6000	84000 97000 100000	15000	29000 30000 30000
2,4-Dinitrotoluene	mg/kg	EIC	1% 2.5% 6%	1.5 3.2 7.2	170 170 170	3700 3700 3800	-	-
Fluorene	mg/kg	S4UL	1% 2.5% 6%	170 400 860	2800 3800 4500	63000 68000 71000	9900	20000
Diethyl phthalate	mg/kg	EIC	1% 2.5% 6%	120 260 570	1800 3500 6300	150000 220000 290000	-	-
Hexachlorobenzene	mg/kg	S4UL	1% 2.5% 6%	1.8 3.3 4.9	4.1 5.7 6.7	110 120 120	16	30
Pentachlorophenol	mg/kg	S4UL	1% 2.5% 6%	0.22 0.52 1.2	27 29 31	400	60	110 120 120
Phenanthrene	mg/kg	S4UL	1% 2.5% 6%	95 220 440	1300 1500 1500	22000 22000 23000	3100	6200 6200 6300
Anthracene	mg/kg	S4UL	1% 2.5% 6%	2400 5400 11000	31000 35000 37000	520000 540000 540000	74000	150000
Di-n-Butyl phthalate	mg/kg	EIC	1% 2.5% 6%	13 31 67	450	15000	-	-
Fluoranthene	mg/kg	S4UL	1% 2.5% 6%	280 560 890	1500 1500 1600	23000	3100	6300 6300 6400
Pyrene	mg/kg	S4UL	1% 2.5% 6%	620 1200 2000	3700 3800 3800	54000	7400	15000
Butylbenzyl phthalate	mg/kg	EIC	1% 2.5% 6%	1400 3300 7200	42000 44000 44000	940000 940000 95000	-	-

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
SVOC (contd.)								
Benzo[a]anthracene	mg/kg	S4UL	1% 2.5% 6%	7.2 11 13	11 14 15	170 170 180	29	49 56 62
Chrysene	mg/kg	S4UL	1% 2.5% 6%	15 22 27	30 31 32	350	57	93 110 120
Bis(2-Ethylhexyl)phthalate	mg/kg	EIC	1% 2.5% 6%	280 610 1100	2700 2800 2800	85000 86000 86000	-	-
Di-n-Octyl phthalate	mg/kg	EIC	1% 2.5% 6%	2300 2800 3100	3400	89000	-	-
Benzo[k]fluoranthene	mg/kg	S4UL	1% 2.5% 6%	77 93 100	110	1200	190	370 410 440
Benzo[a]pyrene	mg/kg	S4UL	1% 2.5% 6%	2.2 2.7 3.0	3.2	35 35 36	5.7	11 12 13
Indeno[1,2,3-c,d]pyrene	mg/kg	S4UL	1% 2.5% 6%	27 36 41	45 46 46	500 510 510	82	150 170 180
Dibenz[a,h]anthracene	mg/kg	S4UL	1% 2.5% 6%	0.24 0.28 0.3	0.31 0.32 0.32	3.5 3.6 3.6	0.57 0.57 0.58	1.1 1.3 1.4
Benzo[g,h,i]perylene	mg/kg	S4UL	1% 2.5% 6%	320 340 350	360	3900 4000 4000	640	1400 1500 1600
Explosives								
HMX	mg/kg	S4UL	1% 2.5% 6%	5.7 13 26	6700	110000	13000	23000 23000 24000
NG	mg/kg	BAE	-	3.1	91	2000	140	350
PA	mg/kg	BAE	-	0.73	170	3100	150	370
PETN	mg/kg	BAE	-	6.1	130	2700	200	490
Picrite	mg/kg	BAE	-	1.7	7900	190000	13000	31000
RDX	mg/kg	S4UL	1% 2.5% 6%	120 250 540	1300	21000	2600 2600 2700	49000 51000 53000
Tetryl	mg/kg	BAE	-	22	540	8800	810	2000
2,4,6-Trinitrotoluene (TNT)	mg/kg	S4UL	1% 2.5% 6%	1.6 3.7 8.1	65 66 66	1000	130	260 270 270
Acid herbicides								
MCPA	mg/kg	RIVM	-	0.00005 (4)	-	-	-	-
Organochlorine pesticides (OCP)								
Gamma-HCH (Lindane)	mg/kg	S4UL	1% 2.5% 6%	0.06 0.14 0.33	2.9 3.3 3.5	67 69 70	8.2	14 15 15
Heptachlor	mg/kg	RIVM	-	0.0007 (4)	-	-	-	-
Aldrin	mg/kg	S4UL	1% 2.5% 6%	5.7 6.6 7.1	7.3 7.4 7.5	170	18	30 31 31
Heptachlor epoxide	mg/kg	RIVM	-	0.0000002 (4)	-	-	-	-
α-Endosulfan (I)	mg/kg	S4UL	1% 2.5% 6%	7.4 18 41	160 280 410	5600 7400 8400	1200	2400 2400 2500
4,4-DDE	mg/kg	RIVM	-	0.01 (4)	-	-	-	-
Dieldrin	mg/kg	S4UL	1% 2.5% 6%	0.97 2 3.5	7 7.3 7.4	170	18	30 30 31

Contaminant	Units	Source	SOM %	Resi. (wHP)	Resi. (woHP)	Commercial	POS(resi)	POS(park)
OCPs (contd.)								
Endrin	mg/kg	RIVM	-	0.00004	-	-	-	-
4,4-DDD	mg/kg	RIVM	-	0.01 (4)	-	-	-	-
β-Endosulfan (II)	mg/kg	S4UL	1% 2.5% 6%	7 17 39	190 320 440	6300 7800 8700	1200	2400 2400 2500
Endrin Aldehyde	mg/kg	RIVM	-	0.00004	-	-	-	-
4,4-DDT	mg/kg	RIVM	-	0.01 (4)	-	-	-	-
Endrin Ketone	mg/kg	RIVM	-	0.00004	-	-	-	-
α-Hexchlorocyclohexane	mg/kg	S4UL	1% 2.5% 6%	0.23 0.55 1.2	6.9 9.2 11	170 180 180	24	47 48 48
β-Hexchlorocyclohexane	mg/kg	S4UL	1% 2.5% 6%	0.085 0.2 0.46	3.7 3.8 3.8	65	8.1	15 15 16
Dichlorvos	mg/kg	S4UL	1% 2.5% 6%	0.032 0.066 0.14	6.4 6.5 6.6	140	16	26 26 27
Organophosphorus pesticide (OPP)								
Azinphos-methyl	mg/kg	RIVM	-	0.000005 (2)	-	-	-	-
Organonitrogen pesticide (ONP)								
Atrazine	mg/kg	S4UL	1% 2.5% 6%	3.3 7.6 17.4	610 610 620	9300 9400 9400	1200	2300 2400 2400
Polychlorinated biphenyls (PCBs)								
PCB (sum)	mg/kg	SGV [E]	6%	8	8	240	-	-
Cyanide compounds								
Cyanide (total)	mg/kg	RIVM	-	5 (20)	-	-	-	-
Cyanide (free)	mg/kg	RIVM	-	1 (20)	-	-	-	-
Cyanide (complex)	mg/kg	RIVM	-	5	-	-	-	-
Thiocyanate	mg/kg	RIVM	-	1 (20)	-	-	-	-
Other commonly tested contaminants								
Tributyl tin oxide (TBTO)	mg/kg	EIC	1% 2.5% 6%	0.25 0.59 1.3	1.4 3.1 5.7	130 180 200	-	-

Appendix D – Defining Risk

Identification of Unacceptable Risk

The method for risk evaluation is qualitative and is developed from the model provided in CIRIA C552 *Contaminated Land Risk Assessment – a guide to good practice* (DETR 2001). It involves classifying risk in terms of (a) magnitude of the potential consequence (severity) of occurrence and (b) the probability (likelihood) of occurrence. The risk rating derived is used to determine what action, if any, is needed to further investigate that risk and/or remediate to reduce risk to an acceptable level.

Task 1: Classification of Consequence

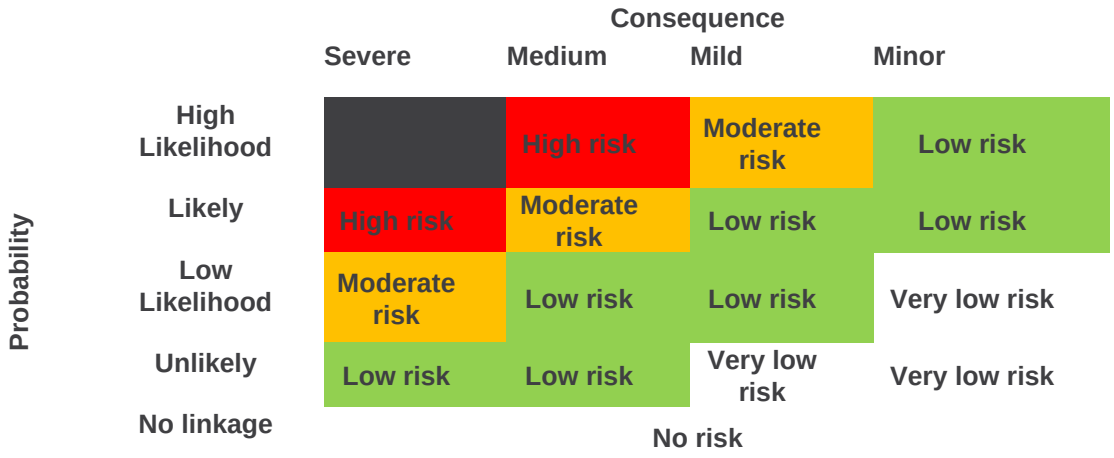
Classification	Definition	Examples
Severe	• Short-term (acute) risk to human health likely to result in "significant harm" (as defined in EPA90 Part 2a) • Short-term (acute) risk of pollution of sensitive water resource. • Short-term (acute) risk to an ecosystem, or organism forming part of an ecosystem.	Unusually high concentration of toxic substance on the surface of a garden or recreation area. Major spillage of contamination from the site into controlled waters. EA Category 1 pollution incident. Closure of an abstraction point. Explosion, causing building collapse (and death if occupied).
Medium	• Chronic damage to human health likely to result in "significant harm". • Pollution of sensitive water resource. • Significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentration of contaminant from site exceeds generic or site-specific assessment criteria for human health or water supply pipes. Presence of asbestos. Leaching of contaminants from a site to a principal or secondary (A) aquifer. Concentration exceeds DWS or EQS in Inner Source Protection Zone (SPZ1). EA Category 2 pollution incident. Death of a species or loss of habitat within an area of national importance.
Mild	• Exposure is unlikely to result in "significant harm" to human health.	Concentration of contaminant from site below generic or site-specific assessment criteria.

Classification	Definition	Examples
	• Pollution of non-sensitive water resource. • Damage to sensitive buildings, structures and services or the environment.	Pollution of secondary (B or undifferentiated) aquifer. EA Category 3 pollution incident. Damage to a building rendering it unsafe to occupy. Death of a species or loss of habitat within an area of local importance. Loss of plants in garden or landscape areas (BS3882 limits exceeded).
Minor	• Harm (but not significant harm) resulting in a financial loss or expenditure to resolve. • Non-permanent human health effects. • Easily repairable damage to buildings, structures and services	Pollution of unproductive strata.

Task 2: Classification of Probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term or there is actual evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur in the very long term.

Task 3: Risk Estimation



Task 4: Description of the Estimated Risks and Likely Action Required

Risk	Action
Very high risk	There is a high probability that severe harm could arise or there is evidence that severe harm is currently happening. This risk, if realised, is likely to result in substantial liability. **Urgent investigation and remediation are required for the site in its existing state and for development.**
High risk	Harm is likely to arise. Realisation of the risk is likely to present a significant liability. **Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term. Remediation will be required for development.**
Moderate risk	A potential linkage is identifiable. However, it is either relatively unlikely that harm would be severe or, if any harm were to occur, it is more likely that the harm would be relatively mild. **Investigation is required to quantify the risk and determine potential liability. Remediation will be required for development.**
Low risk	It is possible that harm could arise but it is likely that this harm, if realised, would at worst normally be mild. **Investigation is not normally required but could be useful to confirm a preliminary assessment. Remedial works are unlikely to be required or will be limited.**
Very low risk	There is a low possibility that harm could arise. In the event of such harm being realised it is not likely to be severe. Site is not capable of being determined under Part 2a. **No further action recommended.**