Contamination Investigation Report

at
Hampton Wick Infants & Nursery School, Normansfield Avenue, Teddington, Greater London TW11 9RP

for
Richmond and Wandsworth Council

Reference: 21324/CIR Rev1.0
April 2024

Control Document

Project
Hampton Wick Infants & Nursery School, Normansfield Avenue, Teddington, TW11 9RP

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

This document comprises the Contamination Investigation Report (CIR) and incorporates the results, discussion, and conclusions to this intrusive works. General site data is recorded below:

Commission Record	
Client	Richmond and Wandsworth Council
Site Name	Hampton Wick Infants & Nursery School, Normansfield Avenue, Teddington, Greater London TW11 9RP
Grid Reference	TQ175701
Soils Limited Quotation Ref	Q28574, dated 5th February 2024
Clients Purchase Order	C-LBR1125/dated 8th February 2024

The record of revision to this document is presented below:

Record Of Revisions		
Revision	**Date**	**Reason**
1.0	April 2024	Original to Client

Note(s): The latest revised document supersedes all previous revisions of the CIR produced by Soils Limited.

Documents associated with this development that must be referred to are given below.

Record Of Associated Documents			
Reference	**Type**	**Date**	**Creator**
XL01032/R1	Phase 1 and 2	January 2010	Clarkebond
21324/PIR	Desk Study	April 2024	Soils Limited

Limitations and Disclaimers

The report was prepared solely for the brief described in Section 1.1 of this report.

The contents, recommendations and advice given in the report are subject to the Terms and Conditions given in Soils Limited's Quotation

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the Client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

If the term "competent person" is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is a Geotechnical Investigation Report and is not necessarily a Ground Investigation Report as defined by EC7 (Eurocode 7 Part 1, §3.4, Part 2, §6.1) or a Geotechnical Design Report (Eurocode 7 Part 1, §2.8) as defined by Eurocode 7 and as such may not characterise the ground conditions and additional works may be required to comply with the requirements of EC7.

Within the report reference to ground level relates to the site level at the time of the investigation, unless otherwise stated.

Exploratory hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce an exploratory hole.

The chemical analyses were undertaken by Derwentside Environmental Testing Services (DETS) in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. “Contaminated Land” is defined in Section 57 of the Environment Act 1995 (as updated 2021) as:

“Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused”.

It must be noted that a detailed survey of the possible presence or absence of invasive species, such as Japanese Knotweed, is outside of the scope of investigation.

Deleterious materials may be present in any Made Ground that pose a potential risk to site workers, end users and adjacent vulnerable receptors. These could include a range of contaminants, including asbestos, especially if the material includes large fractions of demolition derived materials.

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

All environmental works are undertaken in the context of, and in compliance with, BS10175+A2 2017 and LCRM (EA 2021) and all other pertinent planning, standards, documentation and guidance appropriate to the site at the time of production which may include, but are not necessarily limited to, documents provided by BS/CEN/ISO, NHBC, AGS, CIEH, CIRIA, SoBRA and CLAIRE.

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Section 1 Introduction

1.1 Objective of Investigation

The Client commissioned Soils Limited to undertake an intrusive ground investigation and to prepare a Contamination Investigation Report to supply the Client and their designers with information regarding ground conditions, to assist in preparing a scheme for the development that was appropriate to the settings present on the site.

The investigation was to be made by means of contamination laboratory testing undertaken on soil samples taken from exploratory holes.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and all vulnerable receptors from any contamination identified as dictated by the Conceptual Site Model (CSM) in the Preliminary Investigation Report undertaken for the site by Soils Limited (Report ref: 21324/PIR, April 2024) and/or the Revised Conceptual Site Model presented in Appendix C.1.

1.2 Site Description

The site comprised an infant and nursery school. Structures onsite included the main school building and bike shed. The topography of the site was predominantly flat. Vegetation included grass with trees on the west and eastern areas, with the southeastern section of the site covered by hard standing. Several trees were located along the southern border of the site while the northeastern corner was covered by further grass and trees. Soils Limited were instructed to investigate a small section for the proposed developments out of the wider outside area.

The site location plan is given in Figure 1. An aerial photograph of the site and its close environs has been included in Figure 2.

1.3 Proposed Development

The proposed development comprised of the resurfacing of playground areas, and relocation of the sand pit, with the erection of a stage and two timber huts. An existing canopy was to be replaced by a new enlarged canopy. The climbing frame and some fencing and screening was also proposed to be replaced. It is anticipated that the only soft landscaping if present in the area of investigation was proposed to be raised planters.

In compiling this report reliance was placed on drawing numbers 6512 3001 P/5 and 6512 2001 P/13, dated February 2023 prepared by DHP Interdisciplinary Building Design Consultants. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the Client are presented in Appendix D.

1.4 Anticipated Geology

The 1:50,000 BGS Geology map showed the site to be situated on superficial deposits of the Kempton Park Gravel Member overlaying the London Clay Formation bedrock.

1.4.1 Kempton Park Gravel Member

The rivers of the south-east of England, including the River Thames and its tributaries, have been subject to at least three changes of level since Pleistocene times. One result has been the formation of a complex series of River Terrace Gravels. These terraces represent ancient floodplain deposits that became isolated as the river cut downwards to lower levels. The Kempton Park Gravel is found at an elevation below the current river level.

The composition of the Kempton Park Gravel varies greatly, depending on the source material available in the river's catchment. Deposits generally consist of sands and gravels of roughly bedded flint or chert gravels commonly in a matrix of silts and clays.

1.4.2 London Clay Formation

The London Clay Formation comprises stiff grey fissured clay, weathering to brown near surface. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The upper boundary member of the London Clay Formation is known as the Claygate Member and marks the transition between the deep water, predominantly clay environment and succeeding shallow-water, sand environment of the Bagshot Formation.

The lower boundary is generally marked by a thin bed of well-rounded flint gravel and/or a glauconitic horizon. The formation overlies the Harwich Formation or where the Harwich Formation is absent the Lambeth Group.

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to assist the safe development of the site. The intended investigation, as outlined within the Soils Limited quotation (Q28574, dated 5th February 2024), was to comprise the following items:

- All trial hole locations to be scanned with a Cable Avoidance Tool (C.A.T) and signal generator (GENNY) prior to breaking ground;
- 6No. - 8No. shallow windowless sampler boreholes;
- Contamination laboratory testing.

2.1.1 Actual Project Works

The actual project works were undertaken on 29th February 2024, with subsequent sample logging, laboratory testing, and reporting. The actual works comprised:

- All trial hole locations were scanned with a C.A.T and GENNY prior to breaking ground;
- 8No. windowless sampler boreholes to 2.00m bgl;
- Contamination laboratory testing.

Eight windowless sampler boreholes (WS1 – WS8) were backfilled with gravel. Exploratory hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for contamination testing.

2.2 Ground Conditions

On 29th February eight windowless sampler boreholes (WS1 – WS8) were drilled, using a Premier Drilling rig, to depths of 2.00 below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the Client.

The maximum depths of exploratory holes have been included in Table 2.1.

All exploratory holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
WS1	2.00	WS5	2.00
WS2	2.00	WS6	2.00
WS3	2.00	WS7	2.00
WS4	2.00	WS8	2.00

Note(s): The depths given in this table are taken from the ground level on-site at the time of investigation.

The approximate exploratory hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the exploratory hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference must be made to the detailed records given within Appendix B, but for the purposes of discussion, the succession of conditions encountered in the exploratory holes in descending order can be summarised as:

Made Ground/Topsoil (MG/TS)
Kempton Park Gravel Member (KPGR)

The ground conditions encountered in the exploratory holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
	Top	Bottom		
MG	0.00	0.50 – 0.80	0.60	Occasionally Tarmac or Concrete and limestone gravel over greyish brown/dark grey gravelly silty SAND or sandy GRAVEL, with flint, brick, concrete and clinker.
TS	0.00	0.30	0.30	(WS7) Greyish brown SAND with frequent rootlets and leaf matter.
KPGR	0.30 – 0.80	2.00 [1,2]	Not Proven	Light brown/brown mottled light yellowish brown slightly clayey or gravelly SAND.

Note(s): [1] Final depth of exploratory hole. [2] Base of strata not encountered. The depths given in this table are taken from the ground level on-site at the time of investigation.

2.3 Ground Conditions Encountered in Exploratory Holes

The ground conditions encountered in exploratory holes have been described below in descending order. The engineering logs are presented in Appendix B.1.

2.3.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in seven out of the eight exploratory holes from ground level to depths ranging between 0.50 (WS4) and 0.80 bgl (WS2, WS3,

WS8).

The Made Ground comprised occasional tarmac or concrete and limestone gravel over greyish brown/dark grey gravelly silty sand or sandy gravel. Gravel was fine to coarse subangular to subrounded flint, brick, concrete and clinker.

Soils described as Topsoil were encountered in one exploratory hole (WS7) from ground level to a depth of 0.30m bgl.

The Topsoil comprised greyish brown sand with frequent rootlets and leaf matter.

The established depth of Made Ground and Topsoil found at each exploratory hole location have been included in Table 2.3.

Table 2.3 Established Depth of Made Ground/Topsoil

Exploratory Hole	Strata	Depth (m bgl)
WS1	MG	0.70
WS2	MG	0.80
WS3	MG	0.80
WS4	MG	0.50
WS5	MG	0.70
WS6	MG	0.50
WS7	TS	0.30
WS8	MG	0.80

2.3.2 Kempton Park Gravel Member

Soils described as Kempton Park Gravel Member were encountered all eight exploratory holes from ground level to maximum depths of 2.00m bgl, the maximum depth of the investigation.

The established depths of Kempton Park Gravel Member found at each exploratory hole location have been included in Table 2.4.

Table 2.4 Established Depth of Kempton Park Gravel Member

Exploratory Hole	Depth (m bgl)
WS1	2.00 [1]
WS2	2.00 [1]
WS3	2.00 [1]
WS4	2.00 [1]
WS5	2.00 [1]
WS6	2.00 [1]
WS7	2.00 [1]
WS8	2.00 [1]

Note(s): [1] Final depth of exploratory hole.

2.4 Groundwater

Groundwater was not encountered within any exploratory holes during siteworks. This is

anticipated to be due to the shallow termination of boreholes and the underlying granular soils of Kempton Park Gravel Member. A groundwater strike was recorded in one borehole location onsite (BH01: 6.20m bgl, 07/09/2009) in the previous investigation undertaken (report ref: XL01032/R1, dated January 2010 undertaken by Clarkebond).

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in February 2024 when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September to the annual maximum (highest) which typically occurs around March.

Section 3 Determination of Chemical Analysis

3.1 Site Characterisation and Revised Conceptual Site Model

The Preliminary Investigation Report undertaken by Soils Limited (report ref: 21324/PIR dated April 2024) identified a low risk of ground contamination from a potentially infilled pit onsite source.

The Contamination Investigation Report identified Made Ground to depths between 0.50 (WS4) and 0.80 bgl (WS2, WS3, WS8).

There were no significant visual or olfactory indicators of contamination noted.

Superficial deposits of Kempton Park Gravel Member were encountered underlying the Made Ground. No groundwater was encountered. The conceptual site model was updated to take account Made Ground onsite and presented in Appendix C.1.

3.2 Soil Sampling

Exploratory hole locations were established to provide an overview of ground conditions across the site in relation to the proposed construction, together with enabling the collection of samples to enable chemical characterisation of the underlying strata.

Representative samples for potential environmental testing were obtained from the exploratory holes at depths of between 0.20m and 0.70m to allow appropriate representation of the materials encountered, with additional samples to be obtained, if necessary, where there was visual or olfactory evidence of contamination.

Unless otherwise stated, analytical testing was based initially on a screening suite of commonly identified inorganic and organic contaminants, taking into account the prevailing site conditions and the findings of the initial conceptual site model.

3.3 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the Preliminary Investigation Report and Contamination Investigation Report intrusive investigation.

The chemical analyses were carried out on 6No. samples of Made Ground, and 2No. samples of the Kempton Park Gravel Member. The nature of the analyses is detailed in Table 3.1.

Table 3.1 Chemical Analyses Suites - Soil

Determinants	Soil Tested	
	MG	KPGR
Metal suites: Arsenic, Boron (Water Soluble), Cadmium, Chromium (total & hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc	6	2
Organic Matter	6	2

Determinants	Soil Tested	
	MG	KPGR
pH	6	2
Polycyclic aromatic hydrocarbons (PAH) – (EPA 16)	6	2
Phenols – total monohydric	6	2
Extractable petroleum hydrocarbons (EPH) – Texas banding	6	2
Asbestos screening	6	2

The soil testing was carried out in compliance with the MCERTS performance standard, and the results are shown in Appendix C.2, test report 24-02477.

Section 4 Qualitative Risk Assessment

4.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix C.3.

4.2 Representative Contamination Criteria - Soil

The proposed development comprised of the resurfacing of playground areas, and relocation of the sand pit, with the erection of a stage and two timber huts. The existing canopy was to be replaced by a new enlarged canopy. The climbing frame and some fencing and screening was also proposed to be replaced. There was to be modification of soft landscaping.

In compiling this report reliance was placed on drawing numbers 6512 3001 P/5 and 6512 2001 P/13, dated February 2023 prepared by DHP Interdisciplinary Building Design Consultants. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic assessment criteria (GAC) for a '***Public Open Space Residential',*** end use, as presented in SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014 (C4SL), derived for the protection of human health. Where this document has not published screening values for determinants, GACs derived for the same end use have been adopted from the following published guidance; DEFRA Soil Guideline Values (SGV) and LQM/CIEH/Suitable 4 Use Level (S4UL).

To assess the potential toxicity of organic determinants (Petroleum Hydrocarbons and Polyaromatic Hydrocarbons) to the human health, soils samples were analysed for Soil Organic Matter (SOM). The selected samples analysed recorded, SOM values of between 2.0% and 11.9%. For each soil sample tested, the resultant SOM allowed for the correct comparison to be made with the appropriate guideline value for each organic determinants analysed.

4.3 Risk Assessment – Made Ground

Table 4.1 outlines the sample that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 4.1 Summary of GAC Exceedances – Made Ground

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
		None		

Note(s): Units mg/kg

The risk assessment has established potential pollutant linkage in relation to human health from elevated Lead concentrations within the Made Ground at one out of six locations tested onsite. Recommendations in relation to this material are made in Section 4.9.

4.4 Risk Assessment – Kempton Park Gravel Member

Table 4.2 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 4.2 Summary of GAC Exceedances – Kempton Park Gravel Member

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
		None		

Note(s): Units mg/kg

The risk assessment has established **no** potential pollutant linkage in relation to human health within the Kempton Park Gravel Member.

4.5 Asbestos

The test certificate for each sample submitted for contamination analysis during this investigation includes the results of an Asbestos Screen.

In each case 'Not detected' was reported.

This finding does not obviate the risk of asbestos being present on the site and the Client must seek advice from qualified and competent asbestos specialist during and prior to undertaking works to ensure compliance with appropriate legislation and guidance.

4.6 Risk to Groundwater

The site is located on a Superficial Principal Aquifer with unproductive bedrock and is not within a groundwater source protection zone. The nearest groundwater abstraction is located ~510 from the site and is for non-potable use. There is no potable groundwater abstraction within 1km of the site.

The nearest surface watercourse feature is located approximately 85m to the east of the site.

Risk to groundwater was considered negligible, and no further investigation was deemed necessary at this time.

4.7 Risk from Ground Gas Ingression

Potential sources of ground gas within influencing distance of the site identified within the CSM comprise:

- Backfilled Pit

The risks from ground gas associated with the backfilled pit onsite were considered to be **low to very low**, and due to the proposed developments being external only, the risks associated with ground gas were considered negligible, and further monitoring was not considered necessary.

4.7.1 Radon

The site is in a lower probability radon area (where less than 1% of homes are estimated to be at or above the Action Level), therefore radon protection measures are not required within new developments; and particularly not for this site, as the proposed developments are external.

4.8 Generic Quantitative Risk Assessment

Quantitative risk assessments are undertaken for the soils onsite. The CSM has been updated to take account of the assessments below and presented in Appendix C.1. The full laboratory chemical report is presented in Appendix C.2.

4.8.1 Soils

No samples tested showed concentrations in excess of the relevant C4SL for a ***Public Open Space Residential',*** end use land-use scenario.

The Tier 1 Quantitative risk assessment therefore established that there was **no risk to the human health receptors** of construction workers or future end-users.

4.9 Recommendations

Soil chemical analysis recorded no samples with substance levels over their representative guideline values.

Therefore, there was no risk to the Human Health, Building Structures and Services and Groundwater receptor, which would require a remediation strategy.

The remedial objective for the site is to ensure site clean-up removes any unacceptable risk to the identified receptors of Human Health, Building Structures and Services and Groundwater receptor.

In essence the remedial objective must sever any source-pathway-receptor pollutant linkages that have been established. Once this has been achieved, by whatever means, there can theoretically be no risk.

4.10 Protection of Services

Contamination of the ground may pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligations, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from contaminants specified in UKWIR Report 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be used in Brownfield

Sites (UKWIR, 2010), or that the proposed remedial strategy will mitigate any existing risk.

4.11 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

4.12 Excavated Material

Excavated material as waste must be defined or classified prior to any disposal, transport, recycling or re-use at or by an appropriately licensed or exempt carrier and/or off-site disposal facility. The requirements inherent in both Duty of Care and Health and Safety must also be complied with. In order to determine what is to happen, what is suitable, appropriate and most effective in the disposal of wastes, especially those subject to CDM waste management plan requirements, several factors must be considered, and competent advice must always be sought.

4.13 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

4.14 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

4.15 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

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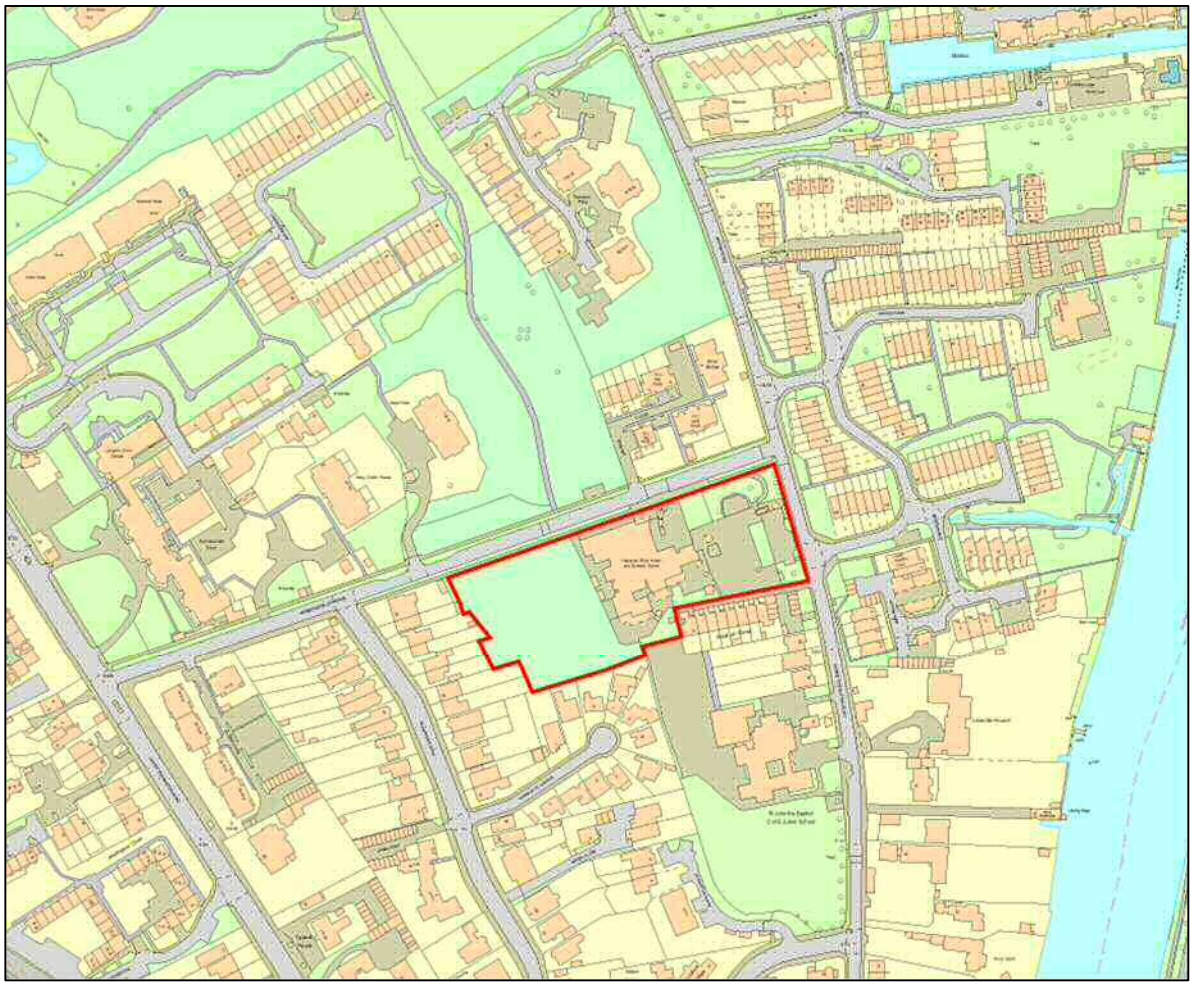

Figure 1 – Site Location Map

Job Number 21324	**Project** Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP
Client Richmond and Wandsworth Council	**Date** April 2024

Figure 2 – Aerial Photograph

Project
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP

Client
Richmond and Wandsworth Council

Date
April 2024

Job Number
21324

Figure 3 – Exploratory Hole Plan

Project
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP

Client
Richmond and Wandsworth Council

Date
April 2024

Job Number
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Appendix A Standards and Resources

The site works, soil descriptions and geotechnical testing was undertaken in accordance with the following standards were applicable:

- BS 5930:2015 and BS EN ISO 22476-2 2005+A1:2011
- BS 5930:2015 and BS EN ISO 22476-2&3:2005+A1:2011
- BS 5930:2015 and BS EN ISO 22476-3:2005+A1:2011
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- LCRM 2021 Environment Agency
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- Soil Guideline Value (SGV) (Environment Agency, 2009)
- Suitable 4 Use Level (S4UL) (Nathanail et al, 2015)
- Google Earth
- British Geological Survey Website & iGeology App

Appendix B Field Work

Appendix B.1 Engineers Logs

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.05	ES			0.10		TARMACADAM		
0.20	ES			0.25		Brownish grey, silty, sandy GRAVEL. Gravel is angular to subangular fine to coarse flint and clinker. MADE GROUND		
0.50	ES			(0.45)		Dark grey, becoming lighter with depth gravelly SAND. Sand is fine to coarse, predominantly fine. Gravel is angular to subangular fine to coarse flint, concrete and clinker. Rare glass fragments. Rare rootlets. MADE GROUND		
0.80	ES			0.70				
				(0.30)		Brown mottled dark grey becoming light brown with depth SAND. Sand is fine to coarse, predominantly fine. KEMPTON PARK GRAVEL MEMBER		
				1.00				
1.30	D			(1.00)		Light brown mottled brown and light yellowish brown slightly clayey SAND. Sand is fine to medium, predominantly fine. Occasional 30-60mm clay beds. KEMPTON PARK GRAVEL MEMBER		
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS2**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.25		Dark grey mottled light greyish brown slightly sandy SILT. Sand is fine to medium, predominantly fine. Frequent rootlets. MADE GROUND		
0.30	ES			0.40		Brownish grey very sandy GRAVEL. Sand is fine to coarse, predominantly fine. Gravel is subangular to subrounded fine to coarse flint and brick fragments. MADE GROUND		
0.50	ES			0.60		Reddish brown mottled greyish brown and yellow very sandy GRAVEL. Sand is coarse. Gravel is subangular to subrounded fine to coarse brick fragments. MADE GROUND		
0.70	ES			0.80		Dark grey gravelly SAND. Sand is fine. Gravel is subangular to well rounded fine to coarse flint and clinker. MADE GROUND		
0.90	ES			1.00		Brown fine SAND. KEMPTON PARK GRAVEL MEMBER		
				(0.60)		Firm brown very sandy CLAY with rare sand lenses. Sand is fine to medium, predominantly medium. KEMPTON PARK GRAVEL MEMBER		
						Light brown SAND. Sand is fine to medium.		
				1.60		Light brown gravelly SAND. Sand is fine to coarse, predominantly medium. Gravel is angular to subangular fine to coarse flint. KEMPTON PARK GRAVEL MEMBER		
				(0.40)				
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.15		TARMACADAM		
0.20	ES			(0.30)		Reddish brown mottled greyish brown and yellow very sandy fine to coarse subangular to subrounded GRAVEL. Sand is coarse. Cloth membrane present at base. MADE GROUND.		
0.40	ES			0.40		Dark grey becoming lighter with depth gravelly silty fine to coarse SAND with rare glass fragments. Gravel is angular to subangular fine to coarse flint, concrete and clinker. MADE GROUND		
0.60	ES			(0.40)				
0.80	ES			0.80		Brown mottled dark grey becoming light brown with depth slightly gravelly fine to medium SAND. Gravel is sub-rounded to sub-angular flint. KEMPTON PARK GRAVEL MEMBER		
1.00	ES			(0.50)				
1.40	ES			1.30		Light brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint. KEMPTON PARK GRAVEL MEMBER		
				(0.70)				
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS4**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.10		Artificial turf over CONCRETE. MADE GROUND		
0.40	ES			(0.40)		Greyish brown gravelly silty fine to coarse SAND. Gravel is fine to coarse subangular to subrounded flint, brick fragments and concrete fragments. MADE GROUND		
0.60	ES			0.50		Dark brown slightly gravelly silty fine to medium SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
0.90	ES			(0.50)				
1.10	ES			1.00		Brown mottled grey slightly gravelly silty fine to medium SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
1.40	D			(0.30)				
				1.30		Light brown gravelly slightly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular flint. KEMPTON PARK GRAVEL MEMBER		
				(0.70)				
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:	Client:	Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP	Richmond and Wandsworth Councils	**WS5**

Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**

Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.15		TARMACADAM		
0.30	ES			0.40		Reddish mottled brown sandy angular to subangular GRAVEL with cloth membrane at base. Sand is coarse. MADE GROUND		
0.50	ES			(0.30)		Dark grey becoming lighter with depth gravelly silty fine to coarse SAND with rare glass fragments. Gravel is angular to subangular fine to coarse flint and brick fragments. MADE GROUND		
0.70	ES			0.70		Brown light brown with depth slightly gravelly fine to medium SAND. Gravel is subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
0.90	ES							
1.10	ES			(0.90)				
1.70	D			1.60		Light brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
				(0.40)				
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS6**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.10		TARMACADAM		
0.30	ES			(0.40)		Dark greyish brown gravelly silty fine to coarse SAND with cloth membrane at base. Gravel is fine to coarse angular to subangular flint, brick fragments and concrete. MADE GROUND		
0.50	ES			0.50		Brown becoming light brown with depth slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
0.70	ES							
0.90	ES			(0.80)				
				1.30		Light brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
1.50	D			(0.70)		*This layer of calcium carbonate with rootlets*		
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS7**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			(0.30)		Greyish brown SAND with frequent rootlets and leaf matter. TOPSOIL		
0.30	ES			0.30		Dark grey becoming lighter with depth slightly gravelly silty fine to coarse SAND with frequent roots and rootlets. Gravel is fine to coarse angular to subangular flint. KEMPTON PARK GRAVEL MEMBER		
0.50	ES							
0.60	ES			(0.70)				
0.80	ES							
1.00	ES			1.00		Brown and light brown fine to medium SAND with rare subangular to subrounded flint gravel. KEMPTON PARK GRAVEL MEMBER		
				(0.50)				
1.50	D			1.50		Light brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
				(0.50)				
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth (m)	Dia (mm)

Remarks:

Chiselling

From (m)	To (m)	Duration	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Hampton Wick Infants & Nursery School, Normansfield Avenue, TW11 9RP		Richmond and Wandsworth Councils			**WS8**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21324	29/02/24	EF	RG	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			PREMIER 1	10/04/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	ES			0.15		TARMACADAM		
0.20	ES			(0.35)		Reddish brown mottled greyish brown very sandy fine to coarse subangular to subrounded GRAVEL with cloth membrane at base. MADE GROUND		
0.40	ES			0.50				
0.60	ES			(0.30)		Dark brown gravelly silty fine to coarse SAND. Gravel is fine to coarse angular to subangular concrete fragments, flint and clinker. MADE GROUND		
0.80	ES			0.80				
1.00	ES			(0.70)		Brown slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
1.60	D			1.50				
				(0.50)		Light brown slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded flint. KEMPTON PARK GRAVEL MEMBER		
				2.00		End of Borehole at 2.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

Appendix C Chemical Laboratory Analyses

Appendix C.1 Conceptual Site Model

Table C.1.1 CSM Revised Pre-Chemical Analyses

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Desk Study and Contamination Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Backfilled pit On-site historic usage.	Ground gas and TPH	Inhalation of vapour/gases (including Radon)	Site Workers/Site Maintenance	Mild	Low	Low	Site located on bedrock of the London Clay Formation, which was classified as unproductive strata and would act as an aquiclude to the groundwater receptors, however the Kempton Park Gravel Member was classified as a principal aquifer.	Phase II ground investigation to confirm the ground conditions present and chemical testing prior to undertaking a generic quantitative risk assessment. Due to the proposed developments being external, the risks associated with ground gas will be reduced.
			End Users					
			Off-site Users	Mild	Unlikely	Very low		
			End Users	Mild	Low	Very low		
	Ground gas, arsenic, lead, nickel and TPH	Migration via surface runoff	Surface Water	Mild	Low	Very low		
		Migration in solution via groundwater	Surface Water					
			Shallow Aquifer					
			~~Deep Aquifer~~	-	-	-		
		Direct contact with construction material	Buried Structures	Mild	Low	Very low		
			Buried Services					
	TPH	Migration of gases via permeable soils	Site Workers/Site Maintenance	Mild	Low	Very low		
			End Users					
			Off-site Users	Minor	Unlikely	Very low		
			Building and Confined Spaces					
			End Users					
			Off-site Users					
Made Ground On-site source.	Metals, Semi-metals and non-metals, PAHs, Asbestos	Inhalation of dust	Site Workers/Site Maintenance	Medium	Low	Moderate/Low	Site located on bedrock of the London Clay Formation, which was classified as unproductive strata and would act as an aquiclude to the groundwater receptors, however the Kempton Park Gravel Member was classified as a Principal Aquifer.	Phase II ground investigation and chemical testing undertaken prior to undertaking a generic quantitative risk assessment.
			End Users	Medium	Unlikely	Low		
			Off-site Users	Medium	Unlikely	Low		
	PAHs, TPHs	Inhalation of vapour/gases (including Radon)	Site Workers/Site Maintenance	Medium	Unlikely	Low		
			End Users					
			Off-site Users					
	Metals, Semi-metals and non-metals, PAHs, TPHs, pH	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Medium	Unlikely	Low		
			End Users	Medium	Low	Moderate/Low		
	Metals, Semi-metals and non-metals, PAHs, TPHs, pH	Migration via surface runoff	Surface Water	Medium	Low	Moderate/Low		
		Migration in solution via groundwater	Surface Water	Medium	Low	Moderate/Low		
			Shallow Aquifer					
			~~Deep Aquifer~~	-	-	-		
		Direct contact with construction material	Buried Structures	Mild	Low	Low		
			Buried Services					
	PAHs, TPHs	Migration of gases via permeable soils	Site Workers/Site Maintenance	Minor	Unlikely	Very low		
			End Users					
			Off-site Users					
			Building and Confined Spaces					

Table C.1.2 CSM Revised Post-Chemical Analyses

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Desk Study and Contamination Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Backfilled pit On-site historic usage.	Ground gas and TPH	Inhalation of vapour/gases (including Radon)	Site Workers/Site Maintenance	Mild	Low	Low	Site located on bedrock of the London Clay Formation, which was classified as unproductive strata and would act as an aquiclude to the groundwater receptors, however the Kempton Park Gravel Member was classified as a principal aquifer.	Phase II ground investigation and subsequent chemical testing undertaken prior to undertaking a generic quantitative risk assessment. Due to the proposed developments being external, the risks associated were considered negligible and no further testing required.
			End Users					
			Off-site Users	Mild	Unlikely	Very low		
			End Users	Mild	Low	Very low		
	Ground gas, arsenic, lead, nickel and TPH	Migration via surface runoff	Surface Water	Mild	Low	Very low		
		Migration in solution via groundwater	Surface Water					
			Shallow Aquifer					
			~~Deep Aquifer~~	-	-	-		
		Direct contact with construction material	Buried Structures	Mild	Low	Very low		
			Buried Services					
	TPH	Migration of gases via permeable soils	Site Workers/Site Maintenance	Mild	Low	Very low		
			End Users					
			Off-site Users	Minor	Unlikely	Very low		
			Building and Confined Spaces					
			End Users					
			Off-site Users					

Appendix C.2 Chemical Laboratory Results

Rob Gardner
Soils Ltd
Thomas Telford House - Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

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

DETS Report No: 24-02477

Site Reference:	Hampton Wick School
Project / Job Ref:	21324
Order No:	21324/RG
Sample Receipt Date:	08/03/2024
Sample Scheduled Date:	08/03/2024
Report Issue Number:	1
Reporting Date:	14/03/2024

Authorised by:

Steve Knight
Customer Support Manager

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

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

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

Soil Analysis Certificate						
DETS Report No: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24	05/03/24	05/03/24
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Hampton Wick School	**~TP / BH No**	WS1	WS2	WS3	WS4	WS5
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: 21324/RG	**~Depth (m)**	0.50	0.70	0.20	0.60	0.30
Reporting Date: 14/03/2024	**DETS Sample No**	703011	703012	703013	703014	703015

Determinand	**Unit**	**RL**	**Accreditation**			(n)		(n)
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	**MCERTS**	7.6	7.7	8.4	7.8	8.6
Organic Matter (SOM)	%	< 0.1	**MCERTS**	3.2	3.9	11.9	2	8.8
Arsenic (As)	mg/kg	< 2	**MCERTS**	13	17	25	20	19
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.2	< 0.2	2	< 0.2	1.4
Chromium (Cr)	mg/kg	< 2	**MCERTS**	11	17	7	27	5
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	27	32	13	21	9
Lead (Pb)	mg/kg	< 3	**MCERTS**	683	203	75	86	62
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	10	14	8	8	6
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	**MCERTS**	24	40	11	24	9
Zinc (Zn)	mg/kg	< 3	**MCERTS**	127	60	188	72	159
Total Phenols (monohydric)	mg/kg	< 2	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)
~ Sample details provided by the customer
(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

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

Soil Analysis Certificate						
DETS Report No: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24		
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied		
~Site Reference: Hampton Wick School	**~TP / BH No**	WS6	WS7	WS8		
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied		
~Order No: 21324/RG	**~Depth (m)**	0.30	0.30	0.60		
Reporting Date: 14/03/2024	**DETS Sample No**	703016	703017	703018		

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	7.9	6.1	7.8		
Organic Matter (SOM)	%	< 0.1	MCERTS	2.7	7.1	2.2		
Arsenic (As)	mg/kg	< 2	MCERTS	20	3	18		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	< 0.2	0.3		
Chromium (Cr)	mg/kg	< 2	MCERTS	20	4	19		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	25	6	26		
Lead (Pb)	mg/kg	< 3	MCERTS	235	30	118		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	15	< 3	14		
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Vanadium (V)	mg/kg	< 1	MCERTS	44	8	42		
Zinc (Zn)	mg/kg	< 3	MCERTS	115	37	89		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	3.2	< 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)
~ Sample details provided by the customer

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24	05/03/24	05/03/24
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Hampton Wick School	**~TP / BH No**	WS1	WS2	WS3	WS4	WS5
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: 21324/RG	**~Depth (m)**	0.50	0.70	0.20	0.60	0.30
Reporting Date: 14/03/2024	**DETS Sample No**	703011	703012	703013	703014	703015

Determinand	Unit	RL	Accreditation			(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	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.17	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.45	< 0.1	< 0.1	0.55	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	0.42	< 0.1	< 0.1	0.50	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.25	< 0.1	< 0.1	0.21	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	0.33	< 0.1	< 0.1	0.30	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.42	< 0.1	< 0.1	0.35	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.30	< 0.1	< 0.1	0.24	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.20	< 0.1	< 0.1	0.18	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1	0.15	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2.5	< 1.6	< 1.6	2.6	< 1.6

~ Sample details provided by the customer
(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: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24		
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied		
~Site Reference: Hampton Wick School	**~TP / BH No**	WS6	WS7	WS8		
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied		
~Order No: 21324/RG	**~Depth (m)**	0.30	0.30	0.60		
Reporting Date: 14/03/2024	**DETS Sample No**	703016	703017	703018		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.35		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.35		
Phenanthrene	mg/kg	< 0.1	MCERTS	0.21	< 0.1	3.35		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.04		
Fluoranthene	mg/kg	< 0.1	MCERTS	0.63	< 0.1	5.83		
Pyrene	mg/kg	< 0.1	MCERTS	0.57	< 0.1	4.71		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.35	< 0.1	1.66		
Chrysene	mg/kg	< 0.1	MCERTS	0.40	< 0.1	1.69		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.42	< 0.1	1.08		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.17	< 0.1	0.42		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.49	< 0.1	1.11		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.39	< 0.1	0.57		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.30	< 0.1	0.42		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	3.9	< 1.6	22.6		

~ Sample details provided by the customer

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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24	05/03/24	05/03/24
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Hampton Wick School	**~TP / BH No**	WS1	WS2	WS3	WS4	WS5
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: 21324/RG	**~Depth (m)**	0.50	0.70	0.20	0.60	0.30
Reporting Date: 14/03/2024	**DETS Sample No**	703011	703012	703013	703014	703015

Determinand	**Unit**	**RL**	**Accreditation**			(n)		(n)
EPH Texas (C6 - C8) : HS_1D_MS_Total	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40) : EH_1D_Total	mg/kg	< 6	**MCERTS**	< 6	< 6	13	10	< 6
EPH Texas (C6 - C40) : HS_1D_MS+EH_1D_Total	mg/kg	< 6	NONE	< 6	< 6	13	10	< 6

~ Sample details provided by the customer
(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 - EPH Texas Banded						
DETS Report No: 24-02477	**~Date Sampled**	05/03/24	05/03/24	05/03/24		
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied		
~Site Reference: Hampton Wick School	**~TP / BH No**	WS6	WS7	WS8		
~Project / Job Ref: 21324	**~Additional Refs**	None Supplied	None Supplied	None Supplied		
~Order No: 21324/RG	**~Depth (m)**	0.30	0.30	0.60		
Reporting Date: 14/03/2024	**DETS Sample No**	703016	703017	703018		

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8) : HS_1D_MS_Total	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
EPH Texas (>C8 - C10) : EH_1D_Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
EPH Texas (>C10 - C12) : EH_1D_Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
EPH Texas (>C12 - C16) : EH_1D_Total	mg/kg	< 1	MCERTS	< 1	< 1	3		
EPH Texas (>C16 - C21) : EH_1D_Total	mg/kg	< 1	MCERTS	6	< 1	21		
EPH Texas (>C21 - C40) : EH_1D_Total	mg/kg	< 6	MCERTS	160	17	43		
EPH Texas (C6 - C40) : HS_1D_MS+EH_1D_Total	mg/kg	< 6	NONE	166	17	67		

~ Sample details provided by the customer

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 24-02477	
Soils Ltd	
~Site Reference: Hampton Wick School	
~Project / Job Ref: 21324	
~Order No: 21324/RG	
Reporting Date: 14/03/2024	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
703011	WS1	None Supplied	0.50	11	Black sandy loam with stones
703012	WS2	None Supplied	0.70	10.2	Brown sandy loam
703013	WS3	None Supplied	0.20	2.7	Light brown sandy gravel with stones
703014	WS4	None Supplied	0.60	11.3	Brown sandy loam with vegetation
703015	WS5	None Supplied	0.30	2.8	Light brown sandy gravel with stones
703016	WS6	None Supplied	0.30	12.3	Brown sandy clay
703017	WS7	None Supplied	0.30	38	Black loamy sand with vegetation
703018	WS8	None Supplied	0.60	11.9	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
~ Sample details provided by the customer

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 24-02477

Soils Ltd

~Site Reference: Hampton Wick School

~Project / Job Ref: 21324

~Order No: 21324/RG

Reporting Date: 14/03/2024

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

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

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List of HWOL Acronyms and Operators
DETS Report No: 24-02477
Soils Ltd
~Site Reference: Hampton Wick School
~Project / Job Ref: 21324
~Order No: 21324/RG
Reporting Date: 14/03/2024

Acronym	**Description**
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total
~	Sample details provided by the customer

EPH Texas (C10 - C12) - EH_1D_Total
EPH Texas (C12 - C16) - EH_1D_Total
EPH Texas (C16 - C21) - EH_1D_Total
EPH Texas (C21 - C40) - EH_1D_Total
EPH Texas (C6 - C40) - HS_1D_MS+EH_1D_Total
EPH Texas (C6 - C8) - HS_1D_MS _Total
EPH Texas (C8 - C10) - EH_1D_Total

Appendix C.3 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land was initially defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2, and retained in the Environment Act 2021, ref 1.3, as;

'Land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

> (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
> (b) pollution of controlled waters is being, or is likely to be, caused.'

The UK guidance on the assessment of contaminated land has developed as a direct result of the introduction of these Acts. The technical guidance supporting the original legislation was summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs). These have since been replaced or superseded by Land Contamination Risk Management (LCRM) 2021, ref 1.4 produced and administrated by the Environment Agency online through the .GOV.uk website https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm .

However, the basic definitions, methodology and guidance remain essentially the same utilizing the UK Contaminated Land Exposure Assessment Models (CLEA) as within the original CLR and planning guidance it replaces or supersedes.

In establishing whether a site fulfils the statutory definition of 'contaminated land' it remains necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the identified receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A 'pollutant linkage' may therefore be defined as the confirmation of a link between a contaminant 'source' and a vulnerable at risk 'receptor' by means of a 'pathway' and that the risk is potentially significant. If there is no complete linkage, risk defaults to low to negligible and can never be potentially significant.

Assessment Methodology

A four-stage assessment process is followed for identifying potential pollutant linkages on a site. These stages are summarised in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable in the context of existing and future proposals.

Stages 1 and 2 develop an initial *'conceptual model'* based upon information collated from desk-based available and existing site information and a walkover of the site as recommended in BS10175 and LCRM. The formation of any conceptual model is an iterative process and as such it should be updated and refined throughout each phase of the project to reflect any additional information obtained and unknowns being resolved and identify the potential contaminants of concern at the site, i.e. those with the potential to cause significant harm to identified receptors.

The extent of the desk studies and enquiries to be conducted should be in general accordance with BS10175 and other UK guidance to produce an initial conceptual model highlighting the known potential risks, remaining unknowns and contaminants of concern. The information from these enquiries is presented in a desk study or preliminary report with recommendations, if necessary, for further work based upon the conceptual model findings and any identified or unresolved unknowns.

If potential pollutant linkages or potentially significant unknowns are identified within the initial conceptual model, further site investigation and report will be recommended and usually required under planning. Such investigation should be based on and driven by the findings of the initial conceptual model and planned in general accordance with BS10175, LCRM and other current UK guidance where relevant. The number of exploratory holes and samples collected for analysis should be consistent with the size, extent and nature of the site, the identified contaminants of concern and the level of initial risk identified in the initial conceptual model. This will enable a contamination risk assessment to be conducted in accordance with current UK requirements, at which point the conceptual model can be updated and any relevant pollutant linkages can be further quantified and any remaining unknowns resolved. As previously this is an iterative process that may highlight or require additional investigation to resolve to the satisfaction of the regulator.

A two-stage investigation process may therefore be more appropriate where time constraints are less of an issue with the first intrusive investigation being conducted as an initial or screening assessment to confirm or validate the presence of potential sources on site identified in the initial conceptual model and to investigate if additional unknown sources not previously identified are present. This helps to define the scope, extent and requirements of a second more refined and targeted investigation to delineate wherever possible the extent of the identified contamination, contaminants of concern and/or remaining unknowns.

All site works should be undertaken in general accordance with the British Standards BS 10175, ref. 5, for environmental only investigations and BS 5930:2015, ref. 1.6, in the case of combined Geoenvironmental and/or Geotechnical investigations.

The results of analysis are compared initially against generic guidance values which are dependent on the proposed end-use of the development and which must ultimately be based on traceable, scientifically valid and justified exposure and chemical data using the UKCLEA methodology.

The end-use and therefore potential exposure pathways may be defined as one of the following under current UK guidance;

- Residential with homegrown produce i.e. typical low rise and low-density housing with gardens where vegetables and fruits may be grown for home consumption.
- Residential without homegrown produce i.e. low-density housing where no gardens are present where vegetables and fruits could be grown for home consumption.
- Allotments – i.e. areas where vegetables and fruits are grown for home consumption but are not specifically associated with a residential property.
- Public open space residential – i.e. grassed areas adjacent and/or directly related to high density housing and other common or communal open areas on which underlying soils could be exposed but on which vegetables and fruits are not grown for consumption.
- Public open space – i.e. areas such as parks, playing fields and other recreational areas to which public access is possible but otherwise to which there is no direct residential linkage.
- Commercial – i.e. industrial premises where there is limited exposure to soil and residents are not present on site.

Standard Land-use Scenarios

The standard land-use scenarios used to develop exposure models are further detailed in the following sections:

Residential with homegrown produce

Generic scenario assumes a house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

- Critical receptor is assumed to be a young female child (zero to six years old)
- Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.

A sub-set of the Residential land-use is **Residential without Homegrown produce**. The generic scenario assumes low density housing with communal landscaped gardens where the consumption of homegrown vegetables will not occur and the pathways of direct ingestion and produce inputs are suitably moderated.

Allotments

Areas of open space commonly made available to local users but remote from residential properties, but on which tenants may grow fruit and vegetables for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make only occasional accompanied visits.

Although some allotment holders may choose to keep animals on allotments, potential exposure to animal products is not currently considered within the CLEA model.

- Critical receptor is a young female child (zero to six years old)
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours but at reduced exposure levels reflecting non-residential status.

Commercial

This generic scenario assumes a typical commercial or light industrial property at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is over working lifetime
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours but exposure reduced to reflect non-residential nature and general lack of open spaces.

Public Open Space within Residential Area

This generic scenario refers to any grassed area up to 0.05 ha that is associated with residential properties but is not for their exclusive use and on which no fruit or vegetables are grown for home consumption.

- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil which can be interacted with directly
- Predominantly used by children for play and/or access
- Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply

- older children chosen as the critical receptor on basis that they will use site most frequently (age class 4-9 years)
- ingestion rate assumed to be 75 mg.day^{-1}

Public Open Space Park

This generic scenario refers to any public park or grassed space that is more than 0.5ha in area:

- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% assumed cover)
- Female child age classes 1-6
- Soil ingestion rate of 50 mg.day^{-1}
- Occupancy period outdoors = 2 hours.day^{-1}
- Exposure frequency of 170 days.year-1 for age classes 2-18 and 85
- days.year^{-1} for age class 1
- Outdoor exposure pathways only (no tracking back of soils).

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC) generated using the CLEA model based on the exposure and land use scenario assumptions noted above.

GAC's are deliberately conservative values adopted to ensure that they are applicable to the majority of possible contaminated sites and below which there is considered a low to negligible risk to identified human health receptors, i.e. there can be no harm. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC's derived by a competent third party or the Environment Agency / DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC's to ensure that they are used appropriately.

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses or the contaminant is susceptible to wide variation depending on factors such as form and bioavailability, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific or remediation values for relevant soil contaminants based on site and contaminant specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL), refs 1.8 and 1.9, as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3) ref 1.7 used in the generation of SGVs. C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern. Where a C4SL has been published, Soils Limited has adopted them as GAC for these six substances.

For all other substances the soils will be compared to Suitable For Use Levels (S4ULs) published by LQM, ref. 1.10, which were developed for around 85 substances and are

intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants.

Where no S4UL or C4SL is available, assessment criteria may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.11, Toxicological and physico-chemical/fate and transport data used to generate the criteria has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs (DEFRA) documents;
2. Other documents produced by UK Government or state organisations;
3. European institution documents;
4. International organisation documents;
5. Foreign government institutions.

In the case of the majority of contaminants considered, the toxicological data has been drawn originally from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), where available. Where no TOX report is available reference has been made to appropriately determined health criteria values, derived from the above-noted hierarchy, as this is considered to represent appropriate peer reviewed data sources. Similarly, fate and transport data should also be determined by reference to appropriate sources and the CLEA model assumptions.

Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE ‘Guidance on Comparing Soil Contamination Data with a Critical Concentration’, ref. 1.12. Individual concentrations are then compared to the selected guideline values to identify and isolate concentrations of contaminants that are in excess of the selected screening low or no risk criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, further risk evaluation needs to be undertaken often as a site specific DQRA in line with current guidance to determine and confirm if the identified exceedances are significant in the context of the proposed development or activity.

References

1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.

1.2 Environment Act 1995, Section 57, DoE 1995.

1.3 Environment Act 2021 OEP 2021.

1.4 Land Contamination Risk Management Gov.UK (EA) 2021

1.5 BS 10175: 2011+A2:2017 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2017

1.6 BS 5930: 2015+A1:2020 '*Code of practice for ground investigations*', British Standards Institute, 2015

1.7 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008

1.8 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.

1.9 Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination', Revision 2, DEFRA research project SP1010.

1.10 The LQM/S4ULs for Human Health Risk Assessment, Nathanail P, McCaffery C, Gillett A, Ogden R, and Nathanail J, Land Quality Press, Nottingham, published 2015.

1.11 CLEA '*Software Version 1.071*' (downloaded from the CL:AIRE website , https://www.claire.co.uk/home/news/44-risk-assessment/178-soil-guideline-values)

1.12 CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE), May 2008.

Land Use				Residential With or Without Plant Uptake							Allotments			Commercial			Public Open Space (POS)								
				With home-grown produce				Without home-grown produce									Residential			Park					
				SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	Name	Authority	Date
Type	Contaminants	Species	Year																						
	Antimony		2010						550							7500							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010
Metals	Arsenic		2014				37			40			49			640			79			168	C4SL	DEFRA	2014
			2015				37			40			40			640			79			170	S4UL	LQM/CIEH	2015
	Barium		2010						1300							22000							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010
	Beryllium		2015				1.7			1.7			35			12			2.2			63	S4UL	LQM/CIEH	2015
	Boron		2015				290			11000			45			240000			21000			46000	S4UL	LQM/CIEH	2015
	Cadmium		2015				11			85			1.9			190			120			532	S4UL	LQM/CIEH	2015
			2014				26			149			4.9			410			220			880	C4SL	DEFRA	2014
	Chromium	III	2015				910			910			18000			8600			1500			33000	S4UL	LQM/CIEH	2015
		VI	2014				21			21			170			49			23			250	C4SL	DEFRA	2014
		VI	2015				6			6			1.8			33			7.7			220	S4UL	LQM/CIEH	2015
	Copper		2015				2400			7100			520			68000			12000			44000	S4UL	LQM/CIEH	2015
	Lead						210			310			84			6000			760			1400	C4SL	DEFRA	2014
	Mercury	Elemental	2012				1.0			1.0			26			26							SGV	DEFRA	2012
			2015				1.2			1.2			21			*58*			16			*30*	S4UL	LQM/CIEH	2015
		Inorganic	2012				170			170			80			36000							SGV	DEFRA	2012
			2015				40			56			19			1100			120			240	S4UL	LQM/CIEH	2015
		Methyl	2012				11			11			8			410							SGV	DEFRA	2012
			2015				11			15			6			320			40			68	S4UL	LQM/CIEH	2015
	Molybdenum		2010						670							17000							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010
	Nickel		2012				130			130			230			1800							SGV	DEFRA	2012
			2015				130			180			53			980			230			800	S4UL	LQM/CIEH	2015
	Selenium		2012				350			350			120			13000							SGV	DEFRA	2012
			2015				250			430			88			12000			1100			1800	S4UL	LQM/CIEH	2015
	Vanadium		2015				410			1200			91			9000			2000			5000	S4UL	LQM/CIEH	2015
	Zinc		2015				3700			40000			620			730000			81000			170000	S4UL	LQM/CIEH	2015
BTEX & MTBE	Benzene		2012				0.33			0.33			0.07			95							SGV	DEFRA	2012
			2014				0.87			3.3			0.18			98			140			230	C4SL	DEFRA	2014
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2012				610			610			120			4400							SGV	DEFRA	2012
			2015	130	290	660	*880*	1900	3900	22	51	120	*65000*	*110000*	*180000*	56000	56000	56000	*87000*	*95000*	*100000*	S4UL	LQM/CIEH	2015
	Ethylbenzene		2012				350			350			90			2800							SGV	DEFRA	2012
			2015	47	110	260	83	190	440	16	39	91	*4700*	*13000*	*27000*	24000	24000	25000	*17000*	*22000*	*27000*	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2012				250			250			160			2600							SGV	DEFRA	2012
			2015	60	140	330	88	210	480	28	67	160	*6600*	*15000*	*33000*	41000	42000	43000	*17000*	*24000*	*33000*	S4UL	LQM/CIEH	2015
		m-xylene	2012				240			240			180			3500							SGV	DEFRA	2012
			2015	59	140	320	82	190	450	31	74	170	*6200*	*14000*	*31000*	41000	42000	43000	*17000*	*24000*	*32000*	S4UL	LQM/CIEH	2015
		p-xylene	2012				230			230			160			3200							SGV	DEFRA	2012
			2015	56	130	310	79	180	310	29	69	160	*5900*	*14000*	*30000*	41000	42000	43000	*17000*	*23000*	*31000*	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	*3200*	*5900*	*12000*	*570000*	590000	600000	*95000*	*130000*	*180000*	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	*7800*	*17000*	*40000*	600000	610000	620000	*150000*	*220000*	*320000*	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	*2000*	*4800*	*11000*	13000	13000	13000	*14000*	*18000*	*21000*	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	*130*	*330*	*760*	*130*	*330*	*770*	2200	4400	7300	*9700*	*23000*	*47000*	13000	13000	13000	*21000*	*23000*	*24000*	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	*1100*	*2400*	*4300*	*1100*	*2400*	*4400*	11000	13000	13000	*59000*	*82000*	*90000*	13000	13000	13000	*25000*	*25000*	*26000*	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	*65000*	*92000*	*110000*	*65000*	*92000*	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	*65000*	*92000*	*140000*	*65000*	*92000*	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	*26000*	*46000*	*86000*	56000	56000	56000	*76000*	*84000*	*92000*	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	*56000*	*110000*	*180000*	56000	56000	56000	*87000*	*95000*	*100000*	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	*3500*	*8100*	*17000*	5000	5000	5000	*7200*	*8500*	*9300*	S4UL	LQM/CIEH	2015

Land Use			Residential With or Without Plant Uptake									Allotments			Commercial			Public Open Space (POS)								
			With home-grown produce			Without home-grown produce												Residential			Park					
		SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	Name	Authority	Date
Type	Contaminants Species	Year																					
	Aromatic >C10 - C12	2015	74	180	380	250	590	1200	13	31	74	*16000*	*28000*	*34000*	5000	5000	5000	*9200*	*9700*	*10000*	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16	2015	140	330	660	1800	2300	2500	23	57	130	*36000*	*37000*	*38000*	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21	2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015
	Aromatic >C21 - C35	2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44	2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aliphatic + Aromatic >C44 - C70		1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH' s) (mg/kg)	Acenaphthene	2015	210	510	1100	*3000*	*4700*	*6000*	34	85	200	*84000*	*97000*	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene	2015	170	420	920	*2900*	*4600*	*6000*	28	69	160	*83000*	*97000*	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene	2015	2400	5400	11000	*31000*	*35000*	*37000*	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene	2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene	2014			5			5.3			5.7			76			10			21	C4SL	DEFRA	2014
		2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene	2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene	2015	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene	2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene	2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene	2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015
	Fluoranthene	2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene	2015	170	400	860	*2800*	*3800*	*4500*	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene	2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene	2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	*190*	*460*	*1100*	4900	4900	4900	*1200*	*1900*	*3000*	S4UL	LQM/CIEH	2015
	Phenanthrene	2015	95	220	440	*1300*	*1500*	*1500*	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene	2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)	2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane	2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane	2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	*140000*	*57000*	*76000*	*100000*	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane	2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane	2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene	2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	*810*	*1100*	1500	S4UL	LQM/CIEH	2015
		2021	0.31	0.7	1.6	0.32	0.71	1.6	2	4.8	11	24	55	130	3200	3300	3400	1400	1900	2500	C4SL	CLAIRE	2021
	Tetrachloromethane (Carbon Tetrachloride)	2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene (TCE)	2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
		2021	0.0093	0.02	0.043	0.0097	0.02	0.045	0.032	0.072	0.16	0.73	1.5	3.4	76	78	79	41	54	69	C4SL	CLAIRE	2021
	Trichloromethane	2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (Cloroethene)	2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
		2021	0.0064	0.01	0.017	0.015	0.019	0.029	0.0017	0.0031	0.0058	1.1	1.4	2.2	7.8	7.8	7.8	18	19	19	C4SL	CLAIRE	2021
Explosives	2,4,6 Trinitrotoluene	2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)	2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)	2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	*23000*	*23000*	*24000*	S4UL	LQM/CIEH	2015
Pesticides	Aldrin	2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin	2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
	Atrazine	2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos	2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan	2015	7.4	18	41	*160*	*280*	*410*	1.2	2.9	6.8	*5600*	*7400*	*8400*	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan	2015	7	17	39	*190*	*320*	*440*	1.1	2.7	6.4	*6300*	*7800*	*8700*	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes	2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes	2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes	2015	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	S4UL	LQM/CIEH	2015
Chlorobenzenes	Chlorobenzene	2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	*1300*	*2000*	*2900*	S4UL	LQM/CIEH	2015
	1,2-Dichlorobenzene	2015	23	55	130	24	57	130	94	230	540	*2000*	*4800*	*11000*	90000	95000	98000	*24000*	*36000*	*51000*	S4UL	LQM/CIEH	2015

Land Use				Residential With or Without Plant Uptake							Allotments			Commercial			Public Open Space (POS)								
				With home-grown produce				Without home-grown produce									Residential			Park					
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	Name	Authority	Date
Type	Contaminants	Species	Year																					
	1,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015
	1,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	*4400*	*10000*	*25000*	17000	17000	1700	*36000*	*36000*	*36000*	S4UL	LQM/CIEH	2015
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	*770*	*1100*	*1600*	S4UL	LQM/CIEH	2015
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	*1700*	*2600*	*4000*	S4UL	LQM/CIEH	2015
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	*380*	*580*	*860*	S4UL	LQM/CIEH	2015
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	*1500*	*1600*	*1600*	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	*49*	*120*	*240*	78	79	79	*110*	*120*	*130*	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	*42*	*72*	*96*	13	13	13	25	26	26	S4UL	LQM/CIEH	2015
	Pentachlrobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	*640*	*770*	*830*	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015	*1.8*	*3.3*	4.9	*4.1*	*5.7*	*6.7*	0.47	1.1	2.5	*110*	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
Phenols & Chlorophenols																								
	Phenols		2012			420			420			280			*3200*							SGV	DEFRA	2012
			2015	120	200	380	440	690	1200	23	42	83	*440*	*690*	*1300*	*440*	*690*	*1300*	*440*	*690*	*1300*	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
Others																								
	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8			8			8			240							SGV	DEFRA	2012

NOTE

Priority	Guideline (mg kg^{-1})
1	Site Specific Assessment Criteria (SSAC) (Soils Limited)
2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014 and 2021)
3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)
4	2015: Suitable 4 Use Level (S4UL) (Nathanail *et al*, 2015)

For Generic Risk Assessment, the values in Bold should have priority unless site specific, Client or regulatory requirements dictate otherwise – which must be justified

Table reviewed January 2022

Appendix D Information Provided by the Client

Original Paper Size **A3**

NOTES

Do not scale dimensions from this drawing except for Local Authority planning purposes.

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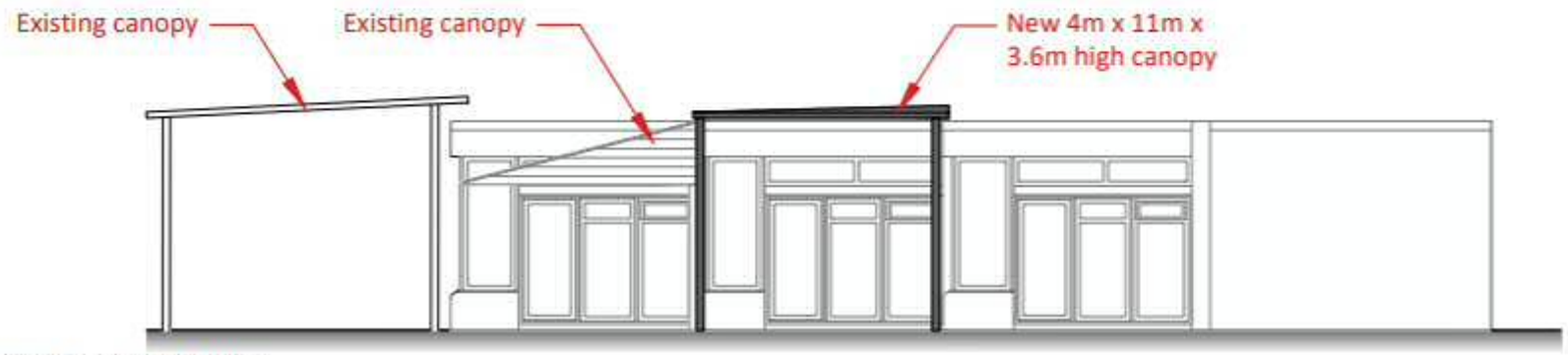
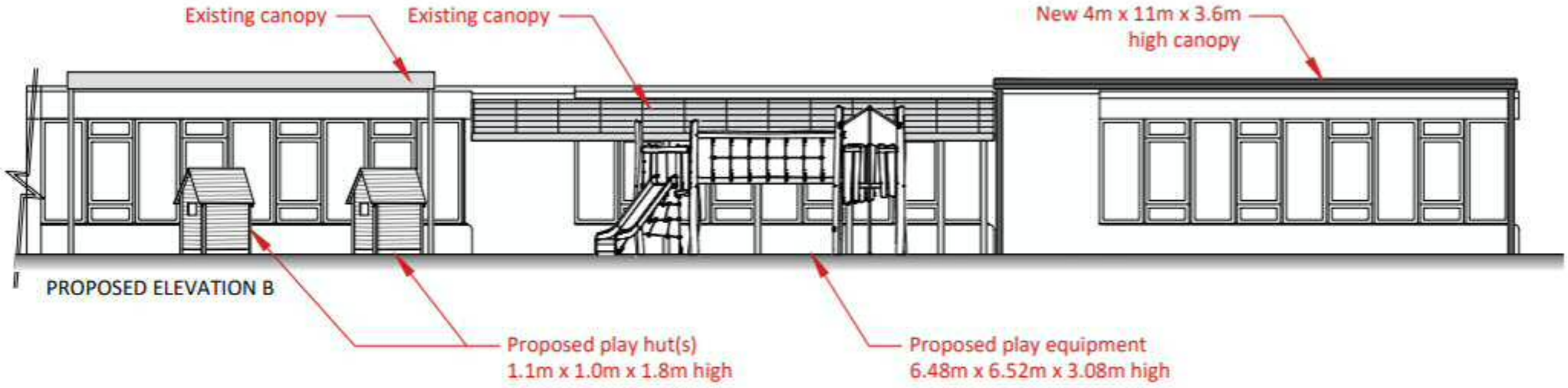
All current drawings and specifications for the project must be read in conjunction with the designers hazard and environment assessment record.

Scale 1:100

0 5m



PROPOSED ELEVATION A



PROPOSED ELEVATION B

Rev	Date	Description	Chk
P5	13.10.23	Play Equipment Updated	-
P4	16.08.23	Play Equipment Updated	-
P3	05.07.23	Play Huts Added	-
P2	29.06.23	Fence B added	-

The Pavilion,
Ascot Racecourse
High Street, Ascot
Berkshire, SL5 7JF

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Project
PLAYGROUND WORKS
Hampton Wick Infant & Nursery, 1 Normansfield Ave, Teddington, TW11 9RP

Drawing
Proposed Elevations

Drawn By	JD	Date	14.02.2023
Project Manager	GC	Scale	1:100

Project No.	Drawing No.	Stage/Rev
6512	3001	P/5

Original Paper Size **A4**

NOTES

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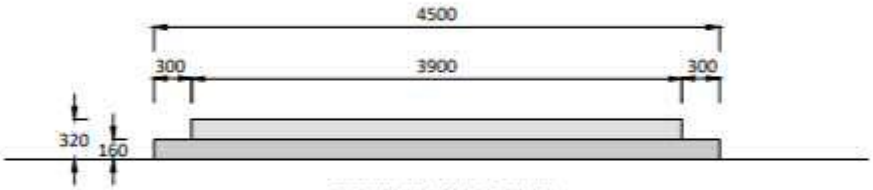
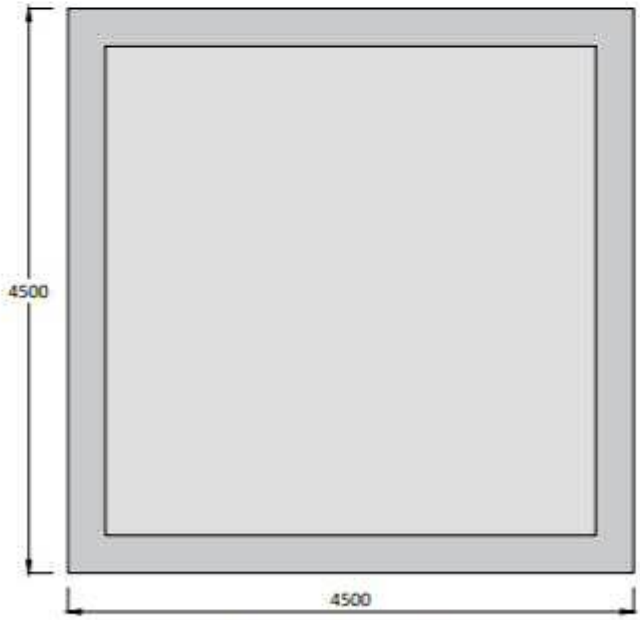
Scale 1:50

0 2m



PROPOSED STAGE SECTION



PROPOSED STAGE PLAN

The Pavilion,
Sand Hurst,
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dhp

Rev	Date	Description	Chk

Project No. 6512 | Drawing No. 3102 | Stage/Rev P/0

Project: Playground Works Hampton Wick Infant & Nursery, 1 Normansfield Ave, Teddington, TW11 9RP

Drawing: Proposed Stage Section & Plan

W:\6512 - Hampton Wick - Playground\Drawings\1 Architects\WIP\6512-Proposed Plan-Planning [2023.07.05] hut added.dwg

Original Paper Size **A4**

NOTES

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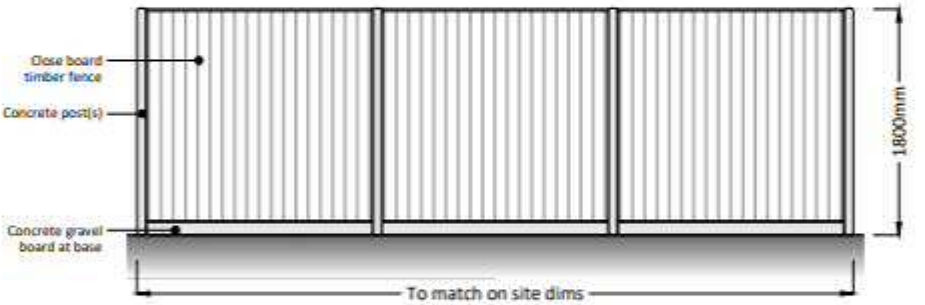
Scale 1:50

0 2m



dhp		Project No. 6512	Drawing No. 3100	Stage/Rev P/0	Project: Playground Works Hampton Wick Infant & Nursery, 1 Normansfield Ave, Teddington, TW11 9RP
					Drawing: Proposed Fence Elevation

W:\6512 - Hampton Wick - Playground\Drawings\1 Architects\WIP\6512-2000-P0-Proposed Plan - Planning (2023.02.29).dwg

NORMANSFIELD AVENUE

HAMPTON WICK

ELEVATION A

ELEVATION B

LOWER TEDDINGTON

8

1

RAEBURN CLOSE

69

Original Paper Size **A1**

NOTES

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Scale 1:200

0 10m

N

Key

- New Paving 160m²
- New Top Soil & Turf 152m²
- Existing Tarmac to remain
- New Porous Tarmac 12.3m²
- Grass rubber crumb safety surface 843.2m²
- Bound Gravel 19.6m²
- Proposed canopy
- Remove water trough and play equipment from concrete base. Remove concrete approx. 1m x 2m
- Site Boundary

PLAY EQUIPMENT

- Railway Sleepers laid on ground forming planting bed
- Existing Sand Pit Excavated Realtree
- Existing Existing Bow Top Fencing to be retained

DRAINAGE NOTE:

The existing surfaces are to be improved with new porous materials. The existing un-porous tarmac surface is to be replaced with porous tarmac, existing grass areas are to have new top soil and turf. Existing artificial grass to be removed in places.

All new surfaces to match or improve on falls to drainage points.

P13	15.01.24	Key text update
P12	19.12.23	Canopy text update
P11	18.12.23	Tree added. Surface Updated
P10	22.11.23	Tree type updated
P9	16.10.23	Update to Trees, Cork Etc.
P8	16.08.23	Play Equipment Updated
P7	15.08.23	Removed tree/Foliage + note
P6	09.08.23	Update to notes, trees, fence
P5	19.07.23	Update to notes, trees, fence
P4	06.07.23	2 x trees relocated
P3	05.07.23	2 x trees relocated
P2	05.05.23	2 x trees added. Fence added
P1	05.05.23	Play equipment text added
Rev	Date	Description

The Pavilion,
Ascot Racecourse
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Berkshire, SL5 7JF
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W www.dhpark.co.uk

dhp

Project
PLAYGROUND WORKS
Hampton Wick Infant & Nursery, 1 Normansfield Ave, Teddington, TW11 9RP

Drawing
Proposed Site Plan

Drawn By	JD	Date	16.02.2023
Project Manager	GC	Scale	1:200
Project No.	Drawing No.	Stage/Rev	
6512	2001	P/13	

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