

Park Lane, Knebworth

Phase 2 Geo-Environmental Investigation and Risk Assessment

Job Number: LKC251040

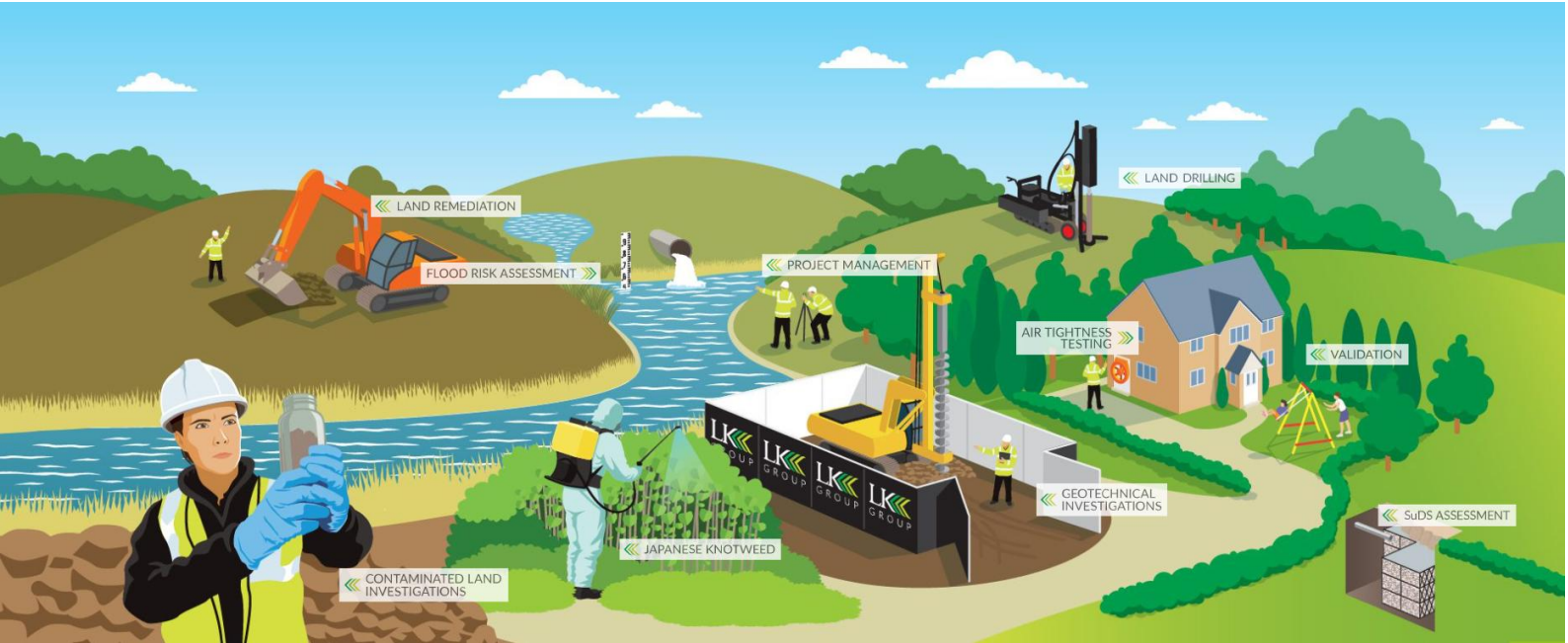
Date: May 2025

Client: Burleigh Dell Developments Ltd



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Site Address	Land adjacent to Martlets, 66 Park Lane, Knebworth, SG3 6PW.
Report Title	Phase 2 Geo-Environmental Investigation and Risk Assessment.
Job Number	LKC251040
Client	Burleigh Dell Developments Ltd.

Revision	0	Date of Issue	09/05/2025
Document Ref:	LKC251040-B1-GI-Park Lane, Knebworth R0		
Status	Final.		
Written By	Michaela Sheppard.		
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EXECUTIVE SUMMARY

Site Details

Location	Land to the north of Park Lane and to the east of the A1, Knebworth. Centred at approximate National Grid Reference 524315E, 220278N.
Area	7,900m ² .
Topography	Shallow slope upwards towards the north of the site between 115mAOD to 120mAOD, at the same topography as adjacent land.
Current Site Use	Soft landscaping associated with 66 Park Lane. A hardstanding road is present in the central south of the site.
Proposed Development	9no. residential houses including gardens, soft landscaping, access road and associated infrastructure.

Site Setting

Main Historical Features	Onsite: Vacant land, vegetated garden. Surrounding Area: 2no. Ponds, Gravel Pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Clay with Flints formation (Clay, silt sand and gravel). Unproductive Aquifer. Bedrock: Lewes Nodular Chalk formation and Seaford Chalk Formation (Chalk). Principal Aquifer.
Site Reconnaissance	Concrete path runs through the centre of the site. Hardstood driveway into the property and in the southern central region of the site. The south of the site features a small woodland area. A bonfire/fly tipping area is located in the northeastern corner of the site. The site is accessible through a residential driveway off Park Lane. No visual or olfactory evidence of contamination identified. Park lane and residential housing to the south. The northeast and west of the site are bounded by vacant fields.
Landfills / Infilled Ground	No recorded landfills. Potentially infilled ground identified.
Recommendations	Site Investigation was recommended to further assess geo-environmental risk.

Ground Investigation Work Undertaken

Date of Investigation:	2 nd April 2025.
Intrusive Investigation Work Undertaken:	4no. window sample boreholes. 8no. hand dug pits. Contamination and geotechnical testing. Infiltration Testing.

Ground Conditions

Topsoil	Horizons of gravelly sand with rootlets and anthropogenic material including ash and brick fragments.
Made Ground	Horizons of gravelly sand with cobbles and sandy gravelly clay with anthropogenic material including brick fragments.
Superficial	Firm clay with flint cobbles, interbedded with horizons of clayey sand with flint cobbles.
Bedrock	Weathered chalk.
Groundwater	No groundwater strike encountered during the investigation.
Obstructions	No obstructions identified within any investigation locations.
Permeability	Based on the results of the falling head tests, the permeability at test depth has been calculated within an order of magnitude of 10 ⁻⁷ m/sec.

Geotechnical Assessment

Allowable Bearing Pressure	125kN/m ² at 0.75-1.00mbgl in the Clay with Flints
Anticipated Foundation Type	Traditional shallow foundations recommended from approximately 1mbgl. If soft ground is encountered, foundations may need to be deepened / widened or ground replaced with compacted granular material.
Concrete Requirements	Based on BRE Digest 2005 ¹ – DS-1 AC-1 recommended.
Temporary support of excavation	May be required; however, temporary excavations in the Clay with Flints should remain stable in the short term
Plasticity	Consideration will need to be given to the shrink / swell of the clay strata if it is to be used as founding strata, particularly where trees/hedges are present. Foundations may need to be deepened. A moderate change potential has been calculated for the site.
Road / Pavement Design	A design CBR value of 5% can be adopted for the Clay with Flints.
Drainage	The Clay with flint is impermeable and conventional shallow depth soakaway drainage unlikely to be suitable.

Contamination Risk Assessment

PL	Contaminant	Risk	Recommendations
1	Metals PAHs	Low	No remediation required.
2	PAHs such as Naphthalene	Low	No remediation required.
3	Carbon dioxide, Methane	Moderate / Low	No remediation required.
4	Groundwater, Surface Water: (mobile contaminants)	Low	No remediation required.
5	Organic contaminants.	Low	No remediation required.

PL	Recommendation
1	No remediation required.
2	No remediation required.
3	No remediation required.
4	No remediation required.
5	No remediation required.

Other Considerations
Unexpected Contamination
Re-use of Site Generated Material
Disposal

TABLE OF CONTENTS

1.	INTRODUCTION.....	1
1.1.	Background	1
2.	SUMMARY OF PRELIMINARY RISK ASSESSMENT (PRA).....	2
2.1.	Phase 1 Preliminary Risk Assessment (PRA)	2
2.2.	Conceptual Model	2
3.	GROUND INVESTIGATION	4
3.1.	Site Investigation Scope	4
3.2.	Site Investigation Design and Methodology	4
3.3.	Well Installations.....	4
3.4.	Sampling Protocol	4
3.5.	In-situ Testing.....	5
3.6.	Gas Monitoring	6
4.	GROUND CONDITIONS.....	7
4.1.	Geology.....	7
4.2.	Groundwater.....	7
4.3.	Permeability Tests.....	7
5.	GEOTECHNICAL ASSESSMENT	9
5.1.	Proposed Development	9
5.2.	Summary of Ground Conditions	9
5.3.	Site Preparation	9
5.4.	Foundation Conditions and Bearing Capacity.....	9
5.5.	Ground Floor Slabs.....	11
5.6.	Pavement Construction	11
5.7.	Drainage.....	11
5.8.	Concrete Durability	11
5.9.	Excavations.....	11
6.	GENERIC RISK ASSESSMENT.....	13
6.1.	Introduction	13
6.2.	Soil Risk Assessment	13
6.3.	Gas Risk Assessment.....	14
6.4.	Controlled Water Assessment	14
6.5.	Potable Water Supply (Pollutant Linkage 5)	14
6.6.	Revised Contamination Conceptual Model	15
7.	SUMMARY CONCLUSIONS	17
7.1.	Ground Conditions.....	17
7.2.	Geotechnical	17
7.3.	Contamination Assessment	17
7.4.	Recommendations.....	18

FIGURES

Figure 1 – Site Location and Boundary Plan

Figure 2 – Proposed Development Plan

Figure 3 – Site Investigation Location Plan

APPENDICES

- Appendix A – Risk Matrix
- Appendix B – Profile Logs
- Appendix C – Certificates of Analysis (Soil)
- Appendix D – Certificates of Analysis (Geotechnical)
- Appendix E – Falling Head Tests
- Appendix F – Generic Assessment Criteria Values
- Appendix G – References

1. Introduction

1.1. Background

LK Consult Ltd (LKC) has been commissioned to carry out a Phase 2 Geo-Environmental Investigation and Risk Assessment for Land Adjacent to Martlets, 66 Park Lane, Knebworth. The investigation was undertaken in support of a future planning application to develop the site for residential use.

The following work has previously been undertaken:

- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: LKC251040, dated April 2025).

This investigation has been undertaken to confirm the ground conditions below the site and to allow a contamination and geotechnical assessment to be undertaken.

The investigation will aim to confirm the risks of the potential pollutant linkages identified in the PRA and recommend further assessment / remediation, as required.

A summary of the site details is presented in Table 1-1. Figure 1 indicates the site location and boundary plan. Figure 2 indicates the proposed development.

Location	Land to the north of Park Lane and to the east of the A1, Knebworth. Centred at approximate National Grid Reference 524315E, 220278N.
Area	7,900m ² .
Topography	Shallow slope upwards towards the north of the site between 115mAOD to 120mAOD, at the same topography as adjacent land.
Current Site Use	Soft landscaping associated with 66 Park Lane. A gravel road is present in the central south of the site.
Proposed Development	9no. residential houses including gardens, soft landscaping, access road and associated infrastructure.

Table 1-1: Summary of site details.

2. Summary of Preliminary Risk Assessment (PRA)

2.1. Phase 1 Preliminary Risk Assessment (PRA)

Pertinent information has been summarised from the PRA in Table 2-1.

Main Historical Features	Onsite: Vacant land, orchard, vegetated garden. Surrounding Area: 2no. Ponds, Gravel Pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Clay with Flints Formation (Clay, silt sand and gravel). Unproductive Aquifer. Bedrock: Lewes Nodular Chalk Formation and Seaford Chalk Formation (Chalk). Principal Aquifer.
Landfills / Infilled Ground	No recorded landfills. Potentially infilled ground identified.

Table 2-1: Summary of site details, historical review, environmental settings, and site reconnaissance.

Table 2-2 summarises the geotechnical constraints which are to be considered in the ground investigation.

Made Ground	Unknown depth and constituent of made ground across the site.
Superficial	Clay anticipated below the site.
Bedrock	Strength and extent of weathering unknown. Unknown depth to bedrock.
Groundwater	Unknown depth and variability of groundwater.
Plasticity	Plasticity of clay deposits should be confirmed, particularly where trees are present or proposed, to identify the shrink / swell risk.
Sulphate	Unknown sulphate content of the made ground and natural.
Road / Pavement Design	Unknown CBR values for footpath and road design.

Table 2-2: Summary of geotechnical constraints.

2.2. Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM² has been summarised in Table 2-3.

Each pollutant linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552³. The risk matrix is provided in Appendix A.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk	Assessment and Recommendations
1	Heavy metals, PAHs, (made ground)	Dermal contact. Inhalation of soil, fibres, and dust.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No significant source of potential contamination identified. Recommendation: Intrusive investigation required to include soil sampling to confirm absence.
	Heavy metals (orchard)	Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce. Windblown dust.		Low Likelihood	Medium	Moderate / Low (localised)	Source of potential contamination in the north-west corner of the site. Given the age of the orchard, possible use of metal-based pesticides. Recommendation: Intrusive investigation required to include soil sampling.
2	PAHs such as naphthalene (made ground)	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	Significant volatile contamination not anticipated based on history. Recommendation: Intrusive investigation required to include soil sampling.
3	Hazardous / ground gas: methane, carbon dioxide (Underlying Chalk, Underlying Peat, Pond, Gravel Pit)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Unlikely	Severe	Moderate / Low	Depth of made ground not expected to pose a significant risk. No significant source of gas within 250m of site. Recommendations: Intrusive investigation required. Gas monitoring subject to ground conditions encountered.
4	PAHs, Metals (made ground)	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Unlikely	Medium	Low	Groundwater unlikely to be impacted due to unproductive superficial strata. Recommendations: No further assessment required.
5	Naphthalene (made ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Unlikely	Medium	Low	Made ground possible however significant contamination not expected at possible pipeline depths of 0.75-1.35mbgl. Recommendation: Intrusive investigation to confirm ground conditions. Sampling required if made ground present at pipeline installation depths.

Table 2-3: Preliminary Contamination Conceptual Model.

3. Ground Investigation

3.1. Site Investigation Scope

The scope of the contaminated land investigation was designed by KPT Design and agreed with the client prior to undertaking the work (LP2039-M66PL-SP-C-001 - GI Spec Date: February 2025).

This investigation was in line with the agreed scope.

3.2. Site Investigation Design and Methodology

The investigation was carried out on 2nd April 2025 and comprised the following:

- 4no. window sample boreholes drilled to 2.00-4.45 metres below ground level (mbgl) (ref. WS101 to WS104).
- 8no. hand pits (using hand auger / spade) excavated to 0.5mbgl (ref. HP101 to HP108).

All site investigation locations are shown in Figure 3.

The locations were chosen to allow adequate assessment of ground conditions across the site. Table 3-1 details the site investigation locations.

Site Investigation Locations	Rationale
WS101	Targeted previous orchard.
WS102-WS104	General site coverage.
HP101-HP108	Shallow CBR tests to advise access road design.

Table 3-1: Summary of Sampling Locations.

All profile logs are provided in Appendix B and are in line with BS14688-1⁴ and BS5930⁵.

3.3. Well Installations

2no. (WS103-WS104) of the boreholes were installed with monitoring wells for falling head tests. Monitoring wells were installed in accordance with BS10175 and CIRIA C665⁶ and generally comprised approximately 1m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

Well installation details are provided in Profile Logs in Appendix B.

3.4. Sampling Protocol

3.4.1. Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation⁷.

Soil samples of approximately 500g were recovered in amber jars and plastic tubs. All the samples were sent to DETS laboratory for chemical testing.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix C. Table 3-2 shows the soil testing undertaken.

Testing	No. Samples	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	4	A basic suite with a broad selection of contaminants where no significant evidence of contamination was identified.
Metals / metalloids, pH, water soluble sulphate, cyanide suite, phenol, TPHCWG, BTEX, MTBE, speciated PAHs, SOM and asbestos screen.	2	Although no evidence of contamination identified, detailed suite undertaken to confirm the absence of contamination and to support waste classification.
Waste Acceptance Criteria (WAC)	2	Samples of representative material which may be earmarked for disposal.

Table 3-2: Summary of Soil Testing.

Notes:

If asbestos present during screen identification and quantification will be undertaken.

Metal/metalloids=arsenic, cadmium, chromium, (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, and boron; TPHCWG=carbon banded and aromatic/aliphatic split petroleum hydrocarbons; PAH=polycyclic aromatic hydrocarbons, BTEX=benzene, toluene, ethylbenzene, and xylenes; MTBE=Methyl tert-butyl ether, SOM=Soil Organic Matter.

3.4.2. Soil Sampling (Geotechnical)

Soil samples taken during the investigation were collected in tubs, bulk bags and sealed U100 tubes and sent to GSTL for geotechnical testing.

Further details are given in the laboratory report presented in Appendix D. Table 3-3 shows the geotechnical testing undertaken.

Testing	No. Samples
Moisture Content	3
Atterberg Limits (plasticity testing)	3
Single Stage Triaxial	3
Particle Size Distribution (PSD)	3
Pipette Analysis	1

Table 3-3: Summary of Geotechnical Testing Undertaken.

3.4.3. Water Sampling / Leaching Testing

Groundwater sampling / leaching testing was not carried out as part of this investigation.

A low risk was identified in the preliminary contamination conceptual model for controlled waters (Pollutant Linkage 4) and further action was only recommended if significant soil contamination was identified on site. Based on the ground conditions encountered, LKC did not consider testing to be required. This is discussed further in section 6.4.

3.5. In-situ Testing

3.5.1. Geotechnical Testing

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. The following tests were undertaken:

- Standard Penetration Tests (SPTs) were performed in the window sample boreholes at approximately 1m intervals.
- Pocket penetrometer tests (giving undrained shear strength) were performed in the window sample boreholes within cohesive strata.

- Clegg Hammer Tests were undertaken to provide equivalent CBR values for road and pavement design.

Pocket penetrometer tests were not always possible due to the cobble content of the clay deposits.

The results are provided within Appendix B.

3.5.2. Falling Head Tests

LKC undertook falling head tests in WS103 and WS104 to assess the permeability of the ground. The tests were carried out in general accordance with guidance given in BS5930⁸ and BS22282⁹.

The tests were carried out in monitoring wells installed within the boreholes / cased window sample boreholes during drilling work.

The results are presented in Appendix E.

3.6. Gas Monitoring

A moderate/low risk was identified in the preliminary contamination conceptual model for gas (Pollutant Linkage 3) and further action was only recommended if significant organic / putrescible material was identified on site. Based on the ground conditions encountered, LKC did not consider gas monitoring to be required. This is discussed further in Section 6.3.

4. Ground Conditions

4.1. Geology

The ground conditions beneath the site are summarised below. Logs are provided in Appendix B.

4.1.1. Topsoil

Topsoil was recorded in all boreholes to depths of 0.10-0.30mbgl. The topsoil comprised horizons of gravelly sand with rootlets and anthropogenic material including ash and brick fragments.

Topsoil was also recorded in HP101, HP103, HP104 and HP105 at depths of 0.15-0.50mbgl. Topsoil comprised horizons of gravelly sand with rootlets.

4.1.2. Made Ground

Made ground was recorded in HP102, HP105 and HP106 to depths of 0.40-0.50mbgl. The made ground comprised horizons of gravelly sand with cobbles and sandy gravelly clay, with rootlets and anthropogenic material including brick fragments.

4.1.3. Natural Strata

Superficial strata comprised horizons of firm to very stiff clay with flint cobbles, interbedded with horizons clayey sand with flint cobbles.

The chalk bedrock was not encountered.

4.1.4. Contamination

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations.

4.1.5. Obstructions

No obstructions were identified within any investigation location.

4.2. Groundwater

4.2.1. Groundwater Levels

No groundwater strikes were recorded in all the boreholes. This data is provided in the profile logs (Appendix B).

4.3. Permeability Tests

4.3.1. Falling Head Tests

The results of the falling head tests are presented in Appendix E.

BS5930¹⁰ indicates that if 'H₀' is taken as the groundwater 'Head' above baseline conditions following the addition of water at the start of the permeability test; and 'H' is the measured groundwater 'Head' above baseline conditions at any given time during the test, then the time taken to reach a head ratio (H/H₀) of 0.37 is used to calculate the permeability of the soils.

Where slow progress was observed and H/H₀ of 0.37 could not be reached in the field, the basic lag time was calculated using the available data.

No water was encountered at in WS103 and WS104, therefore baseline conditions were taken as the base of the monitoring wells.

Due to the slow draining in WS103 and WS104, only one test was carried out in each borehole.

Based on the results of the falling head tests, the permeability at test depth has been calculated within an order of magnitude of 10^{-7} m/sec.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise residential housing with associated landscaping and infrastructure. Details of the proposed loadings are not known and therefore a line loading of 75kN/m has been assumed for preliminary assessment purposes only.

The finished ground levels have not been provided, and it is therefore anticipated that they will not vary significantly from current levels. However, should the development proposals or finished levels be altered then the comments/recommendations in this section may require revising.

The depths of any underground engineering works (sewers etc.) are unknown and therefore have not been considered in the following assessment. Any such works should be designed so as not to influence, or compromise, proposed or existing foundations or

5.2. Summary of Ground Conditions

Ground conditions identified across the site were not significantly variable, as detailed in Section 4.1. they typically comprised a veneer of Topsoil or Made Ground underlain by 2-3m of Clay with Flints. The Chalk bedrock was not encountered.

5.3. Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works¹¹. This should include:

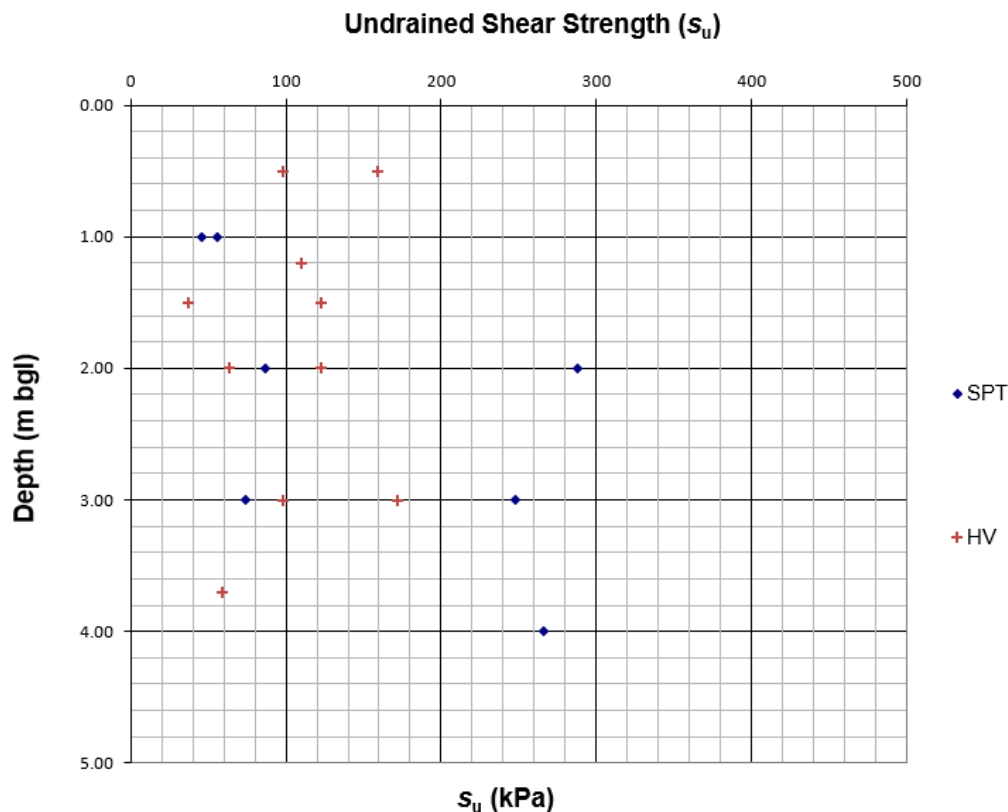
- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,

The Clay with Flints will be susceptible to deterioration from site traffic and weathered. Precautions should be taken to avoid this, as excessive disturbance may result in more onerous floor slab design, road cap thickness and increased amount of site disposal etc. Based on site observations the near surface soils may require at least some treatment or reinforcing to allow safe movement of construction plant and labour.

5.4. Foundation Conditions and Bearing Capacity

5.4.1. General

The natural cohesive material has been assessed using in-situ testing by SPT, Super Heavy Dynamic Probing and Hand Shear Vane (HV) to obtain the undrained shear strength (su) of the material. The results of the testing have been plotted against depth and is shown in Graph 5-1.



Graph 5-1: Summary of s_u Vs. Depth from In-Situ SPT, SHDP and HV Testing.

Graph 5-1 demonstrates that the strength of the cohesive deposits generally consistent with depth, the higher values are likely to be due to flint cobble obstructions.

A conservative s_u of 60kPa is assigned to the cohesive material from a depth of c. 1mbgl for the natural superficial deposits, returning an Allowable Bearing Capacity (ABC) of 125kN/m² for strip/trench fill foundations.

Three clay samples were subjected to Atterberg Limits (plasticity) and Moisture Content testing. Results are provided in Appendix C. Plasticity classification results are presented in Table 5-1.

Borehole	Sample Depth (mbgl)	Plastic Limit %	Plasticity Index %	Passig 0.425mm %	Plasticity Classification	Volume change Potential
WS101	0.0-0.3	16	20	63	Intermediate plasticity	Low
WS102	0.25-0.60	17	36	73	High plasticity	Moderate
WS104	1.5-1.6	35	53	88	Very high plasticity	High

Table 5-1: Plasticity classification results.

The modified plasticity index as detailed in Chapter 4.2-D5 of the NHBC standards (modified plasticity index = plasticity index x % less than 425 μ m sieve / 100%) characterises the clay as having a moderate change potential.

5.4.2. Foundations Options

The made ground and alluvial clays are not suitable for a founding material.

Strip foundations can be constructed 0.75-1.00mbgl into the underlying firm to stiff clay with flints with a recommended Allowable Bearing Capacity of 125kN/m².

Based on this, settlements should be in the order of 15-25mm.

Atterberg Limit determinations, summarised in Section 5.4.2, show the clay to be of very high plasticity.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally in accordance with the requirements of NHBC Standards for a clay of very high plasticity. It is recommended that at working drawing stage a foundation schedule is prepared for the development taking account of the soil plasticity and the locations of trees.

5.5. Ground Floor Slabs

Conventional residential development such as this generally opt for block and beam suspended floors due to ease of installation and the short spans involved.

5.6. Pavement Construction

An assessment of the likely California Bearing Ratio (CBR) for the made ground has been assessed from the following sources:

- In Situ CBR tests undertaken using the Clegg Hammer.
- Description of the materials encountered in the exploratory holes.

Based on this a CBR of 5% will to account for variability. It is, however, recommended that this be re-assessed using on site plate tests of the formation.

Following excavation, the sub formation should be proof rolled and any soft material inspected and removed.

5.7. Drainage

The Clay with flint is impermeable and conventional shallow depth soakaway drainage will not be suitable.

For the possible adoption of soakaway drainage in the underlying chalk, soakaway testing in line with BRE 365 should be completed and those tests be completed in the approximate locations of proposed soakaways. It is noted that the depth of the chalk has only been proven at one location and the depth to the chalk may make conventional soakaway drainage uneconomic.

5.8. Concrete Durability

Based upon the results of the chemical analyses (Appendix D), subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.9. Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant.

Groundwater seepage has not been recorded and should not be a significant aspect in shallow depth excavations.

6. Generic Risk Assessment

6.1. Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM¹²). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

6.2. Soil Risk Assessment

6.2.1. Methodology

With regards to the soil risk assessment LKC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs) ^{13, 14}.
- LQM Suitable 4 Use Levels (S4ULs) ^{15, 16, 17, 18}.

The proposed development is for residential houses with gardens, therefore the assessment criteria for residential with plant uptake has been used.

All criteria have been generated using the CLEA V1.06 model¹⁹ based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

A summary of the generic assessment criteria used in this assessment is provided in Appendix F.

6.2.2. Soil Results Comparison against Assessment Criteria

All analysis sheets are presented in Appendix C.

Results have been compared to the relevant assessment criteria and no elevated contaminants were identified.

No asbestos was identified in any soil samples analysed.

6.2.3. Direct Contact Risk – Pollutant Linkage 1

At the concentrations identified, PAHs and metal contamination onsite is not considered to pose a potential risk to future site users (residents) in gardens and soft landscaped areas, where made ground may be exposed / in contact with homegrown produce. The principal pathways are the ingestion pathways (soil, dust, and homegrown produce) and dermal contact.

The probability of PAH and metal contamination affecting site users is unlikely. With a medium consequence, the risk is considered to be low, and remediation is not recommended.

No asbestos was identified in any of the samples; therefore, the probability of asbestos affected site users is considered to be unlikely. With a medium consequence, the risk is moderate / low. At this stage, a low risk is assumed (as no asbestos identified) and remediation is not required. However, as a precaution, construction workers should be

and vigilant for any suspected ACM during groundworks (discussed further in Section 8.2).

No hydrocarbons were identified, therefore the probability of these contaminants posing a risk to site users is considered unlikely. With a medium consequence, the risk is considered to be moderate, and no remediation is recommended.

6.2.4. Risk from Inhalation of Vapours – Pollutant Linkage 2

No visual / olfactory evidence of volatile contaminants was identified during the investigation. Confirmatory soil analysis did not detect any VOCs / SVOCs above detection limits.

LKC therefore consider the probability of volatile contaminants affecting site users as unlikely. The consequence is expected to be medium, giving a low risk and no remediation is required.

6.3. Gas Risk Assessment (Pollutant Linkage 3)

Gas monitoring was not carried out as part of this assessment. The PRA identified a moderate / low risk and recommended gas monitoring if a significant depth of organic / putrescible material was identified.

No organic / putrescible material was encountered on site. Made ground comprised approximately 0.30m made ground comprising topsoil with rare brick.

Given the ground conditions encountered, LKC considers the probability of gas posing a risk to site users as unlikely. The consequence is severe, which gives a moderate / low risk. Given the known ground conditions, LKC considers there to be a low risk, and no further action is required with respect to Pollutant Linkage 3.

6.4. Controlled Water Assessment (Pollutant Linkage 4)

The PRA identified a low risk with respect to controlled waters as no significant source of mobile contamination was anticipated. Furthermore, although a Principal Aquifer is present below the site, no abstractions have been identified within influencing distance, and the site is not located in a Source Protection Zone. The surface water is not considered to be a significant receptor.

The site investigation did not identify any significant sources of likely mobile contamination within the soils. This confirms an unlikely probability of onsite contamination affecting controlled waters. With a medium consequence the risk is anticipated to be low, and no remediation is required.

6.5. Potable Water Supply (Pollutant Linkage 5)

Soil results were compared to UKWIR²⁰ guidance. Only contaminants of concern, based on the preliminary conceptual model and ground conditions encountered were analysed.

The probability of organic contaminants affecting potable water pipes is unlikely. Given the consequence is considered to be moderate, the risk (Pollutant Linkage 5) is anticipated to be low risk, and no remediation is likely to be required.

Once details of the pipeline location and depths are known a Water Pipe Risk Assessment in line with the utility provider should be undertaken to confirm the most appropriate pipework for potable water. Criteria values may vary for different utility provider areas.

6.6. Revised Contamination Conceptual Model

The preliminary contamination conceptual model (Table 2-3) has been revised following the risk assessments undertaken in Sections 6.1-6.4. The revised contamination conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

The revised contamination conceptual model is presented in Table 6-1.

Where a very low risk or low risk is identified no specific remediation is required.

Where there is a moderate / low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk	Recommendations
1	Heavy metals, PAHs, (made ground)	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No remediation recommended.
	Heavy metals (orchard)	Windblown dust.		Unlikely	Medium	Low	No remediation recommended.
2	PAHs such as naphthalene (made ground)	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No remediation recommended.
3	Hazardous / ground gas: methane, carbon dioxide (Underlying Chalk, Underlying Peat, Pond, Gravel Pit)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Unlikely	Severe	Moderate / Low	No remediation recommended.
4	PAHs, Metals (made ground)	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Unlikely	Medium	Low	No remediation recommended.
5	Naphthalene (made ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Unlikely	Medium	Low	No remediation recommended.

Table 6-1: Revised Contamination Conceptual Model.

7. Summary Conclusions

7.1. Ground Conditions

Ground conditions are summarised in Table 7-1 below.

Topsoil	Horizons of gravelly sand with rootlets and anthropogenic material including ash and brick fragments.
Made Ground	Horizons of gravelly sand with cobbles and sandy gravelly clay with anthropogenic material including brick fragments.
Superficial	Firm to very stiff clay with flint cobbles, interbedded with horizons of clayey sand with flint cobbles.
Bedrock	Weathered chalk.
Groundwater	No groundwater strike encountered during the investigation.
Obstructions	No obstructions identified within any investigation locations.
Permeability	Based on the results of the falling head tests, the permeability at test depth has been calculated within an order of magnitude of 10^{-7} m/sec.

Table 7-1: Summary of Ground Conditions.

7.2. Geotechnical

Geotechnical observations and conclusions are contained in Table 7-2 below, more detailed discussions are contained within Section 5.

Allowable Bearing Pressure	125kN/m ² at 0.75-1.00mbgl in the Clay with Flints
Anticipated Foundation Type	Traditional shallow foundations recommended from approximately 1mbgl. If soft ground is encountered, foundations may need to be deepened / widened or ground replaced with compacted granular material.
Concrete Requirements	Based on BRE Digest 2005 ²¹ – DS-1 AC-1 recommended.
Temporary support of excavation	May be required; however, temporary excavations in the Clay with Flints should remain stable in the short term
Plasticity	Consideration will need to be given to the shrink / swell of the clay strata if it is to be used as founding strata, particularly where trees/hedges are present. Foundations may need to be deepened. A moderate change potential has been calculated for the site.
Road / Pavement Design	A design CBR value of 5% can be adopted for the Clay with Flints.
Drainage	The Clay with flint is impermeable and conventional shallow depth soakaway drainage unlikely to be suitable.

Table 7-2: Geotechnical Conclusions Table.

7.3. Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 7-3 below (more detailed model provided in Section 6).

PL	Contaminant	Risk	Recommendations
1	Metals PAHs	Low	No remediation required.
2	PAHs such as Naphthalene	Low	No remediation required.
3	Carbon dioxide, Methane	Moderate / Low	No remediation required.
4	Groundwater, Surface Water: (mobile contaminants)	Low	No remediation required.
5	Organic contaminants.	Low	No remediation required.

Table 7-3: Summary Risk Table.

PL=Pollutant Linkage, see Table 6-1 for details.

7.4. Recommendations

The recommendations provided below are considered appropriate for the site based on the site investigation work undertaken. LKC should stress that no remediation, enabling works or designing works should take place until Regulatory approval has been obtained.

A summary of remediation requirements is included in Table 7-4.

PL	Recommendation
1	No remediation required.
2	No remediation required.
3	No remediation required.
4	No remediation required.
5	No remediation required.

Table 7-4: Remediation Summary.

7.4.1. Unexpected Contamination

The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required.

Impacted soils should be placed on an impermeable surface to await further assessment, treatment, or removal from site (this may be subject to chemical testing to confirm suitable waste facility). The work should be done under the supervision and instruction of an environmental consultant.

To determine that significantly impacted soils have been removed, verification samples will be collected from the base and sides of the excavation. If all impacted ground cannot be removed and contamination remains on the ground, further remediation may need to be considered.

Validation requirements should include a log of work undertaken, including photographs and details of any sampling undertaken and validation of any potential additional remedial work.

7.4.2. Disposal

Material required to be removed from site should be undertaken under an appropriate duty of care and the results of chemical analysis should be provided to a licensed landfill for confirmation of waste classification.

Waste records such as disposal tickets and waste carrier licences should be provided in the Site Completion Report. Photographic evidence of removal and waste removal tickets should be retained and included in the validation report.

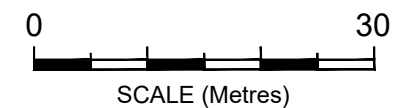
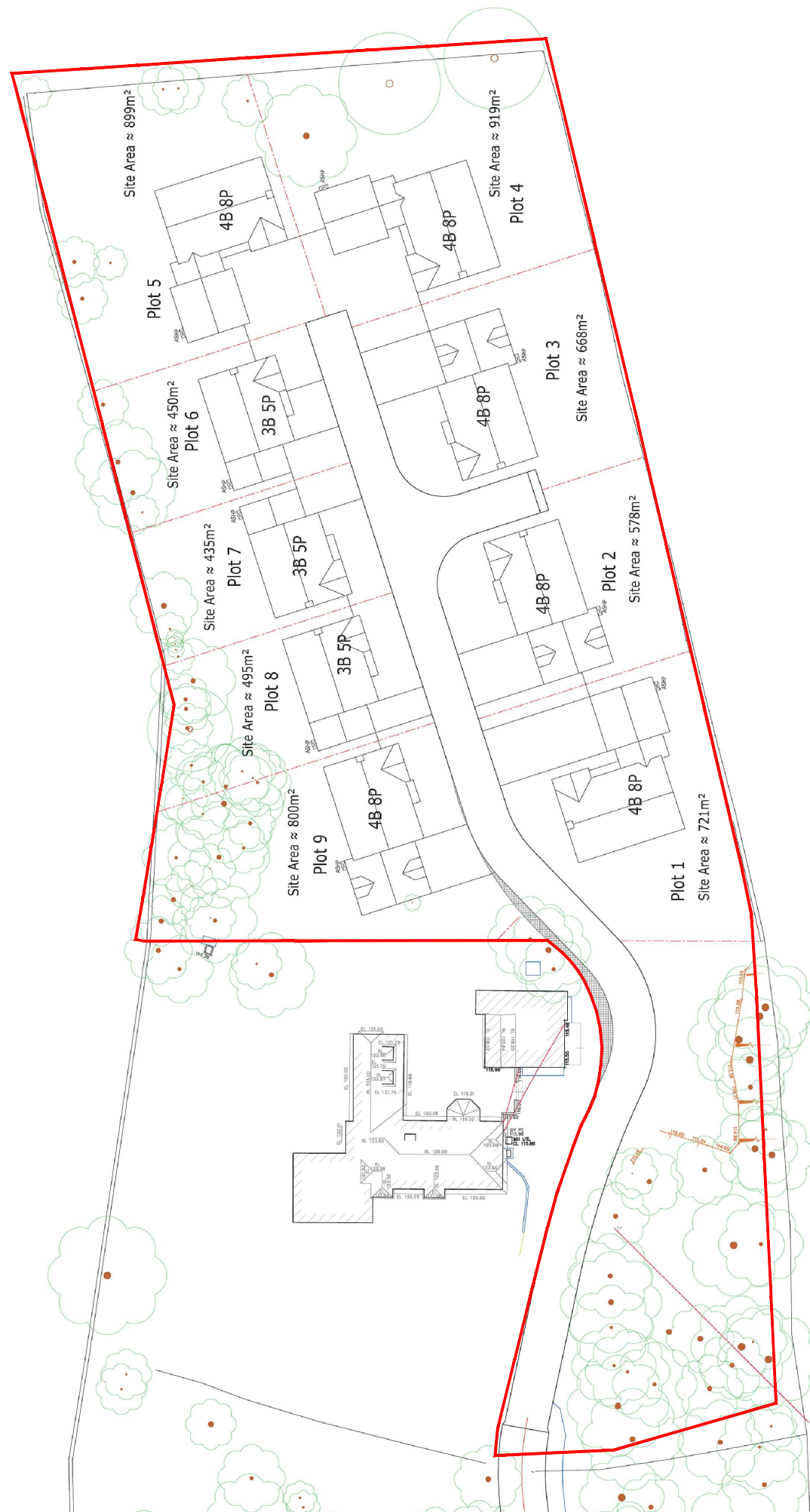
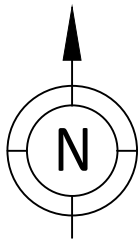
7.4.3. Site Completion Report

All remediation and validation work should be documented in a Site Completion Report. The Site Completion Report will allow discharge of relevant planning conditions.

Figures



Client: Burleigh Dell Developments Ltd				Title: Site Location & Boundary Plan			
Site: Park Lane, Knebworth				Scale (see scale bar): 1:25,000 & 1:2,000 @ A4			
Drawing No.: LKC251040		Drawn By: MS	Checked By: MB	Drawn: April 2025	Figure: 1		



KEY



Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client:
Burleigh Dell Developments Ltd

Site:
Park Lane, Knebworth

Title:
Proposed Development Plan

Job No.: LKC251040	Scale (See Scale Bar): See Scale Bar	Figure: 2	Revision:
Drawn By: AC	Checked By: MS	Drawn: Mar 2025	



KEY

-  Site Boundary
-  Window Sample Borehole (WS)
-  Hand Dug Trial Pit (HP)

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client:
Burleigh Dell Developments Ltd

Site:
Park Lane, Knebworth

Title:
Exploratory Hole Location Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC251040	See Scale Bar	3	A
Drawn By:	Checked By:	Drawn:	
AC	MS	Apr 2025	

Appendix A – Risk Matrix

RISK EVALUATION

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552²². It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring (Table A).
- Magnitude of the probability (likelihood) of the risk occurring (Table B).

Consequence (Severity)		
Classification	Definition	Example
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note: water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/properties. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High Concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled waters. Explosion, causing building collapse (can also equate to short term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ('significant harm' as defined in DETR, 2000). Pollution of sensitive water resources (note Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentrations of a contaminant from site exceed generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer (Principal and Secondary). Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures, and services ('significant harm' as defined in DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable damage to buildings, structures, and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

Table A. Classification of Consequence

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

Table B. Classification of Probability.

These classifications are then compared to indicate the risk presented by each pollutant linkage (Table C). It is important that this classification is only applied where there is a possibility (which can range from high likelihood to unlikely) of a pollutant linkage existing.

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table C. Comparison of Consequence against Probability

Once the risk has been determined the corresponding action can be assessed (Table D).

Risk	Action Required
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table D. Description of the Classification and Likely Action Required.

Where a very low risk is identified no specific remediation is required.

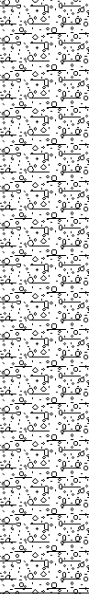
Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where there is a moderate/low risk identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

Appendix B – Profile Logs

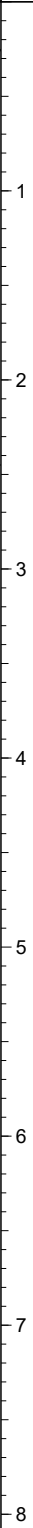
		Window Sample Borehole Log				Location Number: WS101	
Project Name: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd		Date: 02/04/2025		
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd		Co-ords: E524279.00 N220383.00		
Equipment: Window Sample Rig: Premier Compact 110 Series			Level 119.40m AOD	Logged By MS	Scale 1:40	Page Number Sheet 1 of 1	

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well
0.00 - 0.30	B	0.30		TOPSOIL: Dark brown gravelly SAND with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded comprising flint.	119.10		
0.10 - 0.20	D			Firm to stiff consistency high strength gravelly slightly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded comprising flint. Cobbles are rounded comprising flint.			
0.10 - 0.20	ES						
0.30 - 1.00	B						
0.50 - 0.60	D						
0.50 - 0.60	ES						
0.50	PP=98.1kPa						
1.00	N=11 (1,2/2,2,3,4)						
1.50	PP=122.6kPa						
1.60 - 1.70	D						
2.00 - 2.45	U	3.45		3.00m to 3.45mbgl - Very stiff consistency from 3.00m.	115.95		
2.50 - 2.60	D						
3.00	N=57 (7,7/12,14,14,17)						
				End of Borehole at 3.45m			

Remarks:

Borehole dry and stable. Borehole terminated at 3.45mbgl due to SPT refusal.

		Window Sample Borehole Log				Location Number: WS102	
Project Name: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd		Date: 02/04/2025		
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd		Co-ords: E524323.00 N220358.00		
Equipment: Window Sample Rig: Premier Compact 110 Series			Level 118.60m AOD	Logged By MS	Scale 1:40	Page Number Sheet 1 of 1	

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well
0.00 - 0.25	B	0.25		TOPSOIL: Dark brown gravelly SAND with frequent rootlets and rare brick fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded comprising flint. Firm to very stiff consistency high strength orangish brown slightly gravelly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded comprising flint. Cobbles are rounded comprising flint.		118.35	
0.10 - 0.20	D						
0.10 - 0.20	ES						
0.25 - 0.60	B						
0.60 - 0.70	D						
0.60 - 0.70	ES						
0.60	PP=98.1kPa						
1.00	N=9 (1,1/1,1,3,4)						
1.10	PP=110.4kPa						
1.60 - 1.70	D						
1.70	PP=122.6kPa						
2.00	N=63 (10,12/13,16,16,18)						
		2.45		End of Borehole at 2.45m		116.15	
					3		
					4		
					5		
					6		
					7		
					8		

Remarks:
 Borehole dry and stable. Borehole terminated at 2.45mbgl due to SPT refusal.

Remarks:
Borehole dry and stable. Borehole terminated at 4.45mbgl due to SPT refusal.



Window Sample Borehole Log

Location Number:
WS104

Project Name: Park Lane, Knebworth

Client: Burleigh Dell Developments Ltd

Date: 02/04/2025

Project No. : LKC251040

Contractor: KDS Site Investigations Ltd

Co-ords: E524344.00 N220250.00

Equipment: Window Sample Rig: Premier Compact 110 Series

Level
116.00m AOD

Logged By
MS

Scale
1:40

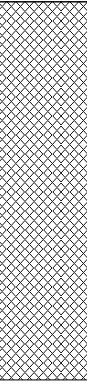
Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well
0.05 - 0.08	D	0.10		TOPSOIL: Dark brown gravelly SAND with frequent rootlets and rare ash. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded comprising flint.		115.90	
0.05 - 0.08	ES			Stiff consistency high strength orangish brown gravelly slightly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded comprising flint. Cobbles are rounded comprising flint.			
0.70	PP=147.2kPa						
0.80 - 0.90	D	1.00		Medium dense to dense consistency orangish brown gravelly clayey SAND with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising flint and chalk. Cobbles are rounded comprising flint.	1	115.00	
0.80 - 0.90	ES						
1.00	N=11 (3,2/2,3,3,3)						
1.50 - 1.60	D						
2.00	N=29 (5,6/6,7,7,9)				2		
2.10 - 2.20	D						
3.00	N=43 (4,5/7,8,12,16)				3		
3.50 - 3.60	D						
3.90 - 4.00	D	3.90		Very stiff consistency structureless white medium to high density CHALK.	4	112.10	
4.00 - 4.45	U						
		4.45		End of Borehole at 4.45m		111.55	
					5		
					6		
					7		
					8		

Remarks:

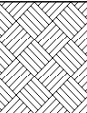
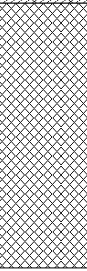
Borehole dry and stable. Borehole terminated at 4.45mbgl on chalk bedrock.

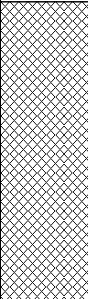
		Trial Pit Log				Location Number: HP101				
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E524305.00 N220375.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:25		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=7%	0.50		TOPSOIL: Brown slightly clayey gravelly SAND with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising flint.						
				End of Trial Pit at 0.50m				0.5	-0.50	
								1.0		
								1.5		
								2.0		
								2.5		
								3.0		
								3.5		
								4.0		
								4.5		
								5.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)		Stable	
			0.20		0.20		0.50			
			Remarks: Trial pit dry.							

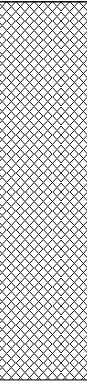
		Trial Pit Log				Location Number: HP102		
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025		
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E524512.00 N220586.00		
Equipment: Hand Excavation Tools			Level	Logged By CT		Scale 1:10	Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description				Level (m)
0.50	CBR=4%	0.50		MADE GROUND: Soft consistency brown mottled orange gravelly sandy silty CLAY with rare brick fragments. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular brick and flint.				
				End of Trial Pit at 0.50m			0.5	-0.50
							1.0	
							1.5	
							2.0	
			Pit Dimensions				Pit Stability	
			Length (m)		Width (m)	Depth (m)	Stable	
			0.20		0.20	0.50		
			Remarks: Trial pit dry.					

		Trial Pit Log				Location Number: HP103				
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E524720.00 N220798.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:10		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=19%	0.50		TOPSOIL: Brown gravelly slightly clayey SAND with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising flint.						
				End of Trial Pit at 0.50m				0.5	-0.50	
								1.0		
								1.5		
								2.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)		Stable	
			0.20		0.20		0.50			
			Remarks:							
					Trial pit dry.					

		Trial Pit Log					Location Number: HP104			
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E524928.00 N221010.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:10		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=9%	0.50		TOPSOIL: Brown gravelly slightly clayey SAND with frequent roots and rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising flint.						
				End of Trial Pit at 0.50m				0.5	-0.50	
								1.0		
								1.5		
								2.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)	Stable		
			0.20		0.20		0.50			
			Remarks: Trial pit dry.							

		Trial Pit Log				Location Number: HP105				
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E525136.00 N221222.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:10		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=6%	0.15		TOPSOIL: Brown gravelly slightly clayey SAND with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising chalk and flint.					-0.15	
				MADE GROUND: Soft consistency brown mottled orange gravelly sandy silty CLAY interbedded with very weak white highly weathered CHALK. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular chalk and flint.						
		0.50		End of Trial Pit at 0.50m				0.5	-0.50	
								1.0		
								1.5		
								2.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)		Stable	
			0.20		0.20		0.50			
			Remarks: Trial pit dry.							

		Trial Pit Log					Location Number: HP106			
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E525344.00 N221434.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:10		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=6%			MADE GROUND: Brown gravelly slightly clayey SAND with frequent rootlets and rare brick fragments. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising brick and flint.						
		0.40		Firm consistency grey sandy silty CLAY.					-0.40	
		0.50	End of Trial Pit at 0.50m				0.5	-0.50		
								1.0		
								1.5		
								2.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)		Stable	
			0.20		0.20		0.50			
			Remarks: Trial pit dry.							

		Trial Pit Log				Location Number: HP107		
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025		
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E525552.00 N221646.00		
Equipment: Hand Excavation Tools			Level	Logged By CT	Scale 1:10	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description				Level (m)
0.50	CBR=5%	0.50		MADE GROUND: Firm consistency brown gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular chalk and flint.				
				End of Trial Pit at 0.50m			0.5	-0.50
							1.0	
							1.5	
							2.0	
				Pit Dimensions			Pit Stability	
				Length (m)	Width (m)	Depth (m)	Stable	
				0.20	0.20	0.50		
				Remarks: Trial pit dry.				

		Trial Pit Log					Location Number: HP108			
Project: Park Lane, Knebworth			Client: Burleigh Dell Developments Ltd			Date: 02/04/2025				
Project No. : LKC251040			Contractor: KDS Site Investigations Ltd			Co-ords: E525760.00 N221858.00				
Equipment: Hand Excavation Tools			Level		Logged By CT		Scale 1:10		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
0.50	CBR=6%	0.50		TOPSOIL: Brown slightly gravelly SAND with frequent roots and rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular comprising flint.						
				End of Trial Pit at 0.50m				0.5	-0.50	
								1.0		
								1.5		
								2.0		
			Pit Dimensions					Pit Stability		
			Length (m)		Width (m)		Depth (m)	Stable		
			0.20		0.20		0.50			
			Remarks: Trial pit dry.							

Appendix C – Certificates of Analysis (Soil)

Michaela Sheppard
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Unit 29 Eton Business Park
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Manchester
M26 2ZS

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

DETS Report No: 25-03805

Site Reference: Park Lane, Knebworth

Project / Job Ref: LKC251040

Order No: PO-C0001167

Sample Receipt Date: 04/04/2025

Sample Scheduled Date: 04/04/2025

Report Issue Number: 1

Reporting Date: 17/04/2025

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.

Soil Analysis Certificate						
DETS Report No: 25-03805	~Date Sampled	02/04/25	02/04/25	02/04/25	02/04/25	02/04/25
LK Consult Limited	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Park Lane, Knebworth	~TP / BH No	WS104	WS101	WS102	WS102	WS103
~Project / Job Ref: LKC251040	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: PO-C0001167	~Depth (m)	0.80-0.90	0.10-0.20	0.10-0.20	0.60-0.70	0.70-0.80
Reporting Date: 17/04/2025	DETS Sample No	771989	771990	771991	771992	771994

Determinand	Unit	RL	Accreditation					
Asbestos Screen ⁽⁵⁾	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	5.3	5.8	5.1	6.7	7.0
Total Cyanide	mg/kg	< 1	NONE			< 1		
Free Cyanide	mg/kg	< 1	NONE			< 1		
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	68	< 10	< 10	11	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.07	< 0.01	< 0.01	0.01	< 0.01
Organic Matter (SOM)	%	< 0.1	MCERTS	1.5	2.6	2.7	0.9	1.2
Arsenic (As)	mg/kg	< 2	MCERTS	28	14	11	18	20
W/S Boron	mg/kg	< 1	NONE			1.3		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.4	0.3	0.2	< 0.2	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	31	22	17	28	33
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	44	19	13	18	14
Lead (Pb)	mg/kg	< 3	MCERTS	38	35	28	15	18
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	27	14	10	11	17
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	60	34	28	55	53
Zinc (Zn)	mg/kg	< 3	MCERTS	72	58	37	24	42
Total Phenols (monohydric)	mg/kg	< 2	NONE			< 2		

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 25-03805	~Date Sampled	02/04/25	02/04/25	02/04/25	02/04/25	02/04/25
LK Consult Limited	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Park Lane, Knebworth	~TP / BH No	WS104	WS101	WS102	WS102	WS103
~Project / Job Ref: LKC251040	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: PO-C0001167	~Depth (m)	0.80-0.90	0.10-0.20	0.10-0.20	0.60-0.70	0.70-0.80
Reporting Date: 17/04/2025	DETS Sample No	771989	771990	771991	771992	771994

Determinand	Unit	RL	Accreditation					
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	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 25-03805	~Date Sampled	02/04/25				
LK Consult Limited	~Time Sampled	None Supplied				
~Site Reference: Park Lane, Knebworth	~TP / BH No	WS102				
~Project / Job Ref: LKC251040	~Additional Refs	None Supplied				
~Order No: PO-C0001167	~Depth (m)	0.10-0.20				
Reporting Date: 17/04/2025	DETS Sample No	771991				

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01			
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10			
Aliphatic >C34 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10			
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21			
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	< 3			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10			
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10			
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21			
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42			

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 25-03805	~Date Sampled	02/04/25				
LK Consult Limited	~Time Sampled	None Supplied				
~Site Reference: Park Lane, Knebworth	~TP / BH No	WS102				
~Project / Job Ref: LKC251040	~Additional Refs	None Supplied				
~Order No: PO-C0001167	~Depth (m)	0.10-0.20				
Reporting Date: 17/04/2025	DETS Sample No	771991				

Determinand	Unit	RL	Accreditation				
Benzene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2			
Toluene : HS_1D_MS	µg/kg	< 5	MCERTS	< 5			
Ethylbenzene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2			
p & m-xylene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2			
o-xylene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2			
MTBE : HS_1D_MS	µg/kg	< 5	MCERTS	< 5			

Soil Analysis Certificate - Sample Descriptions

DETS Report No: 25-03805	
LK Consult Limited	
~Site Reference: Park Lane, Knebworth	
~Project / Job Ref: LKC251040	
~Order No: PO-C0001167	
Reporting Date: 17/04/2025	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
771989	WS104	None Supplied	0.80-0.90	9.7	Brown sandy clay with stones
771990	WS101	None Supplied	0.10-0.20	12	Brown sandy clay with stones
771991	WS102	None Supplied	0.10-0.20	11.1	Brown sandy clay with stones and vegetation
771992	WS102	None Supplied	0.60-0.70	19.2	Brown sandy clay
771994	WS103	None Supplied	0.70-0.80	14.9	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 25-03805
LK Consult Limited
~Site Reference: Park Lane, Knebworth
~Project / Job Ref: LKC251040
~Order No: PO-C0001167
Reporting Date: 17/04/2025

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 diphénylcarbazide 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 FOC 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

List of HWOL Acronyms and Operators

DETS Report No: 25-03805

LK Consult Limited

~Site Reference: Park Lane, Knebworth

~Project / Job Ref: LKC251040

~Order No: PO-C0001167

Reporting Date: 17/04/2025

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 customer and can affect the validity of results

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH - Aliphatic >C34 - C44 - raw data - EH_CU_1D_AL
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C34 - C44 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C35 - C44 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

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

Certificate Key

Symbol	Description
F	Filtered sample
UF	Unfiltered sample
D	Dried sample
AR	As received sample
RL	Reporting limit
~	Sample details provided by customer and can affect the validity of results
M/S	Missing Sample
n	Please note that we are MCERTS soil accredited (UK soils only) for sand, loam, and clay, and UKAS accredited for groundwater, tap water, surface water, and generated leachates. Other matrices are outside our scope of accreditation.
S	Subcontracted analysis
M	MCERTS accredited test
U	UKAS accredited test

Certificate of Analysis

Certificate Number 25-07615

Issued: 17-Apr-25

Client DETS South
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone, Kent
ME17 2JN

Our Reference 25-07615

Client Reference ~ LKC251040

Order No ~ (not supplied)

Contract Title ~ Park Lane, Knebworth

Description 1 Soil sample, 2 Leachate prepared by DETS samples.

Date Received 07-Apr-25

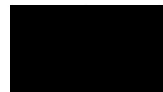
Date Started 07-Apr-25

Date Completed 17-Apr-25

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By



Reyhan Irfan
Operations Manager



2139

Summary of Chemical Analysis Soil Samples

Our Ref 25-07615

Client Ref ~ LKC251040

Contract Title ~ Park Lane, Knebworth

Lab No	2490647
Sample ID ~	WS104
Depth ~	0.05-0.08
Other ID ~	771988
Sample Type ~	SOIL
Sampling Date ~	02/04/2025
Sampling Time ~	n/s

Test	Method	LOD	Units	
Preparation				
Moisture Content	DETSC 1004	0.1	%	23
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	26
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.8
Cadmium	DETSC 2301#	0.1	mg/kg	1.5
Chromium	DETSC 2301#	0.15	mg/kg	43
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	270
Lead	DETSC 2301#	0.3	mg/kg	200
Mercury	DETSC 2325#	0.05	mg/kg	0.08
Nickel	DETSC 2301#	1	mg/kg	22
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	37
Zinc	DETSC 2301#	1	mg/kg	360
Inorganics				
pH	DETSC 2008#		pH	8.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1
Organic matter	DETSC 2002#	0.1	%	7.2
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	65
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic >EC10-EC12	DETSC 3521#	1.5	mg/kg	< 1.50
Aliphatic >EC12-EC16	DETSC 3521#	1.2	mg/kg	< 1.20
Aliphatic >EC16-EC21	DETSC 3521#	1.5	mg/kg	< 1.50
Aliphatic >EC21-EC35	DETSC 3521#	3.4	mg/kg	< 3.40
Aliphatic >EC35-EC40	DETSC 3521*	3.4	mg/kg	< 3.40
Aliphatic >EC40-EC44	DETSC 3521*	3.4	mg/kg	< 3.40
Aliphatic C5-C44	DETSC 3521*	10	mg/kg	< 10.00
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic >EC10-EC12	DETSC 3521#	0.9	mg/kg	< 0.90
Aromatic >EC12-EC16	DETSC 3521#	0.5	mg/kg	< 0.50
Aromatic >EC16-EC21	DETSC 3521#	0.6	mg/kg	< 0.60
Aromatic >EC21-EC35	DETSC 3521#	1.4	mg/kg	< 1.40
Aromatic >EC35-EC40	DETSC 3521*	1.4	mg/kg	< 1.40
Aromatic >EC40-EC44	DETSC 3521*	1.4	mg/kg	< 1.40
Aromatic C5-C44	DETSC 3521*	10	mg/kg	< 10.00

Summary of Chemical Analysis

Soil Samples

Our Ref 25-07615

Client Ref ~ LKC251040

Contract Title ~ Park Lane, Knebworth

Lab No	2490647
Sample ID ~	WS104
Depth ~	0.05-0.08
Other ID ~	771988
Sample Type ~	SOIL
Sampling Date ~	02/04/2025
Sampling Time ~	n/s

Test	Method	LOD	Units	
TPH Ali/Aro C5-C44	DETSC 3521*	10	mg/kg	< 10.00
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01
PAHs				
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.2
Pyrene	DETSC 3301	0.1	mg/kg	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.7

Summary of Asbestos Analysis Soil Samples

Our Ref 25-07615

Client Ref ~ LKC251040

Contract Title ~ Park Lane, Knebworth

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2490647	WS104 771988 0.05-0.08	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING v20.25.02.03

Our Ref 25-07615

Client Ref LKC251040

Contract Title Park Lane, Knebworth

Sample Id WS104 771988 0.05-0.08

Sample Numbers 2490647 2490648 2490649

Date Analysed 17/04/2025

Test Results On Waste					WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste		
DETSC 2084# Total Organic Carbon	%	5.1	3	5	6		
DETSC 2003# Loss On Ignition	%	12.0	n/a	n/a	10		
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a		
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a		
DETSC 3521* Mineral Oil >C10-C40 + Clean Up	mg/kg	< 10	500	n/a	n/a		
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a		
DETSC 2008# pH	pH Units	8.1	n/a	>6	n/a		
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE		
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE		

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	9.7	11	0.019	0.105	0.5	2	25
DETSC 2306 Barium as Ba	180	40	0.36	0.99	20	100	300
DETSC 2306 Cadmium as Cd	0.1	0.086	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	7.1	10	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	50	24	0.1	0.35	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	8.7	2	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	6.2	3.2	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	1.1	9.1	< 0.01	0.057	0.5	10	50
DETSC 2306 Antimony as Sb	38	17	0.08	0.259	0.06	0.7	5
DETSC 2306 Selenium as Se	1.1	0.34	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	170	54	0.34	1.031	4	50	200
DETSC 2055 Chloride as Cl	7200	720	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	220	200	0.44	2.08	10	150	500
DETSC 2055 Sulphate as SO4	27000	4200	54	138.4	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	240000	85000	480	1505.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	70000	17000	140	394.1	500	800	1000

Additional Information		
DETSC 2008 pH	7.4	7.1
DETSC 2009 Conductivity uS/cm	346.0	121.0
* Temperature*	18.0	18.0

Mass of Sample Kg	0.228
Mass of dry Sample Kg	0.175

Stage 1

Volume of Leachant L2	0.297
Volume of Eluate VE1	0.74

Stage 2

Volume of Leachant L8	1.4
Volume of Eluate VE2	0.74

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. Normec DETS does not accept responsibility for errors or omissions.
Values are correct at time of issue.

Information in Support of the Analytical Results

Our Ref 25-07615
 Client Ref ~ LKC251040
 Contract ~ Park Lane, Knebworth

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2490647	WS104 0.05-0.08 SOIL	02/04/25	PG		BTEX / C5-C10, EPH/Aliphatic/Aromatic, Naphthalene, PAH FID, PCB
2490648	WS104 0.05-0.08 LEACHATE	02/04/25	PG		Metals (Soluble) ICPMS
2490649	WS104 0.05-0.08 LEACHATE	02/04/25	PG		Metals (Soluble) ICPMS

Lab No	Sample ID	Comments
2490648	WS104 0.05-0.08 SOIL	Insufficient sample 1037g (<2kg) Sample received
2490649	WS104 0.05-0.08 LEACHATE	Insufficient sample 1037g (<2kg) Sample received

Key: P-Plastic G-Bag

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results
 * -not accredited.
 # -MCERTS (accreditation only applies if report carries the MCERTS logo).
 \$ -subcontracted.
 n/s -not supplied.
 I/S -insufficient sample.
 U/S -unsuitable sample.
 t/f -to follow.
 nd -not detected.

End of Report

Appendix D – Certificates of Analysis (Geotechnical)

Contract Number: 78132

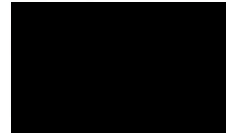
Client Ref: **LKC251040**
Client PO: **PO-C001166**

Date Received: **08-04-2025**
Date Completed: **25-04-2025**
Report Date: **25-04-2025**

Client: **LK Consult Ltd**

Contract Title: **Park Lane, Knebworth**
For the attention of: **Michaela Sheppard**

This report has been checked and approved by:



Richard John
Quality/Technical Manager

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - @ Non Accredited Test	2
4 Point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	2
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	2
Sedimentation by Pipette Method BS EN ISO 17892-4 : 5.4 - @ Non Accredited Test	2
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	2

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

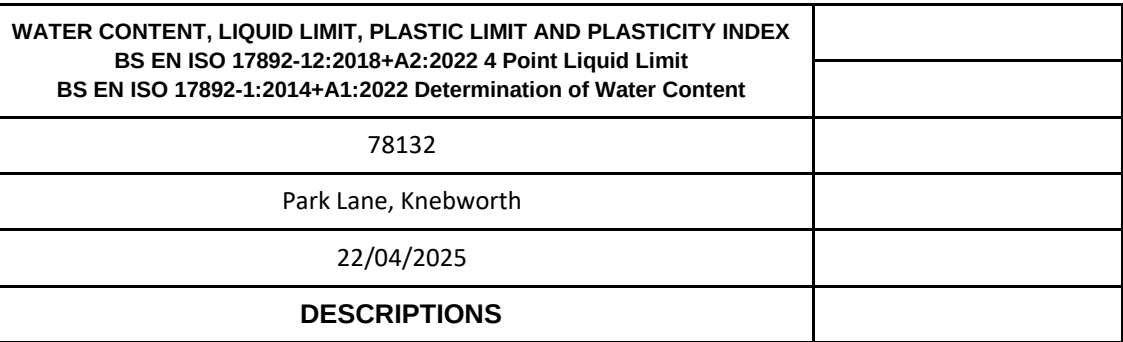
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Approved Signatories:

Brendan Evans (Senior Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)

Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)

Wayne Honey (HR & HSE Manager)

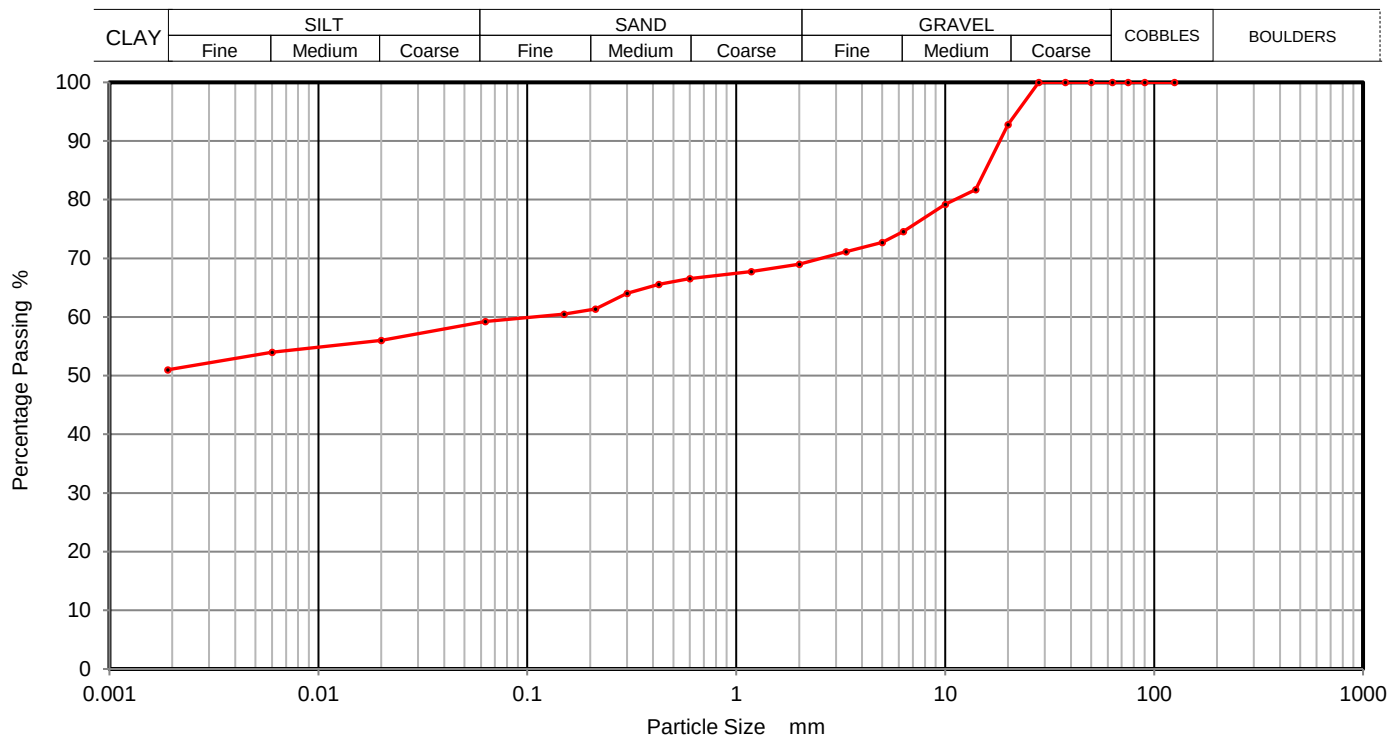
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Operator
Aaron H

PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016
Wet Sieve & Pipette Analysis, Clause 5.2 & 5.4

Contract Number	78132
Borehole/Pit No.	WS101
Sample No.	
Depth Top	0.50
Depth Base	0.60
Sample Type	D

Project Name	Park Lane, Knebworth
Sample Description	Brown slightly silty sandy gravelly CLAY
Date Tested	24/04/2025



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	56
90	100	0.0060	54
75	100	0.0020	51
63	100		
50	100		
37.5	100		
28	100		
20	93		
14	82		
10	79		
6.3	75		
5	73		
3.35	71		
2	69		
1.18	68		
0.63	67		
0.425	66		
0.30	64		
0.20	61		
0.15	60		
0.063	59		

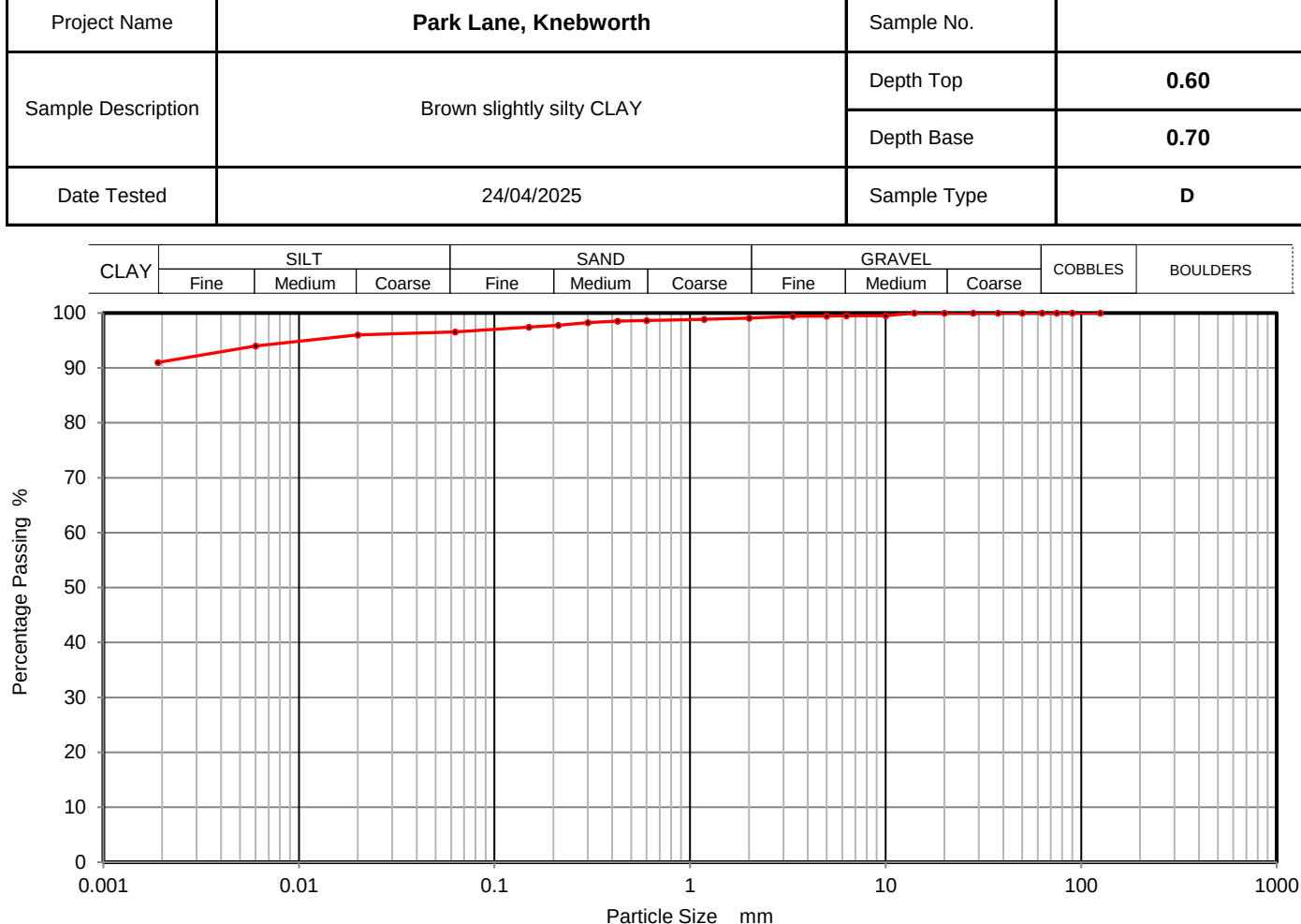
Sample Proportions	% dry mass
Cobbles	0
Gravel	31
Sand	10
Silt	8
Clay	51

Remarks
Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron T

PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016
Wet Sieve & Pipette Analysis, Clause 5.2 & 5.4

Contract Number	78132
Borehole/Pit No.	WS102
Sample No.	
Depth Top	0.60
Depth Base	0.70
Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	96
90	100	0.0060	94
75	100	0.0020	91
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	99		
0.63	99		
0.425	98		
0.30	98		
0.20	98		
0.15	97		
0.063	97		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	2
Silt	6
Clay	91

Remarks
Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron T

Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number 78132

Borehole/Pit No. WS101

Project Name Park Lane, Knebworth

Sample No.

Soil Description Brown gravelly silty sandy CLAY

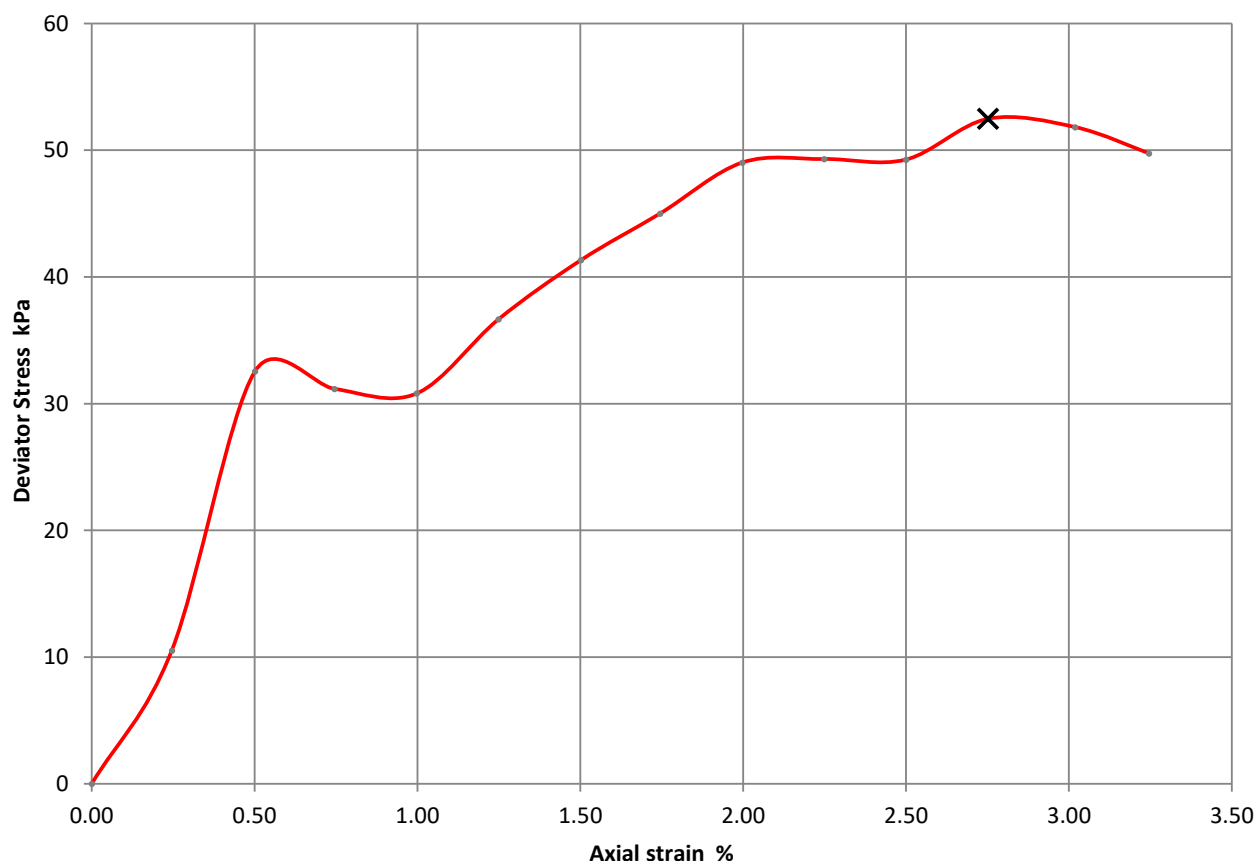
Depth Top (m) 2.00

Depth Base (m) 2.45

Date Tested 21/04/2025

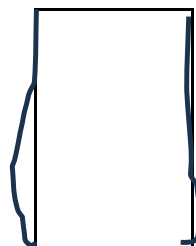
Sample Type U

Operator David E



Moisture Content (%)	25
Bulk Density (Mg/m ³)	1.67
Dry Density (Mg/m ³)	1.34
Specimen Length (mm)	157.1
Specimen Diameter (mm)	69.1
Cell Pressure (kPa)	40
Deviator Stress (kPa)	52
Undrained Shear Strength (kPa)	26
Failure Strain (%)	3
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.4mm
Rate of Strain (%/min)	1.75

Notes.



Failure Sketch.

Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8

Contract Number 78132

Borehole/Pit No. WS103

Project Name Park Lane, Knebworth

Sample No.

Soil Description Brown gravelly silty sandy CLAY

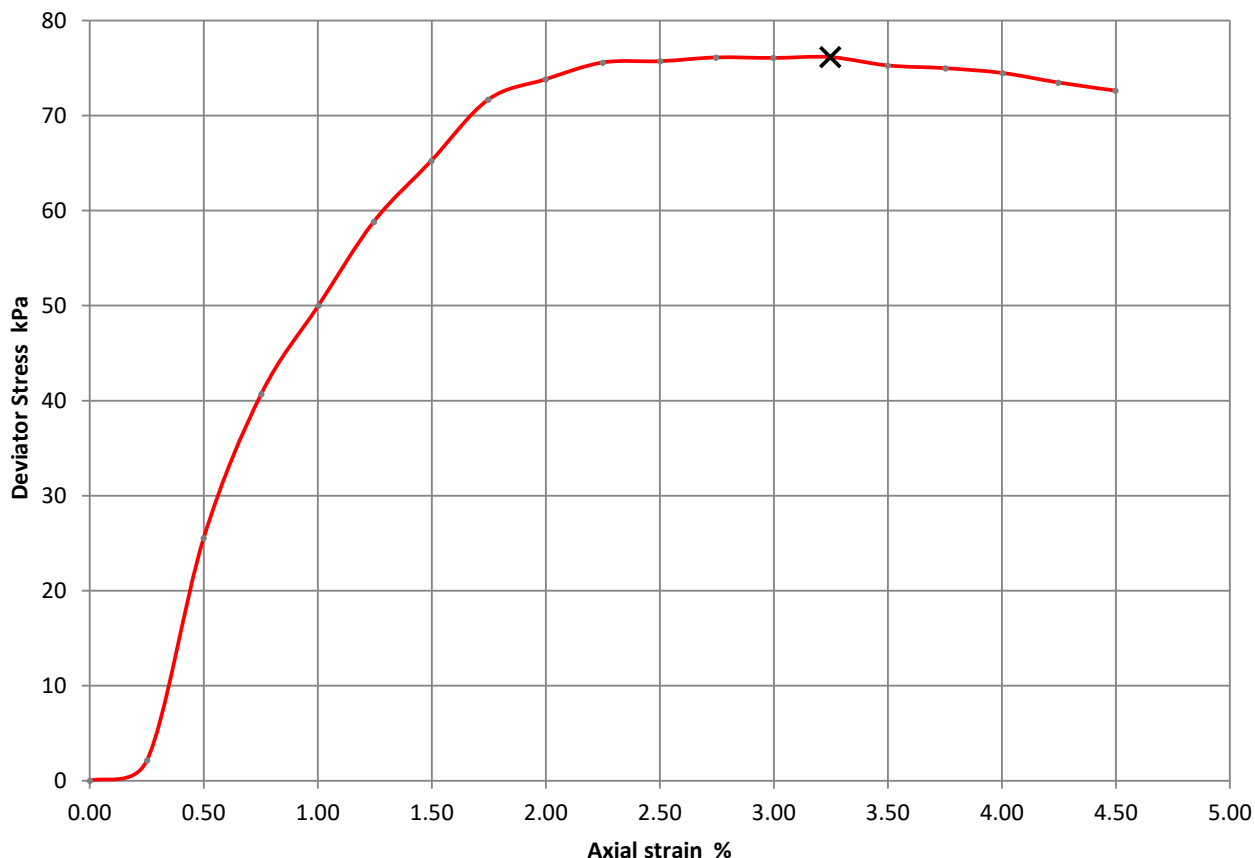
Depth Top (m) 1.00

Depth Base (m) 1.45

Date Tested 21/04/2025

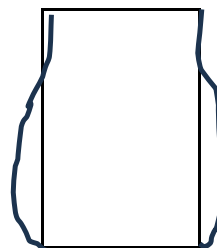
Sample Type U

Operator David E



Moisture Content (%)	14
Bulk Density (Mg/m ³)	1.96
Dry Density (Mg/m ³)	1.72
Specimen Length (mm)	152.2
Specimen Diameter (mm)	67.3
Cell Pressure (kPa)	20
Deviator Stress (kPa)	76
Undrained Shear Strength (kPa)	38
Failure Strain (%)	3
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.4mm
Rate of Strain (%/min)	1.81

Notes.



Failure Sketch.



Laboratory Report



Contract Number: 78131

Client Ref: **LKC251040**
Client PO: **PO-C001166**

Date Received: **08-04-2025**
Date Completed: **22-04-2025**
Report Date: **22-04-2025**

Client: **LK Consult Ltd**

Contract Title: **Park Lane, Knebworth**
For the attention of: **Michaela Sheppard**

This report has been checked and approved by:



Shaun Jones
Laboratory manager

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - @ Non Accredited Test	1
4 Point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	1
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	1
Sedimentation by Pipette Method BS EN ISO 17892-4 : 5.4 - @ Non Accredited Test	1
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

- * - denotes test included in laboratory scope of accreditation
- # - denotes test carried out by approved contractor
- @ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Senior Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (HR & HSE Manager)



Contract Number	78131	
Project Name	Park Lane, Knebworth	
Date Tested	16/04/2025	
	DESCRIPTIONS	

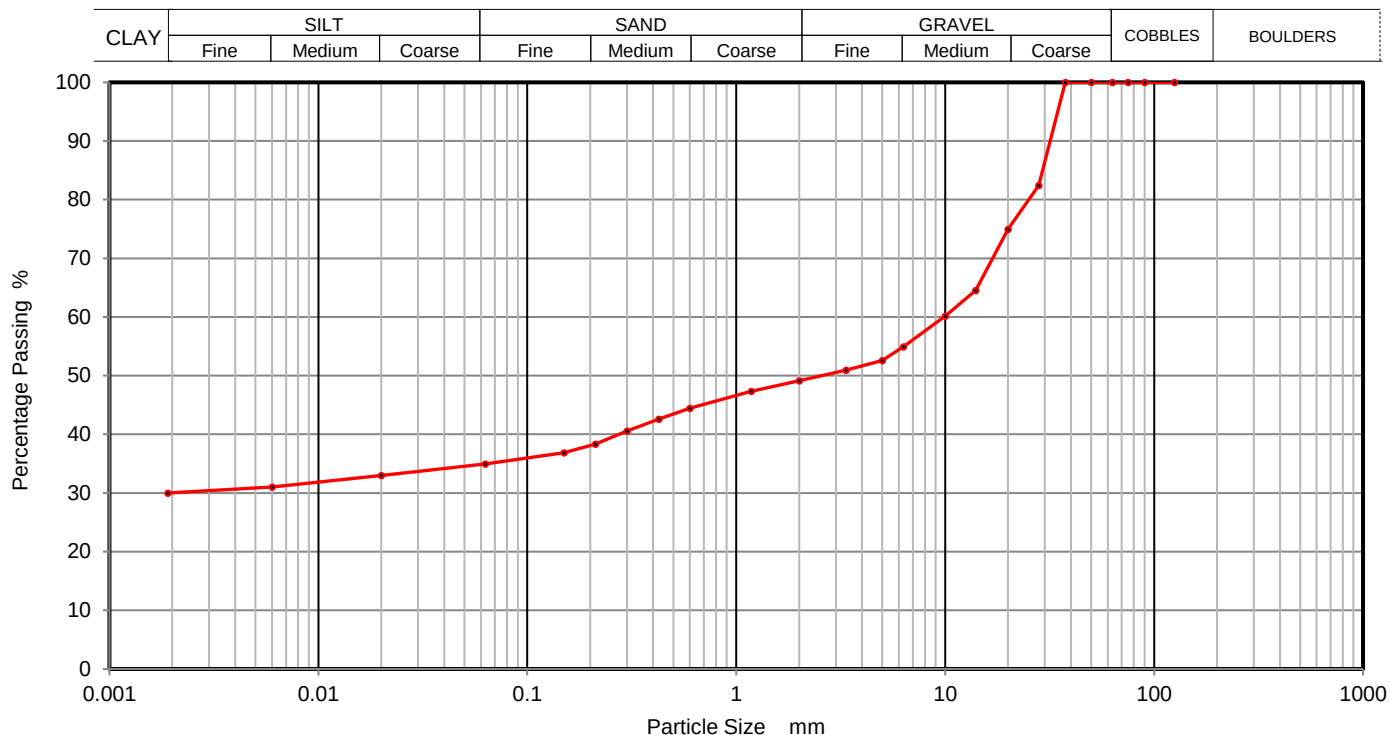
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Operator
Owain. D

PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016
Wet Sieve & Pipette Analysis, Clause 5.2 & 5.4

Contract Number	78131
Borehole/Pit No.	ws104
Sample No.	
Depth Top	0.80
Depth Base	0.90
Sample Type	D

Project Name	Park Lane, Knebworth
Sample Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY
Date Tested	14/04/2025



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	33
90	100	0.0060	31
75	100	0.0020	30
63	100		
50	100		
37.5	100		
28	82		
20	75		
14	65		
10	60		
6.3	55		
5	53		
3.35	51		
2	49		
1.18	47		
0.63	44		
0.425	43		
0.30	41		
0.20	38		
0.15	37		
0.063	35		

Sample Proportions	% dry mass
Cobbles	0
Gravel	51
Sand	14
Silt	5
Clay	30

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron. T

Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8

Contract Number 78131

Borehole/Pit No. ws104

Project Name Park Lane, Knebworth

Sample No.

Soil Description Brown chaly silty sandy CLAY

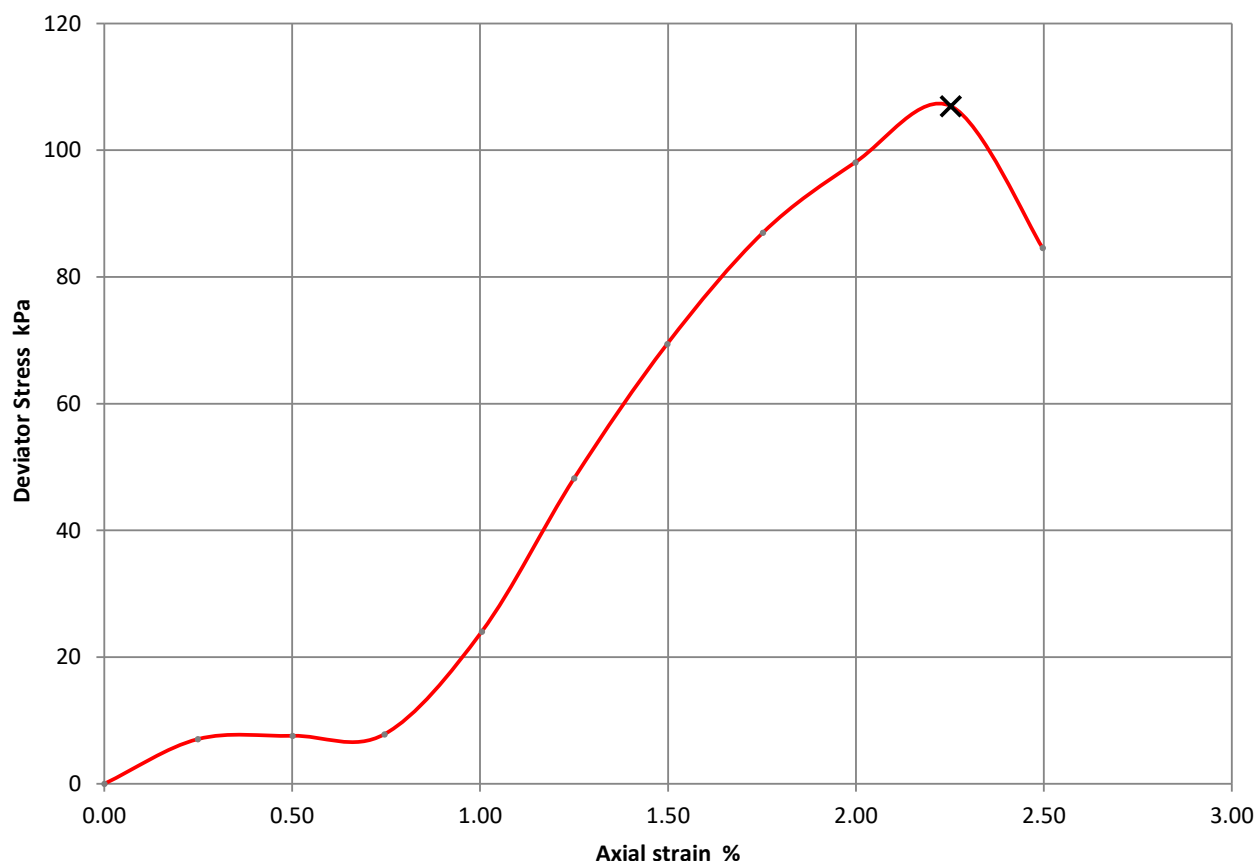
Depth Top (m) 4.00

Depth Base (m) 4.45

Date Tested 11/04/2025

Sample Type U

Operator David. E



Moisture Content (%)	24
Bulk Density (Mg/m ³)	1.42
Dry Density (Mg/m ³)	1.14
Specimen Length (mm)	144.3
Specimen Diameter (mm)	64.3
Cell Pressure (kPa)	80
Deviator Stress (kPa)	107
Undrained Shear Strength (kPa)	53
Failure Strain (%)	2
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.4mm
Rate of Strain (%/min)	1.91

Notes.



Failure Sketch.

Appendix E – Falling Head Tests

VARIABLE HEAD PERMEABILITY TEST



SITE	Park Lane, Knebworth
REF	LKC251040
BH REF	WS103

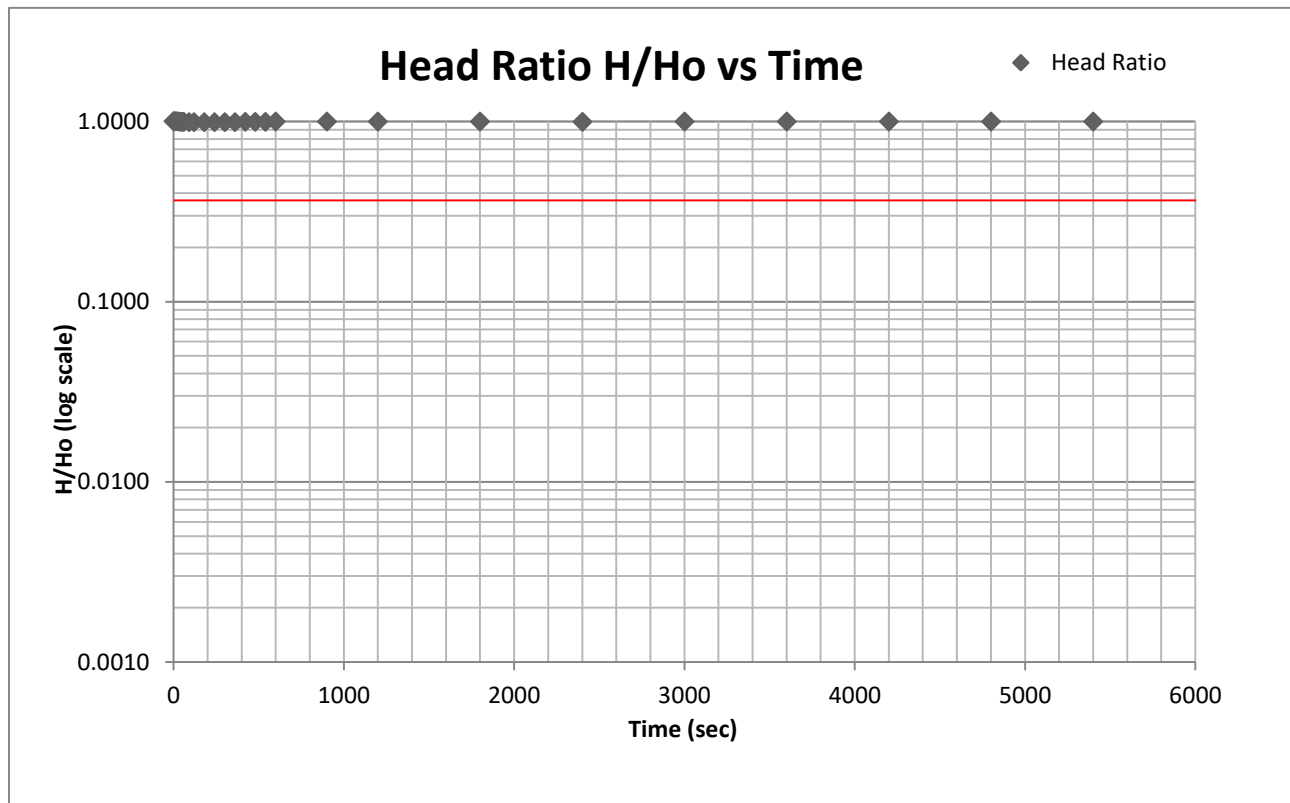
TYPE OF TEST	FALLING HEAD
STRATA	Topsoil to 0.3m, sandy Clay to 4.45m
DATE OF TEST	02/04/2025
STAFF	CT

CONDITIONS OF TEST ZONE (BS5930:1999 Figure 6)	
Select 'Case' from Figure 6	B
Diameter of Borehole (D)	150 mm
L (see BS5930:1999 Figure 6)	0 mm
Intake Factor (F)	0.4125

Initial GW Depth	0 mbgl
Base of Installation	4.45 mbgl
Standpipe Diameter	100 mm
Standpipe X sec Area (A)	7.88E-03 m ²
Depth to response zone	1 m
BASIC TIME LAG (T) (from Plot)	N/A seconds

CALCULATED VALUES	
Permeability $k = A/F \times T$	
k =	N/A m/sec

FIELD MEASUREMENTS			
Time	Depth	Head H	Head Ratio
seconds	mbgl	m	H/Ho
0	0.2	4.250	1.0000
5	0.2	4.250	1.0000
10	0.2	4.250	1.0000
20	0.2	4.250	1.0000
30	0.21	4.240	0.9976
40	0.22	4.230	0.9953
50	0.22	4.230	0.9953
60	0.23	4.220	0.9929
90	0.24	4.210	0.9906
120	0.24	4.210	0.9906
180	0.24	4.210	0.9906
240	0.24	4.210	0.9906
300	0.24	4.210	0.9906
360	0.25	4.200	0.9906
420	0.25	4.200	0.9929
480	0.25	4.200	0.9929
540	0.25	4.200	0.9953
600	0.25	4.200	0.9976
900	0.25	4.200	0.9976
1200	0.25	4.200	0.9976
1800	0.25	4.200	0.9976
2400	0.26	4.190	0.9952
3000	0.26	4.190	0.9976
3600	0.26	4.190	0.9976
4200	0.26	4.190	0.9976
4800	0.26	4.190	0.9976
5400	0.26	4.190	0.9976



VARIABLE HEAD PERMEABILITY TEST



SITE REF	Park Lane, Knebworth
BH REF	LKC251040
WS104	

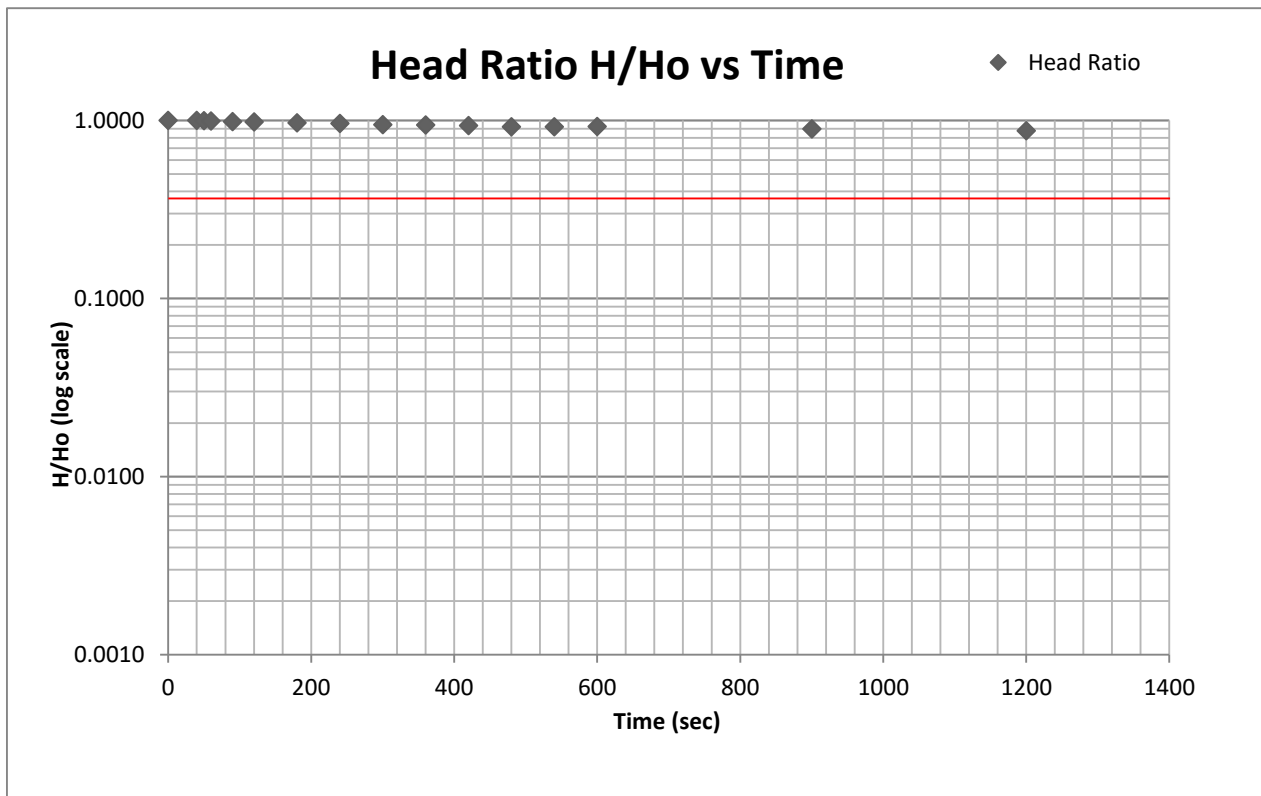
TYPE OF TEST	FALLING HEAD
STRATA	Topsoil to 0.10m, sandy Clay to 1m, clayey sand to 3.9m, chalk to 4.45m.
DATE OF TEST	02/04/2025
STAFF	CT

CONDITIONS OF TEST ZONE (BS5930:1999 Figure 6)	
Select 'Case' from Figure 6	B
Diameter of Borehole (D)	150 mm
L (see BS5930:1999 Figure 6)	0 mm
Intake Factor (F)	0.4125

Initial GW Depth	0 mbgl
Base of Installation	4.45 mbgl
Standpipe Diameter	100 mm
Standpipe X sec Area (A)	7.88E-03 m ²
Depth to response zone	2 m
BASIC TIME LAG (T) (from Plot)	N/A seconds

CALCULATED VALUES	
Permeability $k = A/F \times T$	
k =	N/A m/sec

FIELD MEASUREMENTS			
Time	Depth	Head H	Head Ratio
seconds	mbgl	m	H/Ho
0	1.45	3.000	1.0000
5	1.43	3.020	1.0067
10	1.43	3.020	1.0067
20	1.44	3.010	1.0033
30	1.44	3.010	1.0033
40	1.45	3.000	1.0000
50	1.46	2.990	0.9967
60	1.48	2.970	0.9900
90	1.5	2.950	0.9833
120	1.51	2.940	0.9800
180	1.53	2.920	0.9669
240	1.55	2.900	0.9603
300	1.6	2.850	0.9468
360	1.61	2.840	0.9435
420	1.65	2.800	0.9333
480	1.7	2.750	0.9197
540	1.72	2.730	0.9192
600	1.72	2.730	0.9254
900	1.82	2.630	0.8946
1200	1.9	2.550	0.8733
1800	1.95	2.500	0.8621
2400	1.98	2.470	0.8667
3000	2.01	2.440	0.8592
3600	2.05	2.400	0.8571
4200	2.06	2.390	0.8691
4800	2.06	2.390	0.8755
5400	2.07	2.380	0.8718



Appendix F – Generic Assessment Criteria Values

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS ^{resi}	POS ^{park}	Source
Metals	Inorganic Arsenic	N/A	37	40	49	640	79	168	DEFRA C4SL
	Beryllium	N/A	1.7	1.7	35	12	2.2	63	LQM S4UL
	Boron	N/A	290	11,000	45	240,000	21,000	46,000	LQM S4UL
	Cadmium	N/A	26	149	4.9	410	220	880	DEFRA C4SL
	Chromium (III)	N/A	910	910	18,000	8,600	1,500	33,000	LQM S4UL
	Chromium (VI)	N/A	21.0	21.0	170.0	49	23.0	250	DEFRA C4SL
	Copper	N/A	2,400	7,100	520	68,000	12,000	44,000	LQM S4UL
	Lead	N/A	200	310	80	2,330	630	1,300	DEFRA C4SL
	Elemental Mercury	N/A	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}	LQM S4UL
	Inorganic Mercury	N/A	40	56	19	1,100	120	240	LQM S4UL
	Methylmercury	N/A	11	15	6.0	320	40	68	LQM S4UL
	Nickel (2015 update)	N/A	130	180	53	980	230	800	LQM S4UL
	Selenium	N/A	250	430	88	12,000	1,100	1,800	LQM S4UL
	Vanadium	N/A	410	1,200	91	9,000	2,000	5,000	LQM S4UL
Zinc	N/A	3,700	40,000	620	730,000	81,000	170,000	LQM S4UL	
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000	LQM S4UL
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000	LQM S4UL
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000	LQM S4UL
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000	LQM S4UL
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000	LQM S4UL
		2.5%	5,400	35,000	950	540,000	74,000	150,000	LQM S4UL
		6%	11,000	37,000	2,200	540,000	74,000	150,000	LQM S4UL
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49	LQM S4UL
		2.5%	11	14	6.5	170	29	56	LQM S4UL
		6%	13	15	13	180	29	62	LQM S4UL
	Benzo(a)pyrene (only)	1%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		2.5%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		6%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
	Benzo(a)pyrene (surrogate marker Coal Tar)	1%	0.8	1.2	0.32	15	2.2	4	LQM S4UL
		2.5%	1.0	1.2	0.67	15	2.2	5	LQM S4UL
		6%	1.1	1.2	1.20	15	2.2	5	LQM S4UL
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13	LQM S4UL
		2.5%	3.3	4.0	2.1	44	7.2	15	LQM S4UL
		6%	3.7	4.0	3.9	45	7.2	16	LQM S4UL
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400	LQM S4UL
		2.5%	340	360	470	4,000	640	1,500	LQM S4UL
		6%	350	360	640	4,000	640	1,600	LQM S4UL
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370	LQM S4UL
		2.5%	93	110	75	1,200	190	410	LQM S4UL
		6%	100	110	130	1,200	190	440	LQM S4UL
	Chrysene	1%	15	30	4.1	350	57	93	LQM S4UL
		2.5%	22	31	9.4	350	57	110	LQM S4UL
		6%	27	32	19	350	57	120	LQM S4UL
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1	LQM S4UL
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3	LQM S4UL
		6%	0.3	0.32	0.43	3.6	0.58	1.4	LQM S4UL
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300	LQM S4UL
		2.5%	560	1,600	130	23,000	3,100	6,300	LQM S4UL
		6%	890	1,600	290	23,000	3,100	6,400	LQM S4UL
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000	LQM S4UL
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000	LQM S4UL
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000	LQM S4UL
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150	LQM S4UL
		2.5%	36	46	21	510	82	170	LQM S4UL
		6%	41	46	39	510	82	180	LQM S4UL
	Naphthalene	1%	15	15	65	1,600*	11,000*	8,400*	DEFRA C4SL
		2.5%	36	36	130	3,700*	15,000*	17,00*	DEFRA C4SL
		6%	85	85	200	8,400*	1,200*	1,900*	DEFRA C4SL
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200	LQM S4UL
		2.5%	220	1,500	38	22,000	3,100	6,200	LQM S4UL
		6%	440	1,500	90	22,000	3,100	6,300	LQM S4UL
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000	LQM S4UL
		2.5%	1,200	3,800	270	54,000	7,400	15,000	LQM S4UL
		6%	2,000	3,800	620	54,000	7,400	15,000	LQM S4UL
	Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4	LQM S4UL
		2.5%	0.98	1.2	0.67	15	2.2	4.7	LQM S4UL
		6%	1.1	1.2	1.2	15	2.2	4.8	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS ^{resi}	POS ^{park}	Source
BTEX Compounds	Benzene	1%	0.87	0.38	0.017	27	72	90	LQM S4UL
		2.5%	0.17	0.70	0.034	47	72	100	LQM S4UL
		6%	0.37	1.4	0.075	90	73	110	LQM S4UL
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}	LQM S4UL
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920) ^{vap}	LQM S4UL
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360)	LQM S4UL
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}	LQM S4UL
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220) ^{vap}	LQM S4UL
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}	LQM S4UL
	o-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}	LQM S4UL
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}	LQM S4UL
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}	LQM S4UL
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}	LQM S4UL
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470) ^{vap}	LQM S4UL
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}	LQM S4UL
	p-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}	LQM S4UL
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}	LQM S4UL
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}	LQM S4UL
Aliphatic									
EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304) ^{sol}	95,000 (304) ^{sol}	LQM S4UL	
EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}	LQM S4UL	
EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}	LQM S4UL	
EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}	LQM S4UL	
EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}	LQM S4UL	
EC>16-35	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL	
EC>35-44	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL	
Aliphatic									
EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}	LQM S4UL	
EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}	LQM S4UL	
EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}	LQM S4UL	
EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}	LQM S4UL	
EC>12-16	2.5%	2,400 (59) ^{sol}	2,400 (59) ^{sol}	13,000	82,000 (59) ^{sol}	13,000	25,000 (59) ^{sol}	LQM S4UL	
EC>16-35	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL	
EC>35-44	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL	
Aliphatic									
EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150)	LQM S4UL	
EC>6-8	6%	530	530	13,000	40,000 (736) ^{sol}	620,000	320,000 (736) ^{sol}	LQM S4UL	
EC>8-10	6%	150	150	1,700	11,000 (451) ^{vap}	13,000	21,000 (451) ^{vap}	LQM S4UL	
EC>10-12	6%	760 (283) ^{vap}	760 (283) ^{vap}	7,300	47,000 (283) ^{vap}	13,000	24,000 (283) ^{vap}	LQM S4UL	
EC>12-16	6%	4,300 (142) ^{sol}	4,400 (142) ^{sol}	13,000	90,000 (142) ^{sol}	13,000	26,000 (142) ^{sol}	LQM S4UL	
EC>16-35	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f	LQM S4UL	
EC>35-44	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f	LQM S4UL	
Aromatic									
EC5-7(benzene as non-	1%	70	370	13	26,000 (1,220) ^{sol}	56,000	76,000 (1,220) ^{sol}	LQM S4UL	
EC>7-8(toluene)	1%	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}	LQM S4UL	
EC>8-10	1%	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}	LQM S4UL	
EC>10-12	1%	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}	LQM S4UL	
EC>12-16	1%	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000	LQM S4UL	
EC>16-21	1%	260 ^f	1,900 ^f	46 ^f	28,000 ^f	3,800 ^f	7,600 ^f	LQM S4UL	
EC>21-35	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
EC>35-44	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
Aromatic									
EC5-7(benzene as non-	2.5%	140	690	27	46,000 (2,260) ^{sol}	56,000	84,000 (2,260) ^{sol}	LQM S4UL	
EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) ^{sol}	56,000	95,000 (1,920) ^{sol}	LQM S4UL	
EC>8-10	2.5%	83	110	21	8,100 (1,500) ^{vap}	5,000	8,500 (1,500) ^{vap}	LQM S4UL	
EC>10-12	2.5%	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (899) ^{sol}	LQM S4UL	
EC>12-16	2.5%	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000	LQM S4UL	
EC>16-21	2.5%	540 ^f	1,900 ^f	110 ^f	28,000 ^f	3,800 ^f	7,700 ^f	LQM S4UL	
EC>21-35	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
EC>35-44	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
Aromatic									
EC5-7(benzene as non-	6%	300	1,400	57	86,000 (4,710) ^{sol}	56,000	92,000 (4,710) ^{sol}	LQM S4UL	
EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360)	LQM S4UL	
EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}	LQM S4UL	
EC>10-12	6%	380	1,200	4	34,000 (2,150) ^{sol}	5,000	10,000	LQM S4UL	
EC>12-16	6%	660	2,500	130	38,000	5,100	10,000	LQM S4UL	
EC>16-21	6%	930 ^f	1,900 ^f	260 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
EC>21-35	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL	
EC>35-44	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL	
Aliphatic +Aromatic >EC44	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
	2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL	
	6%	1,900 ^f	1,900 ^f	3,000 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL	

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS ^{res} i	POS ^{park}	Source
Chloroalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	0.0071	0.0092	0.0046	0.67	29	21	LQM S4UL
		2.5%	0.0110	0.0130	0.0083	0.97	29	24	LQM S4UL
		6%	0.0190	0.0230	0.0160	1.7	29	28	LQM S4UL
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425) ^{vap}	LQM S4UL
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) ^{vap}	LQM S4UL
		6%	39	40	240	3,000	140,000	100,000 (6,392)	LQM S4UL
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800	LQM S4UL
		2.5%	3.4	8.0	0.89	550	1,400	2,100	LQM S4UL
		6%	7.5	17	2.0	1,100	1,400	2,300	LQM S4UL
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500	LQM S4UL
		2.5%	2.8	3.5	1.9	250	1,400	1,800	LQM S4UL
		6%	6.4	8.2	4.4	560	1,400	2,100	LQM S4UL
	Tetrachloroethene (PCE)	1%	0.31	0.32	2.00	24	3,200	1400	DEFRA C4SL
		2.5%	0.70	0.71	4.8	55	3,300	1900	DEFRA C4SL
		6%	1.60	1.60	11.0	130	3,400	2,500	DEFRA C4SL
	Tetrachloromethane (carbon tetrachloride)	1%	0.03	0.03	0.45	2.9	890	190	LQM S4UL
		2.5%	0.06	0.06	1.0	6.3	920	270	LQM S4UL
		6%	0.13	0.13	2.4	14	950	400	LQM S4UL
	Trichloroethene (TCE)	1%	0.009	0.010	0.032	0.7	76.0	41.0	DEFRA C4SL
		2.5%	0.020	0.020	0.072	1.5	78.0	51.0	DEFRA C4SL
		6%	0.043	0.045	0.160	3.4	79.0	69.0	DEFRA C4SL
	cis 1,2-dichloroethene	1%	0.46	0.50	0.890	38	3,800	2,000	DEFRA C4SL
		2.5%	0.78	0.84	1.70	64	3,800	2,400	DEFRA C4SL
		6%	1.50	1.60	3.60	120	3,900	3,100	DEFRA C4SL
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600	LQM S4UL
		2.5%	1.7	2.1	0.83	170	2,500	2,800	LQM S4UL
		6%	3.4	4.2	1.7	350	2,500	3,100	LQM S4UL
	Trans-1,2 Dichloroethene	1%	0.9	0.9	3.7	69	13,000	5,600	DEFRA C4SL
		2.5%	1.6	1.7	7.5	120	13,000	7,000	DEFRA C4SL
		6%	3.3	3.4	16.0	260	13,000	9,100	DEFRA C4SL
	Chloroethene (vinyl chloride)	1%	0.006	0.015	0.0017	1.1E+00	7.8	18.0	DEFRA C4SL
		2.5%	0.010	0.019	0.0031	1.4E+00	7.8	19.0	DEFRA C4SL
		6%	0.017	0.029	0.0058	2.20	7.8	19.0	DEFRA C4SL
	2,4,6-Trinitrotoluene (TNT)	1%	1.6	65	0.24	1,000	130	260	LQM S4UL
		2.5%	3.7	66	0.58	1,000	130	270	LQM S4UL
		6%	8.1	66	1.4	1,000	130	270	LQM S4UL
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) ^{sol}	LQM S4UL
		2.5%	250	13,000	38	210,000	26,000	51,000	LQM S4UL
		6%	540	13,000	85	210,000	27,000	53,000	LQM S4UL
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) ^{vap}	LQM S4UL
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) ^{vap}	LQM S4UL
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) ^{vap}	LQM S4UL
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30	LQM S4UL
		2.5%	6.6	7.4	6.1	170	18	31	LQM S4UL
		6%	7.1	7.5	9.8	170	18	31	LQM S4UL
	Dieldrin	1%	0.97	7.0	0.17	170	18	30	LQM S4UL
		2.5%	2.0	7.3	0.41	170	18	30	LQM S4UL
		6%	3.5	7.4	0.96	170	18	31	LQM S4UL
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300	LQM S4UL
		2.5%	7.8	620	1.2	9,400	1,200	2,400	LQM S4UL
		6%	17.4	620	2.7	9,400	1,200	2,400	LQM S4UL
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26	LQM S4UL
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26	LQM S4UL
		6%	0.14	6.6	2.2E-02	140	16	27	LQM S4UL
	Endosulfans (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300	LQM S4UL
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400	LQM S4UL
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500	LQM S4UL
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15	LQM S4UL
		2.5%	0.2	3.8	3.2E-02	65	8.1	15	LQM S4UL
		6%	0.46	3.8	7.7E-02	65	8.1	16	LQM S4UL
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}	LQM S4UL
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}	LQM S4UL
		6%	2.4	2.4	32	290	14,000	2,900	LQM S4UL
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}	LQM S4UL
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}	LQM S4UL
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}	LQM S4UL
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}	LQM S4UL
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}	LQM S4UL
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}	LQM S4UL
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}	LQM S4UL
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120	LQM S4UL
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130	LQM S4UL
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190	LQM S4UL
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190	LQM S4UL
		6%	22	38	7.0	830	100	190	LQM S4UL
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30	LQM S4UL
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30	LQM S4UL
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POSresi	POSpark	Source
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100	LQM S4UL
		2.5%	2.0	150	0.30	4,000	620	1,100	LQM S4UL
		6%	4.5	210	0.70	4,300	620	1,100	LQM S4UL
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110	LQM S4UL
		2.5%	0.52	29	8.0E-02	400	60	120	LQM S4UL
		6%	1.2	31	0.19	400	60	120	LQM S4UL
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300	LQM S4UL
		2.5%	0.29	0.29	10	22	11,000	1,900	LQM S4UL
		6%	0.62	0.62	23	47	11,000	2,700	LQM S4UL
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48	LQM S4UL
		2.5%	0.7	0.78	0.61	66	25	50	LQM S4UL
		6%	1.6	1.8	1.4	120	25	51	LQM S4UL
	Phenol	1%	120	440 (460)	23	440 ^{dir} (26,000)	440 ^{dir} (10,000)	440 ^{dir} (7,600)	LQM S4UL
		2.5%	200	690	42	690 ^{dir} (30,000)	690 ^{dir} (10,000)	690 ^{dir} (8,300)	LQM S4UL
		6%	380	1,200	83	1,300 ^{dir} (34,000)	1,300 ^{dir} (10,000)	1,300 ^{dir} (9,300)	LQM S4UL
sol/vap = solubility/vapour limit (potentially use if free product identified, although highly conservative)									
* = naphthalene C4SL exceeds the CLEA calculated soil saturation concentration (76 mg kg-1 for 1% SOM, 183 mg kg-1 for 2.5% SOM and 432 mg kg-1 for 6% SOM)									
f = oral, dermal and inhalation exposures compared to oral HCV									
dir = S4ULs based on threshold protective of direct skin contact with phenol)brackets long term exposure for illustration purposes)									
g = derived based on 2,3,4-tetrachlorophenol									

Appendix G – References

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