

118 HEMPSTEAD ROAD,
KINGS LANGLEY,
WD4 8AL

Phase II
Environmental Report

Client
Mr NAKhtar

Report No.5732

11th December2023



CONTENTS

	Section	Page
	SYNOPSIS	1
1	Site description	2
2	Limitations	2
3	Development proposals	2
4	Geology	3
5	Field work	3
6	Laboratory testing	4
7	Ground conditions	
	7.1 Stratigraphy	4
	7.1.1 Made Ground	5
	7.1.2 Head	5
	7.1.3 Lewes Nodular Chalk	5
	7.2 Groundwater	5
8	Discussion	
	8.1 General	6
	8.2 Contaminant analysis	
	8.2.1 Solid phase	6
	8.2.2 Gas phase	8
	8.2.3 Validation at WS5 location	9
9	Conclusions and riskevaluation	9

References

Procedural Notes

APPENDICES

- A Borehole Records
- B Standpipe Records
- C Laboratory Test Results - Investigation
- D Original Testing Certificates - Investigation
- E Laboratory Test Results - Validation
- F Original Testing Certificates - Validation
- G Figures

**118 HEMPSTEAD ROAD,
KINGS LANGLEY,
WD4 8AL**

**Phase II
Environmental Report**

Synopsis

An investigation has been carried out on land adjacent to 118 Hempstead Road, Kings Langley on the instructions of Mr. NAKhtar. A Phase I Environmental Assessment^[1] has been prepared for the site by Aval Consulting Group and should be read in conjunction with this report.

The purpose of the investigation was to determine the ground conditions and to provide recommendations in respect of environmental matters for the residential development.

Five windowless samplers were carried out, supported by a programme of laboratory testing.

The ground conditions revealed by the investigation comprised Made Ground overlying Head with Lewes Nodular Chalk at depth. Contamination testing revealed one isolated area of contamination that has been successfully remediated and validated.

1

Site description

At the time of the investigation the site comprised hardstanding, grassland and an outbuilding that was used as a storage facility for the neighbouring residential development. The area was also used for car parking

No visual or olfactory contamination was noted on site, nor was there any discoloration to vegetation.

Figure 1 of Appendix G shows the general layout of the site. A full and detailed description is provided in the desk study to which the reader is referred.

2

Limitations

This report is subject to AP geotechnics service constraints laid out in the appended Procedural Notes and any limitation noted in this document.

3

Development proposals

The site has planning permission for a house and gardens as shown at Figure 2 of Appendix G.

4

Geology

Published records of the British Geological Survey indicate the site to lie on Lewes Nodular Chalk, although an area of overlying Head is mapped just over the northern boundary.

5

Field work

The extent of the field work was agreed with the Aval Consulting and comprised five windowless sampler holes to a maximum of 4m depth. The location of the exploratory points is shown on Figure 1 at Appendix G.

Representative soil samples were recovered from the boreholes for subsequent laboratory examination and testing. Details of the strata encountered are provided on the Borehole Records at Appendix A; together with particulars of the samples recovered and groundwater observations.

A standpipe was installed in WS1 to allow monitoring of groundwater and ground gas levels. The results so far are presented at Appendix B.

In the area of WS5 soil contamination was found and the resulting remediation exercise was validated at the sides and base to confirm the removal of the contamination "hot-spot".

6

Laboratory testing

The following laboratory tests were conducted on soil samples recovered during the field work:-

- Contamination: chemical analyses to detect the presence of contaminants as detailed in the desk study, viz:-

Metals & metalloids: Total arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc.

Inorganics: Water soluble boron.

Organic: Petroleum hydrocarbons and polycyclic aromatic hydrocarbon.

Others: Asbestos screen.

Results of these tests are presented at Appendix C, whilst the original testing houses contamination results are at Appendix D.

7

Ground conditions

7.1

Stratigraphy

The stratigraphy of the site as revealed by the boreholes is described in detail at Appendix A and in general terms hereafter.

7.1.1

Made Ground

Made Ground was encountered in all exploratory positions and reached a maximum observed thickness of 1.1m in WS1. Beneath the hardstanding and sub-base, where present; it generally comprised variable materials from a sandy clay through a gravel to a brick rubble. It was generally found to be in the order of ½m thick.

7.1.2

Head

Underlying the Made Ground is material that has been assessed as Head it comprised an orange brown and brown sandy clay with some flint gravel.

The material was generally in a firm consistency.

7.1.3

Lewes Nodular Chalk

Lewes Nodular Chalk was encountered in window sampler holes of sufficient depth and it continued to the limit of investigation. The samples produced by percussive drilling only permit basic descriptions since the fabric of the rock is destroyed by the action of drilling.

7.2

Groundwater

Groundwater was only encountered during drilling of the borehole 1 at some 1½m depth. However, the speed of drilling, the requirement to add water in granular material will have masked some inflows. The groundwater monitoring standpipe was dry during all visits.

Details of all groundwater observations are provided on the appropriate Borehole Records at Appendix A and the standpipe monitoring records and Appendix B.

8

Discussion

8.1

General

The site has evidently already carried development and the investigation has revealed some Made Ground to be present. It is possible that other pockets of Made Ground may also be present; perhaps deeper, of different character or associated with the remains of underground construction; even though not detected by this investigation.

All remnants of previous construction should be removed prior to redevelopment to enable the proposals to be constructed without hindrance and to perform satisfactorily.

The investigation found soils to be generally suitable for use apart from at WS5 location. This area has been subsequently remediated.

8.2

Contaminant analysis

8.2.1

Solid phase

Contaminant testing was undertaken on selected soil samples and the results have been compared with the limited number of CLEA^[2] Soil Guideline Values (SGVs) for residential land

with plant uptake that have been published to date. Where not available from that source, reference has also been made to the LQM/CIEHS4ULs for Human Health Risk Assessment^[3]. Appropriate trigger levels are given with the results at Appendix C. Analysis for metals/metalloids revealed all the determinands to be below relevant triggers for all samples.

No SGV exists for lead (the old SGV of 450 mg/kg having been withdrawn) and LQM have not calculated one. However, provisional Category 4 Screening Levels^[4] (C4SLs) have been published by Defra which suggest a maximum concentration of 200 mg/kg lead for residential land use with plant uptake (a number of different concentrations have been published, dependant on differing exposure scenarios). All lead results are below this trigger.

Analysis for TPH & BTEX recorded low concentrations all below the residential trigger. Such low concentrations are not considered significant.

Analysis for speciated PAH recorded a maximum total concentration of 124 mg/kg at 0.5m depth in WS5. Some individual PAHs were above the residential land use with plant uptake trigger in this sample.

No Asbestos fibres were detected in any sample.

The receptor for RESIWOPUGAC is a zero to six year old child, with an exposure duration of six years, and time spent outdoors of one hour. Active pathways include direct ingestion of soil and indoor dust, dermal contact with soil and indoor dust, and the inhalation of indoor and outdoor dust and vapours.

With regards to potential remediation of soil contaminated with PAH, it is considered that soil removal and validation of the excavation is a suitable process of remediation in the area of WS5. The remainder of the site does not require remediation based on the test results.

Nevertheless, in view of the foregoing, it is recommended that appropriate health and safety precautions, such as detailed in HS(G)66^[5] and elsewhere, should be followed by the construction workforce and others who may come into contact with potentially contaminated soil. They should be agreed with the Health and Safety Executive and are likely to include, but not be restricted to, the following:-

- maintenance of good standards of personal hygiene.
- wearing personal protective clothing that is changed and cleaned frequently to eliminate skin contact.
- prevention of ingestion by using washing and changing facilities at all break times.
- prohibition of eating, drinking or smoking between break times.
- controlling the spread of dust and airborne mists to prevent inhalation.

8.2.2

Gas Phase

A standpipe was installed in the WS1 and four monitoring visits, have been carried so far, with two more still to be undertaken. They have taken readings of flow rate, methane, carbon dioxide, oxygen, atmospheric pressure and groundwater levels. The results are presented at Appendix B and some flow rate, methane and carbon dioxide levels have been detected. No SGVs have been published for soil gas concentrations. However, a report published by CIRIA^[6] describes a risk based approach to assessing potential hazards from ground gases taking into account gas concentrations and flow rate. A Gas Screening Value (GSV) is calculated which in turn allows a Characteristic Situation to be determined which informs the level of protection required.

A GSV of 0.0116 l/hr has been calculated for Carbon Dioxide and 0.0056 l/hr for N₂ (allowing for the accuracy of the flow pod being plus or minus 0.3 l/hr and the gas analyzer plus or minus 0.5%) and using the highest value for each. These values fall within Characteristic Situation 1 (CS1). Thus no gas protection are expected to be required, but this should be confirmed by the final two sets of monitoring.

8.2.3

Validation at WS5 location

Around the area of WS5 material was evacuated to some 0.7m depth (into the natural ground) in an area some 5m by 5m centered at the original widow sampler location. Validation samples on the remaining soil were undertaken from the sides and base to confirm they were acceptable to remain. The results of this analysis are provided at Appendix E, whilst the original testing house sheets are at Appendix F, together with associated site plans showing the validation locations at Figures 1 & 3 of Appendix G. The results of the testing are at concentrations appropriate to the proposed end use of the site.

No further works are expected to be required in the area of WS5.

9

Conclusions and risk evaluation

Following the implementation of the ground investigation, the contaminant linkages identified during the Preliminary Environmental Risk Assessment have been re-evaluated and re-classified in relation to the additional information obtained. The results of the reassessment are summarised in Table 1:.

Table1: Revised Conceptual Mode

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
Human Health					
Future Site Users	Potential contamination in Made Ground, shallow soils	Direct contact, dermal contact, ingestion and inhalation.	Medium	Ground investigation has identified elevated concentrations of PAHs have been identified. The “hot spot” of contamination at WS5 has been removed and validated.	Low
	Ground gas and vapours arising from Made Ground on-site and organic contamination.	Lateral migration and accumulation in internal spaces with potential risk of exposure. Migration to outdoor spaces.	Medium	The site has been identified as Characteristic Situation 1 (CS1). No ground gas protection measures are required.	Low
Off-site residents/users	Potential contamination in demolition and construction dust during redevelopment.	Inhalation and ingestion of potentially contaminated dust and fibres during redevelopment work.	Medium	A Construction Environmental Management Plan(CMEP) should be prepared for the works, detailing measures of managing waste during demolition and construction works and techniques for suppressing the generation of dust, such as dampening down of the Site, wheel washing for vehicles leaving the Site and covering material stockpiles on-site. Details on asbestos migration measure (if required) are presented in theAPoW (ref.WIE15739-100-R-6-2-2-APoW March 2020).	Low
Property					
On-site structures	Ground gas and vapours arising from Made Ground on-site and organic contamination.	Lateral migration through Made Ground and accumulation in internal spaces.	Medium	The Site has been identified as Characteristic Situation (CS1), No ground gas protection measures are appr	Low
Off-site structures	Potential contamination in groundwater.	Lateral migration through granular deposits and backfill to existing sewers.	Medium	Very limited amounts of groundwater has been encountered.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
	Ground gas and vapours from organic matter and contamination in soils.	Migration off-site along service corridors. Ingress into off-site structures.	Medium	Geological conditions in the surrounding area are similar to the Site, including the presence of Head. Redundant pipe work on-site should be removed and capped at the Site boundary as part of the Site's enabling works. Clean service corridors, physically separated from residual contaminated soils and groundwater, should be provided for new services to ensure a preferential pathway is not created for contamination to migrate off-site.	Low
Ecological Systems					
Proposed soft landscaping	Potential contamination in Made Ground and shallow soils.	Plant intake in Made Ground and shallow soils.	Medium	The vast majority of results are below relevant trigger concentration. The hot spot of contamination round WS5 has been removed and validated. No additional remediation is warranted	Low

A M Smith
AP GEOTECHNICS LTD.
11th December 2023

This report has been prepared for the sole and specific use of Mr. NAKhtar for the purpose of the proposed development at 118 Hempstead Road and should not be relied upon by any third party. Any other persons who use any information contained herein without the written permission of AP GEOTECHNICS LTD. do so at their own risk. The copyright to this report remains the property of AP GEOTECHNICS LTD.

References

- [1] Report No.92439
Contaminated LandPhase 1 Assessment
118 Hempstead Road, Kings Langley
Aval Consulting Group.,September 2023

- [2] The Contaminated Land Exposure Assessment Model
Department for Environment, Food and Rural Affairs
The Environment Agency
R & D PublicationsSGV 1 *et al.*, March 2002

- [3] TheLQM/CIEHS4ULs for Human Health Risk Assessment
Nathanail,C.P.,McCaffrey, C. *et al*
Land Quality Management Ltd., 2015

- [4] Category 4 Screening Levels for assessment of land affected by contamination
Department for Environment Food and rural affairs., 2012

- [5] Protection of workers and the general public during the development of
contaminated land
HS(G)66
Health and Safety Executive, 1991

- [6] Report No C665
Assessing risks posed by hazardous ground gases to buildings
Wilson, S.,Oliver, S.,Mallett, H.,Hutchings, H and Card, G
CIRIA, 2007

PROCEDURAL NOTES for GROUND INVESTIGATIONS

General

This report has been prepared generally in accordance with CLR 11: Model Procedures for the Management of Land Contamination (Defra & Environment Agency 2004).

This report is based upon data obtained from field descriptions of the strata and examination of the samples by an engineer, together with the results of in situ and laboratory tests as appropriate. Responsibility cannot be accepted for variations in ground conditions between and around any of the exploratory points that is not revealed by the data. Whilst the report may offer an opinion on the ground conditions between exploratory points and below the depth of investigation, this is for guidance only and no liability is accepted for its accuracy. Unless specifically included in the report, it should be assumed that no testing has been carried out in respect of asbestos or Japanese Knotweed and no liability will be inferred or accepted.

Drilling procedure

Boring by light cable percussion drilling allows the ground conditions to be reasonably well established. However, a certain amount of disturbance is inevitable and some mixing of soils can occur.

Sampling procedure

"Undisturbed" samples of predominantly cohesive soils are taken with a 100mm diameter open tube sampler, generally in accordance with BS 5930: 1999.

Where appropriate, or where an undisturbed sample is unsuccessful, disturbed samples are recovered and sealed into polythene bags.

Groundwater samples are taken when water is encountered in sufficient quantity.

Standard penetration tests

The test is conducted generally in accordance with BS 1377: Part 9: 1990. The sampler tube is subject to a seating drive of 150mm into the soil at the base of the borehole. Results are given on the Borehole Records as the number of blows required to drive the sampler tube a further 300mm and this is known as the "N" value. Where the driving resistance is such that full penetration is not achieved, the test is generally terminated after 50 blows and the actual distance penetrated is recorded.

Groundwater

Groundwater observations necessarily reflect the conditions encountered at the time of the exploratory work. Long term monitoring of standpipes is usually required to establish an equilibrium water level since the normal rate of boring is too fast to permit steady state conditions to be achieved.

Groundwater levels are subject to variations caused by changes in drainage conditions and seasonal climatic changes.

Water may necessarily be added to advance the bore whilst casing may be required to maintain an open hole. These can both mask subsequent groundwater observations and are therefore noted on the individual Borehole Record.

APPENDICES

A Borehole Records

Symbols and Abbreviations

Borehole Records

B Standpipe Records

Gas Emissions and Water Levels

C Laboratory Test Results - Investigation

Contaminants in Soil

D Original Testing Certificates - Investigation

Analytical Reports

E Laboratory Test Results - Validation

Contaminants in Soil

D Original Testing Certificates - Validation

Analytical Reports

G Figures

Figure 1: Existing Site Plan

Figure 2: Proposed Site Plan

Figure 3: Validation Sampling Locations

APPENDIX A

BOREHOLE RECORDS

SYMBOLS and ABBREVIATIONS

Samples

Undisturbed

U	Standard open drive "undisturbed" 102mm dia. in boreholes 38mm dia. in trial pits, window sampler and hand auger
T	Thin wall open drive
P	Piston
CBR	CBR mould
L	Windowless sampler liner

Disturbed

D	Small
B	Bulk
W	Water
C	Contaminants: plastic tub
J	Contaminants: brown glass jar

In situ tests

SPT	Standard Penetration Test, open shoe
CPT	solid cone
	N value is number of blows for 300mm penetration.
	Blow count also given as seating drive followed by four increments of 75mm.

V () Vane test (c_u kPa)

P () Hand penetrometer (c_u kg/cm²)

M () Mexe probe (CBR %)

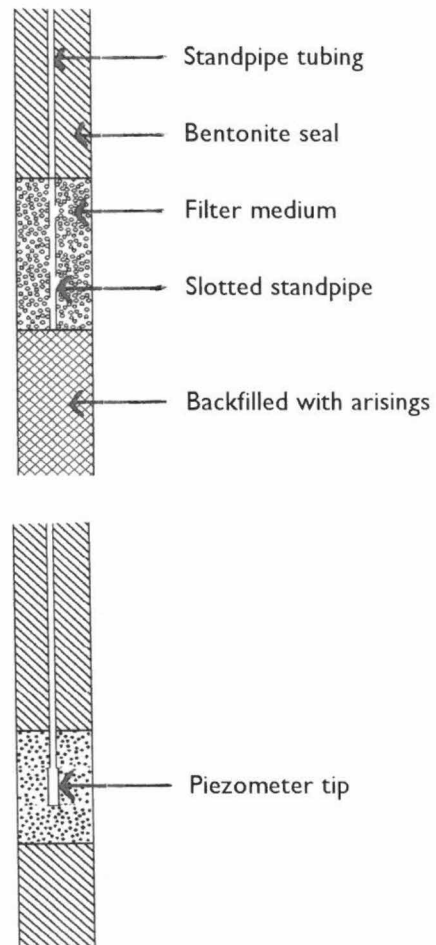
Water records

▼₂ Standing level

∇₂ Depth encountered

suffix identifies separate strikes

Standpipes

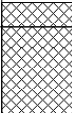
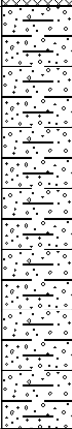



Excavation Method Drive-in Window Sampler	Dimensions 115mm to 1.00m	Ground Level (mOD)	Client Mr Naeem Akhtar	Job Number 5732
	Location See site plan	Dates 31/10/2023	Engineer Aval Consulting Group	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	D1	DRY	50% recovery		(0.13)	MADE GROUND: Tarmac			
0.70-1.00	L1				0.13	CONCRETE			
					(0.02)				
					0.15	MADE GROUND: Orange brown sand with occasional gravel			
					(0.16)				
					0.31	MADE GROUND: Orange sandy clay and with some gravel and brick fragments			
					(0.23)				
					0.54	MADE GROIND: Orange brown clayey sand with some gravel and occasional cobbles			
					(0.16)				
					0.70	MADE GROUND: Brick and concrete rubble			
1.00	D2		40% recovery		1.00	MADE GROUND: Orange brown and brown silty clay with some gravel and brick fragments			
1.00-1.45	SPT(C) N=0		1/0,0,0,0		(0.10)				
1.00-2.00	L2				1.10	Soft to firm dark brown and brown sandy CLAY			
1.50	D3		steady(1) at 1.45m, rose to 1.30m in 10 mins.		(0.60)				
2.00	D4		70% recovery		1.70	Firm orange brown and brown sandy CLAY with some gravel			
2.00-2.45	SPT(C) N=5		5/2,1,1,1		(0.92)				
2.00-3.00	L3	1.30							
2.50	D5				2.62	White structureless CHALK			
3.00	D6		90% recovery		(1.38)				
3.00-3.45	SPT(C) N=7		3/1,2,2,2						
3.00-4.00	L4	1.30							
4.00-4.45	SPT(C) N=18	1.30	31/10/2023:1.30m 4/4,5,4,5		4.00	Complete at 4.00m			







Remarks Hand dug pit to 0.70m	Scale (approx)	Logged By
	1:25	ljs
	Figure No. 5730-2.WS1	

Excavation Method Drive-in Window Sampler	Dimensions 116mm to 1.00m	Ground Level (mOD)	Client Mr Naeem Akhtar	Job Number 5732
	Location See site plan	Dates 01/11/2023	Engineer Aval Consulting Group	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1				0.08	MADE GROUND: Brown sandy clay with some gravel		
					0.38	MADE GROUND: Light grey friable sandy clay with some gravel		
1.00	D2				(1.39)	Firm orange brown and brown sandy CLAY with some gravel		
1.50	D3				1.77	White structureless CHALK		
2.00	D4				(1.23)			
2.50	D5				3.00	Complete at 3.00m		
3.00	D6							




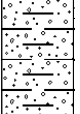
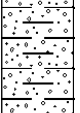
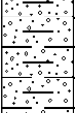
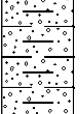
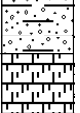
Remarks	Scale (approx)	Logged By
	1:25	
	Figure No. 5730-2.WS2	

Excavation Method Drive-in Window Sampler	Dimensions 115mm to 1.00m	Ground Level (mOD)	Client Mr Naeem Akhtar	Job Number 5732
	Location See site plan	Dates 09/10/2023	Engineer Aval Consulting Group	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1				0.29	MADE GROUND: Tarmac		
					0.29 (0.14)	MADE GROUND: Brick and concrete rubble with some brown sandy clay and gravel		
					0.43 (0.09)	MADE GROUND: Dark brown sandy clay with some gravel, brick and chalk fragments		
1.00	D2				0.52	Firm orange brown and brown sandy CLAY with some gravel		
1.50	D3				(1.13)			
2.00	D4				1.65	White structureless CHALK with flint		
2.50	D5				(1.35)			
3.00	D6				3.00	Complete at 3.00m		






Remarks	Scale (approx)	Logged By
	1:25	ljs
	Figure No. 5732.WS3	

Excavation Method Drive-in Window Sampler	Dimensions 115mm to 1.00m	Ground Level (mOD)	Client Mr Naeem Akhtar	Job Number 5732
	Location See site plan	Dates 03/10/2023-09/10/2023	Engineer Aval Consulting Group	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.55	D1				(0.16)	MADE GROUND: Tarmac		
					0.16	MADE GROUND: Crushed brick and gravel		
					(0.14)	MADE GROUND: Dark brown and grey sandy clay with some gravel and brick fragments		
					0.30			
1.00	D2				(0.28)	Firm orange brown and brown sandy CLAY with some gravel		
					0.58			
1.50	D3							
2.00	D4							
2.50	D5					White structureless CHALK with flint		
3.00	D6					Complete at 3.00m		

Remarks	Scale (approx)	Logged By
	1:25	ljs
	Figure No. 5732.WS4	

Excavation Method Drive-in Window Sampler	Dimensions	Ground Level (mOD)	Client Mr Naeem Akhtar	Job Number 5732
	Location See site plan	Dates 09/10/2023	Engineer Aval Consulting Group	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1				(0.16)	MADE GROUND: brown sandy clay with some gravel		
					0.16	MADE GROUND: Crushed brick and concrete with some gravel		
					(0.20)	MADE GROUND: Brown sandy gravel with some breeze block and concrete		
					0.36			
					(0.19)	Firm orange brown and brown sandy CLAY with some gravel		
					0.55			
					(0.45)			
					1.00	Complete at 1.00m		

Remarks	Scale (approx) 1:25	Logged By ljs
	Figure No. 5732.WS5	

APPENDIX B

STANDPIPE RECORDS

STANDPIPE RECORDS

GAS EMISSIONS AND WATER LEVELS

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AL
 Client: Mr NAEEM AKHTAR

Project No: 5732
 Sheet No: 1/1

Date		Measurement	Units	Location							
09/11/2023				BH1							
Weather conditions				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady
Temp. °C	7.1	Flow rate	l/hr	0.1	0.0						
Atmos. mb	990	Methane	%	0.0	0.0						
		Carbon dioxide	%	0.7	2.4						
Cloud	90%	Carbon monoxide	ppm	0	0						
Sun	10%	Hydrogen sulphide	ppm	0	0						
Rainfall	nil	Oxygen	%	18.9	15.4						
		Water level	m bgl	Dry							

Date		Measurement	Units	Location							
20/11/2023				BH1							
Weather conditions				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady
Temp. °C	10	Flow rate	l/hr	0.0	0.0						
Atmos. mb	1012	Methane	%	0.0	0.0						
		Carbon dioxide	%	0.8	0.9						
Cloud	60%	Carbon monoxide	ppm	0	0						
Sun	40%	Hydrogen sulphide	ppm	0	0						
Rainfall	nil	Oxygen	%	18.6	18.7						
		Water level	m bgl	Dry							

Date		Measurement	Units	Location							
28/11/2023				BH1							
Weather conditions				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady
Temp. °C	8.7	Flow rate	l/hr	0.0	0.0						
Atmos. mb	1005	Methane	%	0.9	0.0						
		Carbon dioxide	%	0.2	0.9						
Cloud	0%	Carbon monoxide	ppm	0	0						
Sun	100%	Hydrogen sulphide	ppm	0	0						
Rainfall	nil	Oxygen	%	19.1	19.2						
		Water level	m bgl	Dry							

Date		Measurement	Units	Location							
05/12/2023				BH1							
Weather conditions				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady
Temp. °C	6.6	Flow rate	l/hr	0.0	0.0						
Atmos. mb	1014	Methane	%	0.0	0.0						
		Carbon dioxide	%	0.7	0.6						
Cloud	30%	Carbon monoxide	ppm	0	0						
Sun	70%	Hydrogen sulphide	ppm	0	0						
Rainfall	nil	Oxygen	%	19.6	19.4						
		Water level	m bgl	Dry							

Readings taken with GFM435 manufactured by Gas Data Ltd.

APPENDIX C

LABORATORY TEST RESULTS - INVESTIGATION

CONTAMINANTS IN SOIL

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AP
 Client: Mr Naeem Akhtar
 Agent: Aval Consulting Group

Project No: 5732
 Sheet No: 1/1

Location	Sample	Depth m	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Zinc	TPH4 by GCMS				Phenols
						water sol.	hexavalent	aqueous extract					inorganic					C10 - C20	C20 - C30	C30 - C40	Total
W S1		0.50	8.9	85	0.78	0.5	0.4	-	23	30	26	<0.3	18	<1.0	33	62					
WS2		0.50	15	120	1.6	1.0	<0.2	-	35	35	24	<0.3	39	<1.0	57	94					
WS5		0.50	23	220	1.80	1.3	<0.2	-	28	56	42	<0.3	22	<1.0	53	200					
S4UL ¹	residential ³		37		1.7	290	11	910		2400		40	180	250	410	3700					380
	residential ^{3a}		40		1.7	11000	85	910		7100		56	180	430	1200	40000					1200
	commercial		640		12	240000	190	8600		68000		1100	980	12000	9000	730000					1300
	POS resi*		79		2.2	21000	120	1500		12000		120	230	1100	2000	81000					
CLEA ²	residential		32							130				350							
	commercial		640							1800				13000							

Notes

- 1. S4UL given at 6% soil organic matter
 - 2. CLEA SGVs given at 6% soil organic matter
 - 3. Residential with plant uptake
 - 3a. Residential without plant uptake
 - *. Public open space near residential housing
- © AP GEOTECHNICS LTD.

All units are mg/kg dry weight of soil unless otherwise stated, except for pH which is dimensionless

Exceptions denoted thus: XX
XX

CONTAMINANTS IN SOIL

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AP
 Client: Mr Naeem Akhtar
 Agent: Aval Consulting Group

Project No: 5732
 Sheet No: 1/1

Speciated Total Petroleum Hydrocarbons (Aromatic / Aliphatic Split with BTEX)											
Location Sample Depth, m	W S1	W S2	W S5						LQM/CIE H S4U L		
									residential	allotments	commercial
Determinand	Concentration, mg/kg										
Aromatic Hydrocarbon											
C5 - C7	<0.001	<0.001	<0.001						300	57	86000
>C7 - C8	<0.001	<0.001	<0.001						660	120	180000
>C8 - C10	<0.001	<0.001	<0.001						190	51	17000
>C10 - C12	<1.0	<1.0	<1.0						380	74	34000
>C12 - C16	<2.0	<2.0	11						660	130	38000
>C16 - C21	<10	<10	62						930	260	28000
>C21 - C35	<10	<10	100						1700	1600	28000
Total Aromatic Hydrocarbon	<10	<10	180								
Aliphatic Hydrocarbon											
C5 - C6	<0.001	<0.001	<0.001						160	3900	12000
>C6 - C8	<0.001	<0.001	<0.001						530	13000	40000
>C8 - C10	<0.001	<0.001	<0.001						150	1700	11000
>C10 - C12	<1.0	<1.0	<1.0						760	7300	47000
>C12 - C16	<2.0	<2.0	3.4						4300	13000	90000
>C16 - C21	<8.0	<8.0	<8.0								
>C21 - C35	<8.0	<8.0	22								
Total Aliphatic Hydrocarbon	<10	<10	32								
Total Petroleum Hydrocarbon	<5	<5	212								
BTEX	Concentration, µg/kg										
Benzene	<5.0	<5.0	<5.0						370	75	90000
Toluene	<5.0	<5.0	<5.0						660000	120000	18000000
Ethyl Benzene	<5.0	<5.0	<5.0						260000	91000	27000000
p & m-xylene	<5.0	<5.0	<5.0						310000	160000	30000000
o-xylene	<5.0	<5.0	<5.0								
MTBE	<5.0	<5.0	<5.0								

Notes

Total = Sum of compounds above detection limit.

S4UL given at 6% soil organic matter

*Results given as total of (ortho), (meta) and (para) xylene. SGV given is the lowest permissible value for any xylene compound

Exceptions denoted thus:

Residential	XX
Commercial	XX

CONTAMINANTS IN SOIL

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AP
 Client: Mr Naeem Akhtar
 Agent: Aval Consulting Group

Project No: 5732
 Sheet No: 1/1

Speciated Polyaromatic Hydrocarbons by GCMS															
Location Sample Depth, m	W S1	W S2	W S5									LOM/CIE H S4U L ³			
	0.50	0.50	0.50									residential4	residential5	allotments	commercial
Determinand	Concentration, mg/kg														
PAH															
Naphthalene	<0.05	<0.05	0.56									13	13	24	1100
Acenaphthylene	0.07	<0.05	0.17									920	6000	160	100000
Acenaphthene	<0.05	0.06	3.2									1100	6000	200	100000
Fluorene	<0.05	0.07	3.5									860	4500	160	71000
Phenanthrene	0.22	0.56	23									440	1500	90	23000
Anthracene	0.07	0.11	6.4									11000	37000	2200	540000
Fluoranthene	0.53	0.7	23									890	1600	290	23000
Pyrene	0.54	0.59	18									2000	3800	620	54000
Benzo(a)anthracene	0.04	0.28	8.8									13	15	13	180
Chrysene	0.36	0.32	8									27	32	19	350
Benzo(b)fluoranthene	0.59	0.36	9.5									3.7	4.0	3.9	45
Benzo(k)fluoranthene	0.27	0.16	3.2									100	110	130	1200
Benzo(a)pyrene	0.5	0.28	7.4									3	3.2	3.5	36
Indeno(123-cd)pyrene	0.3	0.16	3.6									41	46	39	510
Dibenzo(ah)anthracene	<0.05	<0.05	1									0.3	0.32	0.43	3.6
Benzo(ghi)perylene	0.35	0.18	3.8									350	360	640	4000
Total PAH (16)	4.2	3.83	124												

Notes

1. Total PAH = Sum of EPA16 identified components
2. The results are expressed as mg/kg dry weight soil after correction for moisture content
3. S4UL given at 6% soil organic
4. Residential with plant uptake
5. Residential without plant uptake

Exceptions denoted thus: Residential XX
 Commercial XX

CONTAMINANTS IN SOIL

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AP
 Client: Mr Naeem Akhtar
 Agent: Aval Consulting Group

Project No: 5732
 Sheet No: 1/1

Location	Sample	Depth m	Asbestos identification		
			Description of matrix	Overall percentage of asbestos identified (approx.)	Type of asbestos identified
W S1		0.5C	Brown clay and sand with gravel		none detected
WS2		0.50	Brown clay ans sand with gravel and stones		none detected
WS5		0.50	Brown sand with gravel and brick		none detected

APPENDIX D

ORIGINAL TESTING CERTIFICATES - INVESTIGATION



Adrian Smith
AP Geotechnics Ltd
51-53 Guildford Street
Chertsey
KT16 9BA

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

t: 01932 848460

t: 01923 225404

e: adrian.smith@apgeotechnics.co.uk

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 23-62722

Project / Site name:	118 Hempstead Road Kings Langley	Samples received on:	16/10/2023
Your job number:	5732	Samples instructed on/ Analysis started on:	16/10/2023
Your order number:		Analysis completed by:	23/10/2023
Report Issue Number:	1	Report issued on:	23/10/2023
Samples Analysed:	3 soil samples		

Signed: 

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

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

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

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

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

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

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

Analytical Report Number: 23-62722

Project / Site name: 118 Hempstead Road Kings Langley

Lab Sample Number				2845999	2846000	2846001
Sample Reference				WS1	WS2	WS5
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.50	0.50
Date Sampled				13/10/2023	13/10/2023	13/10/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	31	< 0.1
Moisture Content	%	0.01	NONE	11	11	11
Total mass of sample received	kg	0.001	NONE	0.4	0.3	0.4

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.56
Acenaphthylene	mg/kg	0.05	MCERTS	0.07	< 0.05	0.17
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.06	3.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.07	3.5
Phenanthrene	mg/kg	0.05	MCERTS	0.22	0.56	23
Anthracene	mg/kg	0.05	MCERTS	0.07	0.11	6.4
Fluoranthene	mg/kg	0.05	MCERTS	0.53	0.7	23
Pyrene	mg/kg	0.05	MCERTS	0.54	0.59	18
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.4	0.28	8.8
Chrysene	mg/kg	0.05	MCERTS	0.36	0.32	8
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.59	0.36	9.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.27	0.16	3.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.5	0.28	7.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.3	0.16	3.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.35	0.18	3.8

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	4.2	3.83	124
-----------------------------	-------	-----	-----------	-----	------	-----

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.9	15	23
Barium (aqua regia extractable)	mg/kg	1	MCERTS	85	120	220
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.78	1.6	1.8
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	1	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	35	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	35	56
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	24	42
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	39	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	33	57	53
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	62	94	200

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0

Analytical Report Number: 23-62722
 Project / Site name: 118 Hempstead Road Kings Langley

Lab Sample Number	2845999	2846000	2846001
Sample Reference	WS1	WS2	WS5
Sample Number	None Supplied	None Supplied	None Supplied
Depth (m)	0.50	0.50	0.50
Date Sampled	13/10/2023	13/10/2023	13/10/2023
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	3.4
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	22
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	< 10	< 10	32

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	11
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10	62
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10	100
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	< 10	< 10	180

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-62722

Project / Site name: 118 Hempstead Road Kings Langley

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2845999	WS1	None Supplied	0.5	Brown clay and sand with gravel.
2846000	WS2	None Supplied	0.5	Brown clay and sand with gravel and stones.
2846001	WS5	None Supplied	0.5	Brown sand with gravel and brick.

Analytical Report Number : 23-62722

Project / Site name: 118 Hempstead Road Kings Langley

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. Refer to CoA for band specific accreditation.	In-house method with silica gel split/clean up.	L088/76-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

APPENDIX E

LABORATORY TEST RESULTS - VALIDATION

CONTAMINANTS IN SOIL

Project: 118 HEMPSTEAD ROAD, KINGS LANGLEY, WD4 8AP
 Client: Mr Naeem Akhtar
 Agent: Aval Consulting Group

Project No: 5732
 Sheet No: 1/1

Speciated Polyaromatic Hydrocarbons by GCMS															
Location Sample Depth, m	V1	V2	V3	V4	V5							LOM/CIE H S4U L ³			
												residential4	residential5	allotments	commercial
Determinand	Concentration, mg/kg														
PAH															
Naphthalene	0.06	0.06	<0.05	0.08	<0.05							13	13	24	1100
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05							920	6000	160	100000
Acenaphthene	<0.05	<0.05	<0.05	0.26	<0.05							1100	6000	200	100000
Fluorene	<0.05	<0.05	<0.05	0.28	<0.05							860	4500	160	71000
Phenanthrene	0.09	0.08	0.26	2.7	0.15							440	1500	90	23000
Anthracene	<0.05	<0.05	0.06	0.58	<0.05							11000	37000	2200	540000
Fluoranthene	0.13	0.17	0.5	3.5	0.14							890	1600	290	23000
Pyrene	0.11	0.16	0.45	2.9	0.12							2000	3800	620	54000
Benzo(a)anthracene	<0.05	0.09	0.27	1.5	0.09							13	15	13	180
Chrysene	<0.05	0.13	0.27	1.4	0.13							27	32	19	350
Benzo(b)fluoranthene	0.08	0.14	0.33	1.7	0.07							3.7	4.0	3.9	45
Benzo(k)fluoranthene	<0.05	0.05	0.14	0.53	0.05							100	110	130	1200
Benzo(a)pyrene	0.05	0.1	0.26	1.3	0.06							3	3.2	3.5	36
Indeno(123-cd)pyrene	<0.05	<0.05	0.14	0.63	<0.05							41	46	39	510
Dibenzo(ah)anthracene	<0.05	<0.05	<0.05	<0.05	<0.05							0.3	0.32	0.43	3.6
Benzo(ghi)perylene	<0.05	<0.05	0.19	0.07	<0.05							350	360	640	4000
Total PAH (16)	<0.80	0.98	2.87	18	<0.08										

Notes

1. Total PAH = Sum of EPA16 identified components
2. The results are expressed as mg/kg dry weight soil after correction for moisture content
3. S4UL given at 6% soil organic
4. Residential with plant uptake
5. Residential without plant uptake

Exceptions denoted thus: Residential XX
 Commercial XX

APPENDIX F

ORIGINAL TESTING CERTIFICATES - VALIDATION



Adrian Smith
AP Geotechnics Ltd
51-53 Guildford Street
Chertsey
KT16 9BA

t: 01932 848460
e: adrian.smith@apgeotechnics.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-68194

Project / Site name:	118 Hempstead Road, Kings Langley	Samples received on:	10/11/2023
Your job number:	5732	Samples instructed on/ Analysis started on:	10/11/2023
Your order number:		Analysis completed by:	17/11/2023
Report Issue Number:	1	Report issued on:	17/11/2023
Samples Analysed:	5 soil samples		

Signed: _____

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 23-68194
 Project / Site name: 118 Hempstead Road, Kings Langley

Lab Sample Number	2874953		2874954		2874955		2874956		2874957	
Sample Reference	V1		V2		V3		V4		V5	
Sample Number	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Date Sampled	09/11/2023		09/11/2023		09/11/2023		09/11/2023		09/11/2023	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status							
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	17	17	17	17	17	17
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Speciated PAHs

Compound	Units	Limit of detection	Accreditation Status	2874953	2874954	2874955	2874956	2874957
Naphthalene	mg/kg	0.05	MCERTS	0.06	0.06	< 0.05	0.08	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.26	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.28	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.09	0.08	0.26	2.7	0.15
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.06	0.58	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.13	0.17	0.5	3.5	0.14
Pyrene	mg/kg	0.05	MCERTS	0.11	0.16	0.45	2.9	0.12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.09	0.27	1.5	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.13	0.27	1.4	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.08	0.14	0.33	1.7	0.07
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.05	0.14	0.53	0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.05	0.1	0.26	1.3	0.06
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.14	0.63	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.19	0.7	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	Units	Limit of detection	Accreditation Status	2874953	2874954	2874955	2874956	2874957
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	0.98	2.87	18	< 0.80

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-68194
Project / Site name: 118 Hempstead Road, Kings Langley

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2874953	V1	None Supplied	None Supplied	Brown clay and sand with gravel.
2874954	V2	None Supplied	None Supplied	Brown clay and sand with gravel.
2874955	V3	None Supplied	None Supplied	Brown sandy clay with gravel.
2874956	V4	None Supplied	None Supplied	Brown clay and sand with gravel.
2874957	V5	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 23-68194
Project / Site name: 118 Hempstead Road, Kings Langley

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

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

APPENDIX G

FIGURES

118 Hempstead Road,
Kings Langley, WD4 8AL

Existing Site Plan

Scale: as shown

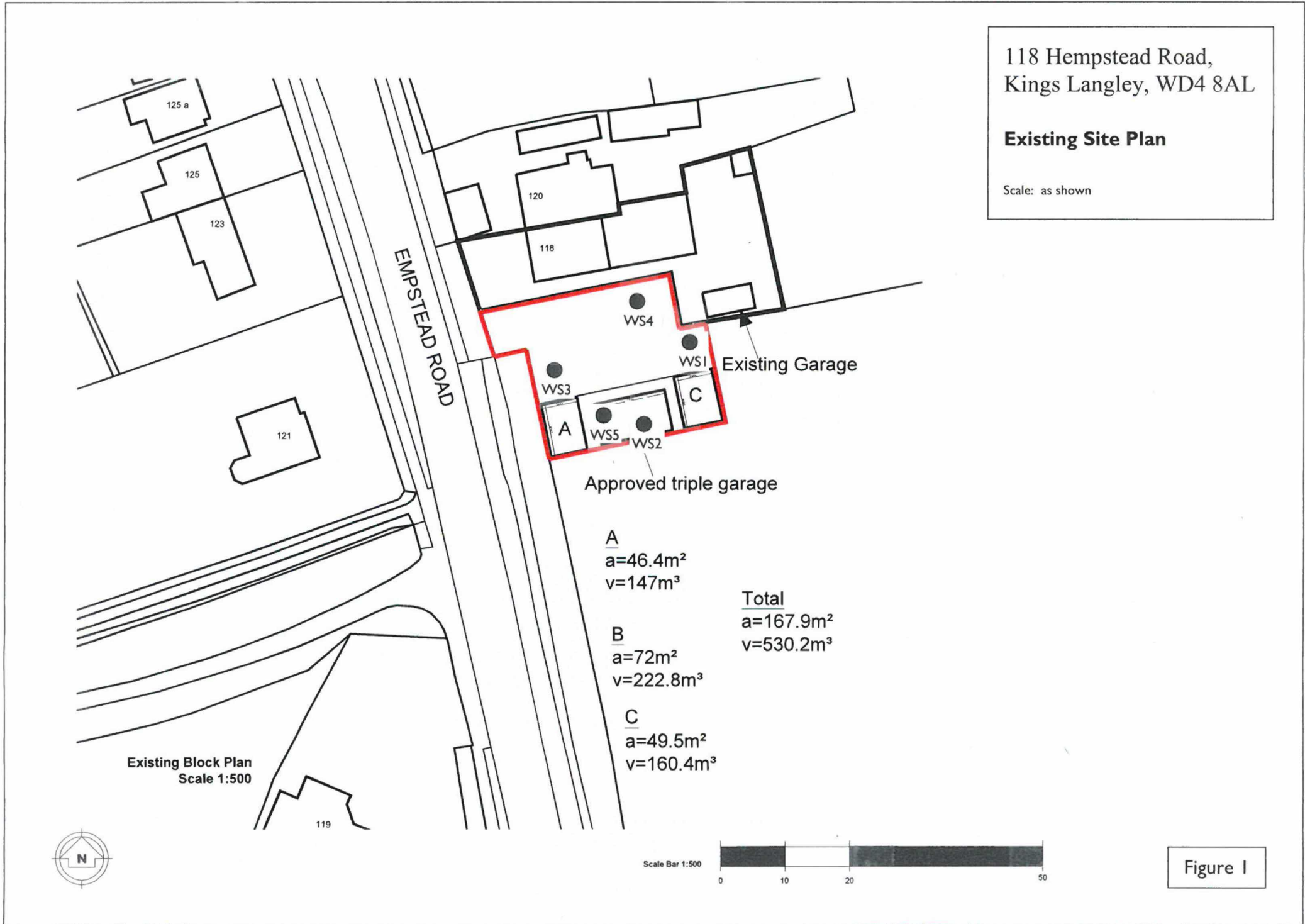
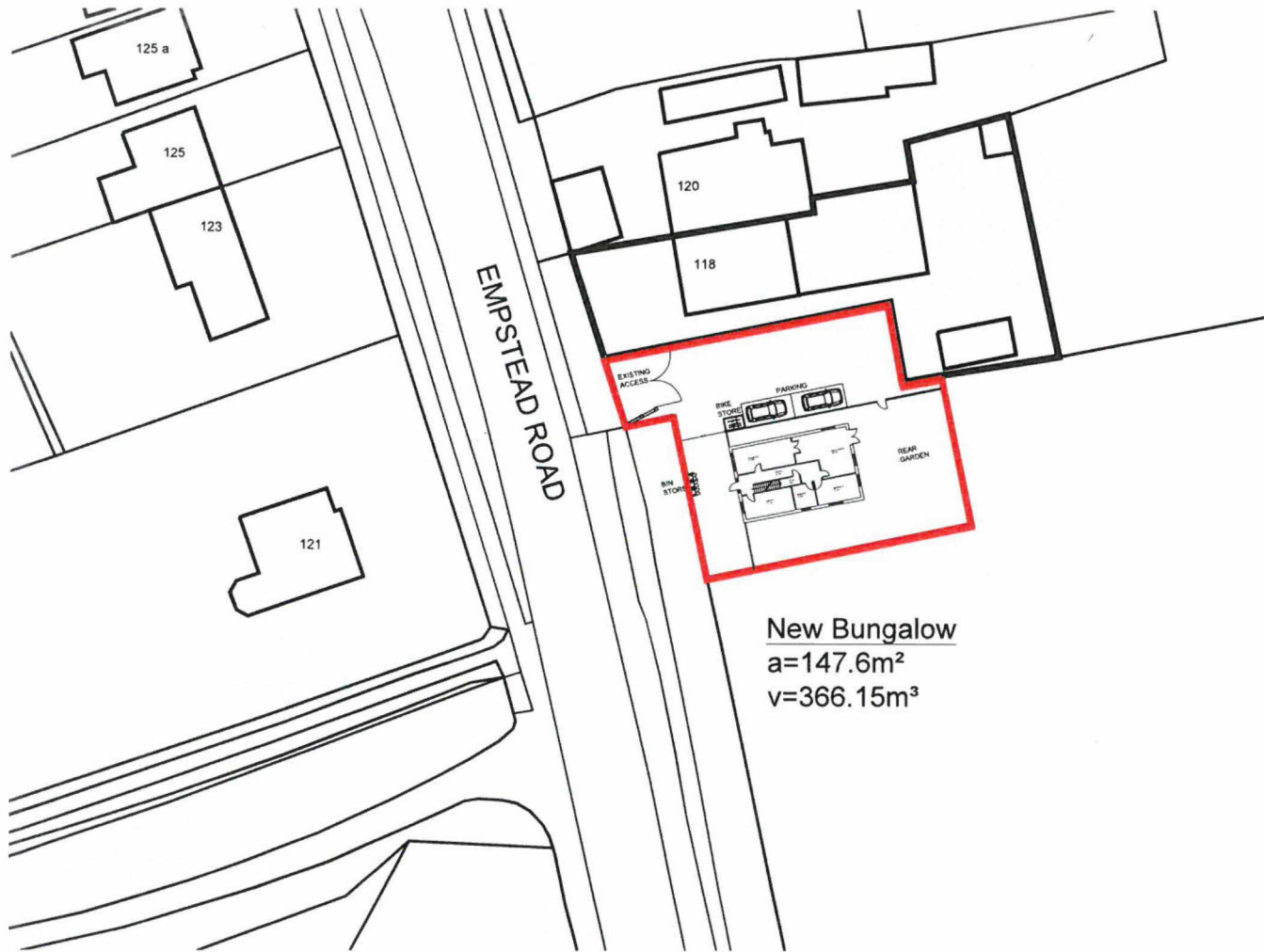


Figure 1

118 Hempstead Road,
Kings Langley, WD4 8AL

Proposed Site Plan

Scale: as shown



New Bungalow
 $a=147.6m^2$
 $v=366.15m^3$

Proposed Block Plan
Scale 1:500

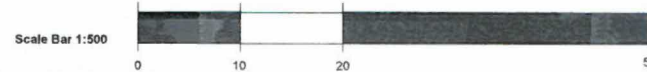


Figure 2

118 Hempstead Road,
Kings Langley, WD4 8AL

Validation Sampling Locations

Scale: as shown

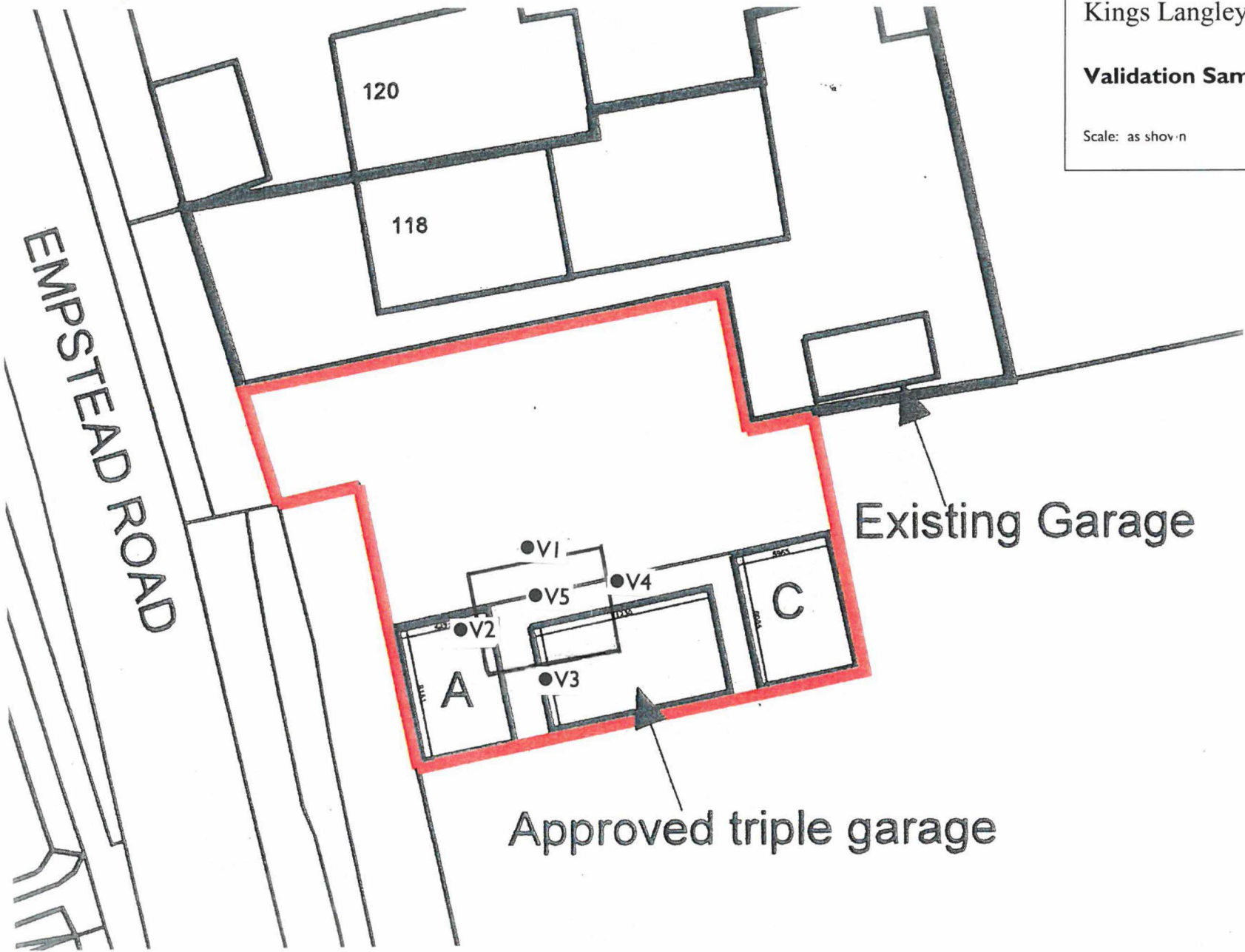


Figure 3