PHASE II GEOTECHNICAL & CONTAMINATION ASSESSMENT

STUBBINS WOOD NURSERY LANGWITH JUNCTION

TEAM EDUCATION TRUST

MARCH 2025

IVY HOUSE environmental

SUMMARY TABLE: PHASE II GEOTECHNICAL & CONTAMINATION ASSESSMENT	
SITE:	Stubbins Wood Nursery
CLIENT:	TEAM EDUCATION TRUST
DATE:	March 2025
REFERENCE:	IV.12.25
DEVELOPMENT PROPOSAL:	School Nursery Classroom
HUMAN HEALTH:	Topsoil contaminated with PAH's – 0.6m Replacement soil cap required.
CONTROLLED WATERS:	Negligible Risk.
GAS RISK:	No Source – No Risk
RADON GAS:	No protection required
WATER PIPES:	Upgraded water pipes required.
COMMENTS:	Remediation method Statement may be required by the LPA.
FOUNDATIONS:	Trench fill to 1.0 - 1.2mbgl.
FLOOR SLABS:	Beam & Block or revise specification to ground bearing slab.
CONCRETE:	Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.
COMMENTS:	Structural Engineer to be consulted re. foundations.

Authorised:		Richard Sutton MRICS *Director*
Date:	27th March 2025	
Version:	1.0	

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APPENDICES

1.0 INTRODUCTION

1.1 PREAMBLE

This Phase II Geo - Environmental Assessment has been produced for *Team Education Trust* to provide a pre-development contamination and geotechnical assessment of the site known as *Stubbins Wood Nursery*. The development proposal for the site is for *a Classroom.*

1.2 SITE LOCATION

The site is located approximately 7.5km north of Mansfield town centre. The National Grid Reference (NGR) for the approximate centre of the site is SK 525 686. The site location, development proposal and site layout are illustrated in Appendix A.

1.3 PROJECT BRIEF

The brief for the Phase II Geo-Environmental Assessment incorporates:

- A review and assessment of the site history, with reference to potentially contaminative uses.
- A review of regulatory authority and environmental data relating to the site and its environs.
- A site inspection.
- An appraisal of potential environmental risks.
- Development of a Phase I Conceptual Model.
- Provide a strategy for, and to implement, a Phase II Environmental and Geotechnical Assessment.
- Development of the Phase II Conceptual Model.
- To provide recommendations to mitigate against environmental risks.
- Provide geotechnical design for the proposed development.

1.4 DATA REFERENCES

- Phase 1 Environmental Assessment. Stubbins Wood Nursery. Ivy House Environmental Ltd. Ref. IV.12.25. Ph1.RPS.Feb.2025
- Phase I Environmental Assessment Search Data (Supplied by Emapsite Ltd).
- Historical Ordnance Survey (OS) Mapping (Supplied by Emapsite Ltd).
- British Geological Survey Online Geological Mapping.
- BSI (2017), BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice.
- BSI (2020), BS 5930:2015+A1 2020 Code of practice for ground investigations.

1.5 LIMITATIONS

This report has been produced in accordance with industry best practice at the time of writing.

Ivy House Environmental Ltd has, in the production of this report, relied upon information provided by third parties. Ivy House Environmental Ltd does not warrant the accuracy of this information and will not be responsible for any opinions which Ivy House Environmental has expressed, or conclusions which it has drawn, in reliance upon information which is subsequently proven to be inaccurate.

All statements and opinions provided in this report have been reported in good faith and are based on the information gained during, and restrictions imposed by, site investigation techniques used at the time. Ivy House Environmental cannot be held responsible for conditions not revealed by the investigation.

This report has been prepared for the sole use of the client and shall not be relied upon or transferred to third parties without the express written consent of Ivy House Environmental. Unauthorised third parties rely upon the information contained within this report at their own risk.

2.0 DESK STUDY AND SITE OBSERVATIONS

A copy of the full desk study is referenced above and have previously been submitted to the client.

2.1.1 SUMMARY

The development proposal is for the construction of a new classroom building to service the Nursery school. The site area currently forms the school field to the west of the main classrooms. The grounds slope up to the south – east and west forming a shallow bowl around the proposed new unit. The remainder of the grounds are occupied by extensive school fields to the North – West and South – East.

The BGS geological map for this area illustrates Bedrock Strata of the Cadeby Formation, of Dolostone, grey to buff grey, commonly Oolitic or granular, with subordinate mudstone, dolomitic siltstone and sandstone. No superficial strata are recorded.

The historical development of the site illustrates the growth of Langwith Junction throughout the expansion of the mining industry in the 1900's. The site area was formerly occupied by a school building from the 1970's to the late 2010's.

The site is not located in an area which is at risk from historical coal mining. The site is not located in ana rea which requires Radon protection.

2.2 POTENTIALLY CONTAMINATIVE LAND USES

Environmental search data supplied by Environmental Data Ltd contained in the above referenced report states that:

- The site is not located within 500m of a landfill site.
- There are zero waste treatment facilities located within 250m of the site.
- There are zero discharge consents within 250m of the site.
- There are zero hazardous substance or IPC consents located within 250m of the site.
- There are zero fuel sites located within 500m of the site.

As the site formerly housed a school building, the following suite of contaminants are considered within the risk profile for the development:

- Heavy metals, PAH's, asbestos, inorganics and Petroleum Hydrocarbons.

3.0 PHASE I CONCEPTUAL MODEL

<table>
<tr><th colspan="4">HUMAN HEALTH</th></tr>
<tr><th>SOURCE</th><th>PATHWAY</th><th>RECEPTOR</th><th>SOLUTION</th></tr>
<tr><td rowspan="3">Potentially contaminated made ground from historical school building.</td><td rowspan="2">Pathways for the end user of the site include direct contact (dermal) with potentially contaminated soil and soil dust; ingestion and inhalation of potentially contaminated soil and soil dust.</td><td>Construction Workers</td><td>Basic PPE for all workers (overalls, gloves, dust mask if required) and wash facilities/personal hygiene</td></tr>
<tr><td rowspan="2">End Users (e.g. staff, students)</td><td>Concrete hardstanding flooring/ foundation slab breaking pathway between contaminated made ground and receptors.</td></tr>
<tr><td>Inhalation of potential soil vapours and potential ground gas.</td><td rowspan="2">Aluminium sheathed or steel water pipes.</td></tr>
<tr><td>Contaminated made ground and natural strata</td><td>Leaching into water supply pipes</td><td>Water Supply/End Users</td></tr>
<tr><th colspan="4">CONTROLLED WATERS</th></tr>
<tr><td rowspan="2">Potentially contaminated made ground from historical school building.</td><td>Leaching and vertical migration through the vadose zone to the saturated zone</td><td>Principal Aquifer (Cadeby Formation)</td><td>Negligible Risk</td></tr>
<tr><td>Leaching and horizontal migration to surface waters</td><td>Surface Waters</td><td>Negligible Risk</td></tr>
</table>

4.0 PHASE II FIELDWORK

4.1 INTRODUCTION

The Phase II intrusive investigation was undertaken on the 18th of March 2025 under the supervision of a suitably qualified IVENV Engineer engineer and in general accordance with the Code of Practice for Site Investigations BS5930: 2015+A1: 2020

The Phase II investigation incorporated the following:

- The advancing of 4No window sample boreholes to a maximum depth of 2.10mbgl.
- The analysis of 4No samples for a standard 'CLEA' screening suite.
- The analysis of 3No samples for geotechnical design criteria including Water Soluble Sulphate and pH and 3No Plasticity tests.

Window samples logs are contained in Appendix B, chemical analysis reports are contained in Appendix C and geotechnical test reports are contained in Appendix D.

4.2 RATIONALE

The Phase II investigation has been designed to facilitate an assessment of the general ground conditions across the site, including contaminant sources, pathways and receptors. The investigation has also been designed in consideration of the current site layout and access restrictions, the development proposal and health and safety issues, the rationale behind the location of each exploratory hole is detailed in table 4.1 below:

Table 4.1: Phase II Rationale

Hole ID	Location	Notes
WS1 - 4	General grid	CLEA Suite

4.3 LABORATORY ANALYSIS & TESTING

Selected soil samples were analysed at specialist environmental and geotechnical laboratories or by field monitoring equipment as detailed in the following sections.

4.3.1 Chemical Analysis

A total of 4 samples of Topsoil were sent for analysis at a UKAS/MCERTS accredited laboratory. The scheduled parameters are detailed in table 4.2.

Table 4.2: Soil Analysis

Sample ID	Depth (mbgl)	Strata	Suite
WS1 - 4	0.1 - 0.2	Topsoil	CLEA

No groundwater samples were sampled for analysis.

The chemical analysis results are contained in Appendix C.

4.3.2 Geotechnical Testing

Three samples of CLAY were sent to an accredited geotechnical laboratory and subjected to Plasticity Index (PI), Water Soluble Sulphate and pH testing.

The geotechnical test results are contained in Appendix D.

5.0 GROUND CONDITIONS

The intrusive investigation has revealed that TOPSOIL across the site (0.2 – 0.3mbgl) is underlain by weathered solid strata of the Cadeby Formation to a maximum depth of 2.10mbgl.

Made Ground was encountered as Limestone Sub – Base *White/Yellow silty gravel of Limestone* at depths of 0.2 – 0.5mbgl and 0.2 – 0.4mbgl in boreholes WS1 and WS3 respectively.

5.1 SUPERFICIAL STRATA

Superficial strata were not encountered on site.

5.2 SOLID STRATA

Weathered Solid strata of the Cadeby Formation were present at depths 0.2 – refusal.. This strata generally consisted of:

- Red/brown sandy CLAY with mudstone gravel.
- Red/Brown stiff Sandy CLAY with gravel of mudstone.
- Brown, stiff, slightly sandy CLAY.
- Orange/Brown stiff CLAY with fine to course gravel of mudstone.
- Stiff orange/brown CLAY.

5.3 FIELD OBSERVATIONS

Table 5.1 illustrates the pertinent geological and contamination observations made during the intrusive investigation.

Table 5.1: Fieldwork Observations

Location	Depth/Strata	Observation
WS1	Refusal at 1.0m	Shallow Rock
WS2	2.1/Mst	Stiff sandy CLAY to refusal at 2.1mbgl
WS3	1.7/Mst	Stiff Orange CLAY to refusal at 1.7mbgl
WS4	1.0/Mst	Refusal at 1.0m

5.4 GROUNDWATER

Groundwater strikes were not encountered in the exploratory holes, monitoring pipe was not installed.

NOTE: Groundwater levels are subject to seasonal variations and may be affected by local abstraction rates.

5.5 FIELD TESTS

Standard Penetration Tests (SPT) were undertaken during drilling of all windowless sampler boreholes. Figure 5.1 shows SPT ‘N’ Values vs Depth (m bgl) for tests within the weathered solid geology (Cadeby Formation). Figure 5.2 illustrates the individual SPT ‘N’ Value profile for each borehole.

5.5.1 SPT PROFILE

Standard Penetration Tests (SPT’s) were undertaken at approximately 1.0m intervals in each borehole to assess soil strength/relative density. Figures 5.1 and 5.2, overleaf, show SPT ’N’ Values vs separate geology and each borehole, respectively.

Figure 5.1: SPT 'N' Value vs Depth for Cadeby Formation deposits

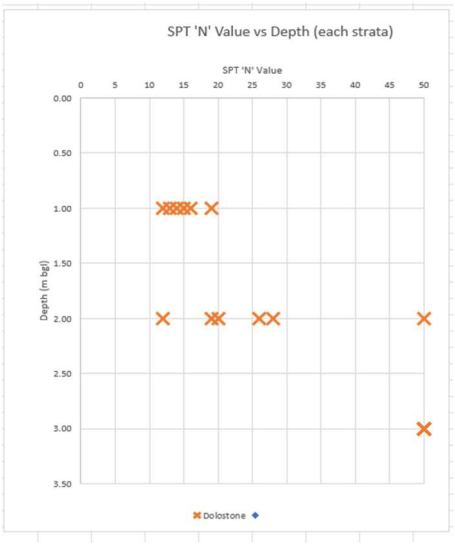


Figure 5.2: SPT 'N' Value vs Depth for Individual Borehole Profiles

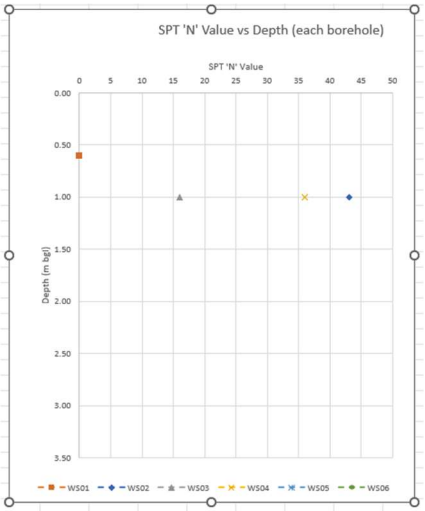


Figure 5.1 illustrates a gradual increase of SPT 'N' Values with depth (m bgl) recorded in weathered Cadeby deposits and shallow refusals in boreholes WS1 and Ws4.

Figure 5.2 shows that the SPT refuses at shallow depths across the site, illustrating the presence of shallow rock.

All windowless sampler borehole logs are included in Appendix B and include a full record of SPT 'N' Values.

6.0 GEOTECHNICAL ASSESSMENT

The geotechnical assessment considers the development proposal for a prefabricated school classroom.

6.1 GEOTECHNICAL LABORATORY TESTING

The results contained in Appendix D illustrate modified Plasticity values of between 7 and 8.3% and moisture contents between 11.0 and 12.1%, indicating the underlying weathered strata to be of low plasticity and non – shrinkable.

Water Soluble Sulphate and pH analysis revealed results of 11.8 & 17.4mg/lSO_4 and 8.8 - 11.8 respectively.

6.2 FOUNDATION DESIGN & FLOOR SLABS

The ground conditions encountered were generally consistent in that shallow refusals were encountered in 50% of the boreholes with WS1 and WS4 refusing on rock at 1.0mbgl and boreholes WS2 and WS3 drilling through weathered solid strata to refusal at 2.1 and 1.70mbgl respectively.

For the proposed new structure, which will be a lightweight classroom building, trench fill foundations founding on the rock at 1.0 – 1.2mbgl are recommended for a bearing capacity of approximately 100kN/m^2 .

Beam and block floor slab is considered suitable.

Alternatively, a ground bearing slab may be suitable, engineered fill material should be properly placed and mechanically compacted in layers beneath the slab not exceeding 225mm.

Deepening for trees is not required.

6.3 EXCAVATION & GROUNDWATER CONDITIONS

Excavations will be possible using a conventional excavator, although a breaker may be required for the reported shallow rock.

6.4 BURIED CONCRETE

Based on the recorded water-soluble sulphate concentrations and pH value it is considered appropriate to adopt a basic Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.

7.0 CONTAMINATION ASSESSMENT

7.1 HUMAN HEALTH

With regards to the soil risk assessment, Ivy House Environmental observe the following hierarchy:

- Category 4 Screening Levels (C4SLs)
- LQM Suitable 4 Use Levels (S4uls)

Where no C4SLs have been generated Ivy House will use the LQM S4ULs. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on minimal risk' as per previous guidelines and assumptions.

As the site will be a school classroom, *Residential With Produce* is considered the most suitable model.

7.2 HUMAN HEALTH

An assessment of the chemical analysis results against the Ivy House GAC (Appendix E) illustrates that topsoil around the site is contaminated with PAH's and remediation to protect human health will be required.

Upgraded water pipes will be required for the project due to elevated Arsenic concentrations.

7.2.1 Asbestos Contamination

Asbestos fibres were not detected in any of the soil samples.

7.3 CONTROLLED WATERS

As groundwater was not encountered on site and the water table is likely to lie within the deep aquifer, the site is not considered to pose a risk to controlled waters.

8.0 PHASE II CONCEPTUAL SITE MODEL

The conceptual model for the site considers the development proposal for a nursery school building located within the school field, the *Residential with Produce* model applies to this assessment use and the information gathered during the Phase I and II assessments.

The site has previously been occupied by a school building.

There are no landfill sites within 250m of the site.

Contaminants of concern for the end user include PAH's.

Upgraded, Protective water supply pipes will be required due to elevated contaminant concentrations (Arsenic).

Pathways for the end user of the site include the ingestion of contaminated soil and contaminated vegetables, direct contact (dermal) with contaminated soil and soil dust; ingestion and inhalation of contaminated soil dust.

The primary receptors for the site are construction workers and end users of the site (School children, teachers and staff). The risk posed to human health receptors is considered moderate, therefore remediation will be required.

For the environment (controlled waters) the primary receptor is the non aquifer (Mercia Mudstone) underlying the site and/or the nearby surface water body.

Groundwater was not encountered on site. Leaching of contamination is not considered to pose a risk to the deep aquifer.

The primary pathway for controlled waters is the leaching and vertical migration of contaminants through the vadose zone to the saturated zone and/or leaching and horizontal movement of contaminants to the nearby surface water body.

The risk posed to controlled waters (principal aquifer) by contaminated made ground and natural strata is considered to be negligible.

The development of the conceptual model is illustrated on Figure 8.1.

Figure 8.1: Phase II Conceptual Site Model

<table>
<tr><th colspan="4">HUMAN HEALTH</th></tr>
<tr><th>SOURCE</th><th>PATHWAY</th><th>RECEPTOR</th><th>SOLUTION</th></tr>
<tr><td rowspan="4">Topsoil contaminated with PAH’s.

Elevated Arsenic Concentrations.</td><td rowspan="2">Ingestion of contaminated soil and contaminated vegetables, direct contact (dermal) with contaminated soil and soil dust; ingestion and inhalation of contaminated soil dust.</td><td>Construction Workers</td><td>Basic PPE for all workers (overalls, gloves, dust mask if required) and wash facilities/personal hygiene</td></tr>
<tr><td rowspan="2">End Users (Pupils & Staff)</td><td>Capping of landscaped areas with minimum of 600mm clean soil.</td></tr>
<tr><td rowspan="2">Leaching into water supply pipes</td><td rowspan="2">Requirement for upgraded water pipes, e.g. aluminium sheathed or steel pipes.</td></tr>
<tr><td>Water Supply/End Users</td></tr>
<tr><th colspan="4">CONTROLLED WATERS</th></tr>
<tr><td>Topsoil contaminated with PAH’s.</td><td>Leaching and vertical migration through the vadose zone to the saturated zone</td><td>Principal Aquifer</td><td>No groundwater encountered, Negligible Risk.</td></tr>
</table>

9.0 RISK MANAGEMENT & REMEDIATION

Previous sections have quantified the risk posed to identified receptors which, in some instances, require remediation to protect or reduce levels of risk. The following section details measures and recommendations for dealing with risks associated with soil, gas and groundwater contamination in respect to the development proposal of *School Nursery Classroom.*

9.1 REMEDIATION TO PROTECT END USERS

Due to the presence of elevated PAH's in topsoil sampled across the site, the removal of contaminated topsoil should be implemented along with the laying of a minimum 0.6m thick layer of clean, approved soils across landscaped areas.

Selection of suitable, protective water supply pipes should be approved by the local utility company.

9.2 REMEDIATION TO PROTECT CONTROLLED WATERS

No remediation is not required to protect this receptor.

9.3 REMEDIATION TO PROTECT CONSTRUCTION WORKERS

No remediation is required to protect this receptor.

9.4 REMEDIATION TO PROTECT THIRD PARTIES

No remediation is required to protect this receptor.

9.5 REMEDIATION TO PROTECT CONSTRUCTION MATERIALS

Concrete specification has been provided.

9.6 WASTE MANAGEMENT

Topsoil tested across the should be suitable for re-use at a restoration project subject to compliance with site thresholds.

10.0 RECOMMENDATIONS

Recommendations for further assessment of the site include:

- Should any signs of organic contamination (solvents/oils/fuels) be evident during construction activities, a qualified environmental specialist should be consulted to assess the risk posed to end users and the environment.
- The foundation specification should be confirmed by the appointed structural engineer.
- Contaminated topsoil should be removed from the site area and disposed off site.

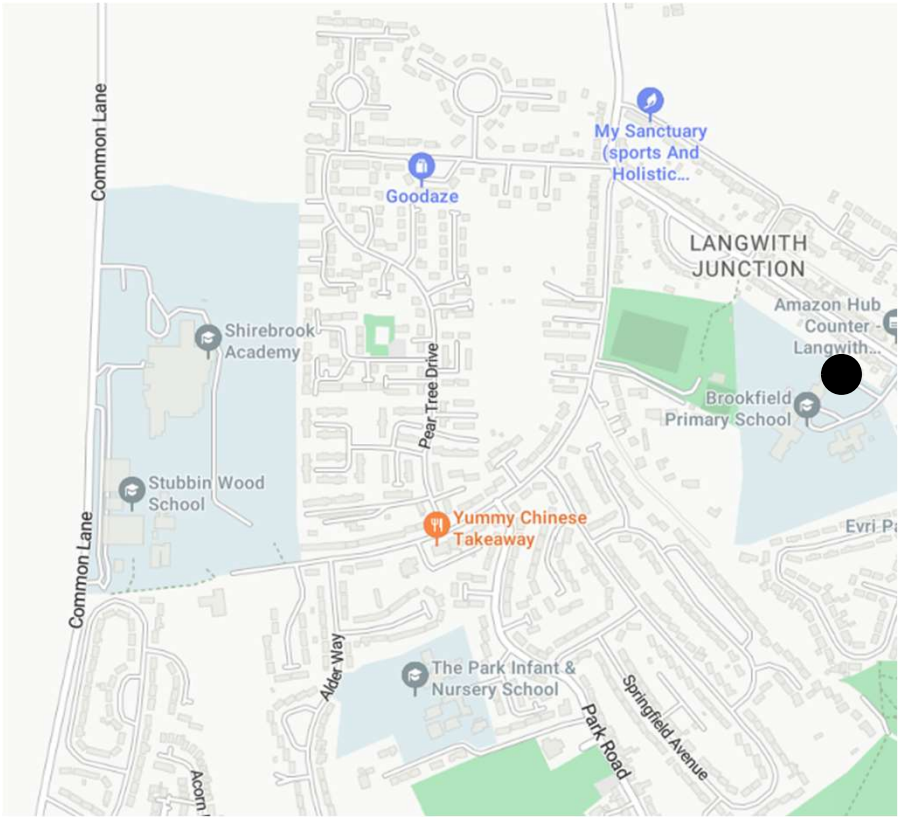
11.0 CONCLUSIONS

The Phase II Assessment and the recommendations contained within has illustrated that the proposed development of the site for a nursery school classroom poses a contamination risk to end users of the site via contaminated topsoil.

However, if the recommendations of this report are carried out to mitigate or remove all hazards presented in the conceptual model, the site can be made suitable for the proposed use.

APPENDIX A

N



KEY:

● Approximate Site Location

NG20 8QF

DO NOT SCALE

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TITLE: Site Location Plan

PROJECT: Stubbins Wood Nursery

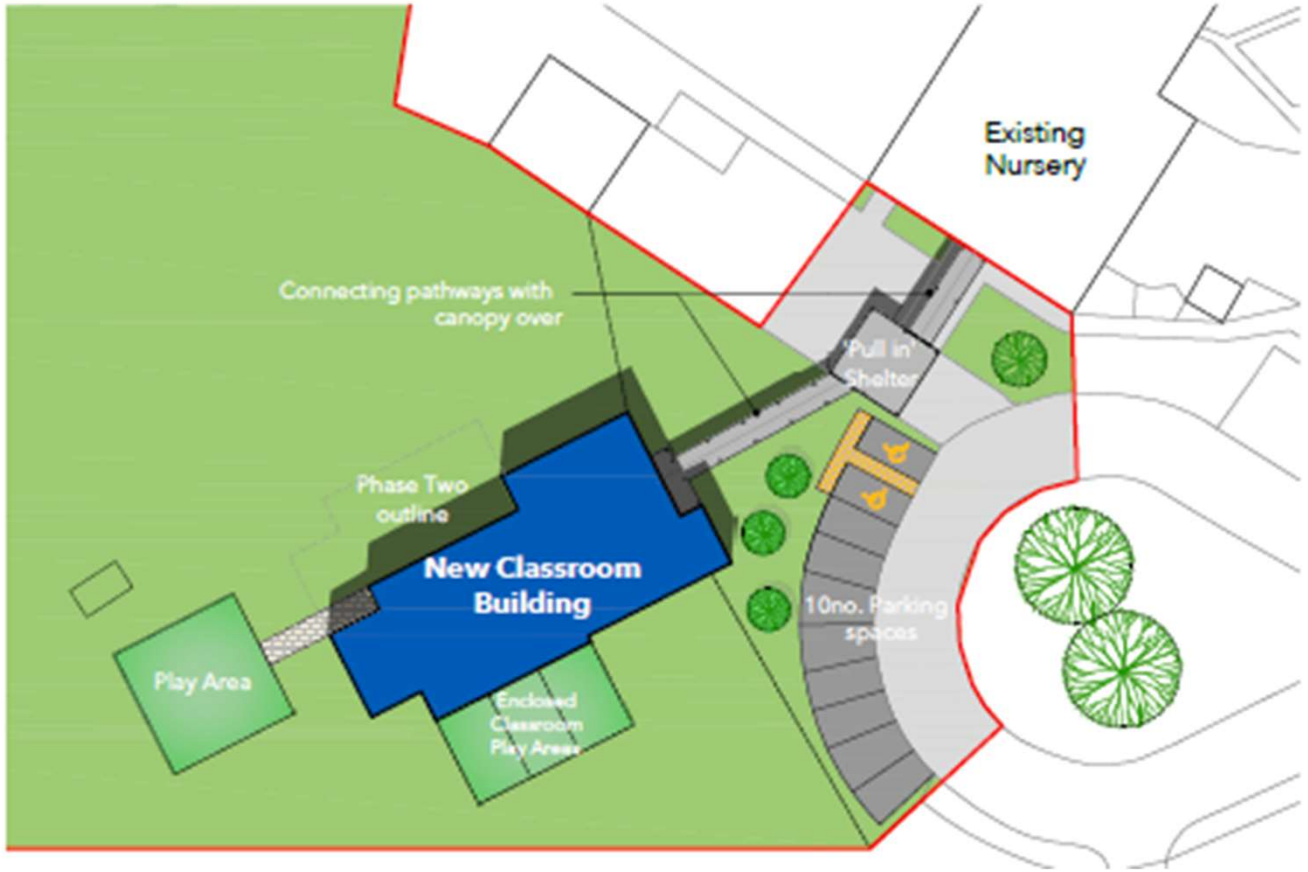
PROJECT No: IV.12.25

DATE: 03/2025

SCALE : NTS

DRAWN : RPS

DWG No: Figure 1



KEY:

Site Boundary

DO NOT SCALE

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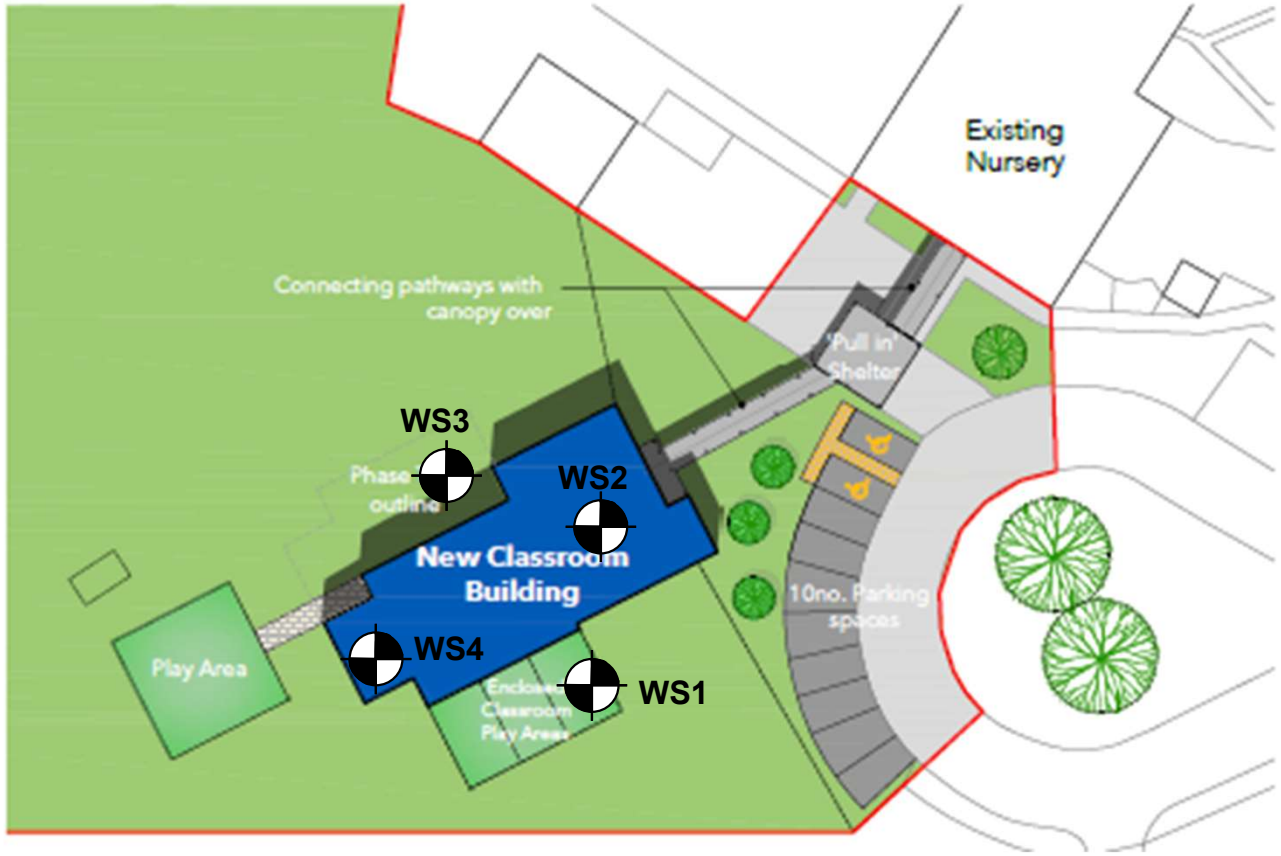
TITLE:	Site Layout
PROJECT:	Stubbins Wood Nursery
PROJECT No:	IV.12.25
DATE:	03/2025
SCALE :	NTS
DRAWN :	RPS
DWG No:	Figure 2



KEY:

WS Borehole

DO NOT SCALE

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TITLE:	Borehole Location Plan
PROJECT:	Stubbins Wood Nursery
PROJECT No:	IV.12.25
DATE:	03/2025
SCALE :	NTS
DRAWN :	RPS
DWG No:	Figure 3

APPENDIX B

IVY HOUSE environmental

Chartered Environmental Surveyors & Environmental Consultants
Scotland Farm, Ockbrook, Derby DE72 3RX
Telephone. 01332 661987

Site
Stubbins Wood Nursery School, Langwith Junction

Number
WS1

Excavation Method
Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Client
Team Education Trust

Job Number
IV.12.25

Location

Dates
18/03/2025

Engineer
Richard Sutton

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	ES1				(0.20) 0.20	TOPSOIL; Black sandy soil with rootlets and fine gravel of quartzite.		
					(0.20) 0.40	MADE GROUND - Limestone sub - base - White/yellow silty gravel of limestone.		
					(0.35) 0.75	MUDSTONE - Red/Brown sandy CLAY with mudstone rock.		
						Complete at 1.00m		

Remarks
No groundwarter contaminated.
No visual or olfactory contamination.
Refusal at 0.75m.

Scale (approx)
1:50

Logged By
RPS

Figure No.
IV.12.25.WS1

IVY HOUSE environmental

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Scotland Farm, Ockbrook, Derby DE72 3RX
Telephone. 01332 661987

Site	Number
Stubbins Wood Nursery School, Langwith Junction	WS2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Team Education Trust	IV.12.25
	Location	**Dates** 18/02/2025-18/03/2025	**Engineer** Richard Sutton	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL - Black sandy soil with rootlets and fine gravel of quartzite.		
0.20	1ES				(0.80)	MUDSTONE - Red/Brown Stiff sandy CLAY with gravel of mudstone.		
0.70	2ES				1.00			
1.00	1GE				(1.10)	Stiff dry, firm red/brown sandy CLAY.		
1.80	2DE				2.10	Complete at 2.10m		

Remarks

Scale (approx)	Logged By
1:50	RPS

Figure No. IV.12.25.WS2

IVY HOUSE environmental

Chartered Environmental Surveyors & Environmental Consultants
Scotland Farm, Ockbrook, Derby DE72 3RX
Telephone. 01332 661987

Site	Number
Stubbins Wood Nursery School, Langwith Junction	WS3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Team Education Trust	IV.12.25
	Location	**Dates**	**Engineer**	**Sheet**
		18/02/2025-18/03/2025	Richard Sutton	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	ES1				(0.20) 0.20	TOPSOIL - Black SAND soil with rootlets and fine gravel of quartzite.		
					(0.30) 0.50	MADE GROUND - Limestone sub - base - White/yellow silty gravel of limestone.		
					0.60			
					0.70 (0.30)	MUDSTONE -Brown stiff slighty sandy CLAY.		
					1.00	Grey/Red MUDSTONE with F-C gravel mudstone.		
					(0.70)	Orange Brown Stiff CLAY with some, fine gravel of mudstone.		
					1.70	Stiff orange brown CLAY with F-C gravel of mudstone.		
						Complete at 1.70m		

Remarks

Scale (approx)	Logged By
1:50	RPS

Figure No. IV.12.25.WS3

IVY HOUSE environmental

Chartered Environmental Surveyors & Environmental Consultants
Scotland Farm, Ockbrook, Derby DE72 3RX
Telephone. 01332 661987

Site	Number
Stubbins Wood Nursery School, Langwith Junction	WS4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Team Education Trust	IV.12.25
	Location	**Dates**	**Engineer**	**Sheet**
		18/02/2025-18/03/2025	Richard Sutton	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL - Black sandy soil with rootlets and fine gravel of quartzite.		
0.20	ES1				0.30 (0.30) 0.60	MADE GROUND - Limestone sub - base - White/yellow silty gravel of limestone.		
					(0.40) 1.00	MUDSTONE - Red/Brown sandy CLAY with F - C gravel of mudstone.		
1.00	GS1					MUDSTONE - Very sandy soft CLAY.		
						Complete at 1.00m		

Remarks

Scale (approx)	Logged By
1:50	RPS

Figure No. IV.12.25.WS4

APPENDIX C

Ivy House Environmental Ltd
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Ockbrook
Derby
DE72 3RX

e: RPS@ivyhousenv.co.uk

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

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

Analytical Report Number : 25-008252

Project / Site name:	Stubbins Wood Nursery	**Samples received on:**	21/02/2025
Your job number:	IV 12 15	**Samples instructed on/ Analysis started on:**	21/02/2025
Your order number:		**Analysis completed by:**	27/02/2025
Report Issue Number:	1	**Report issued on:**	28/02/2025
Samples Analysed:	7 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
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
air	- once the analysis is complete

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

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

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: 25-008252
Project / Site name: Stubbins Wood Nursery

Lab Sample Number				459091	459092	459093	459094	459095
Sample Reference				WS1	WS2	WS3	WS4	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.10	0.20	0.10	0.20	0.70
Date Sampled				18/02/2025	18/02/2025	18/02/2025	18/02/2025	18/02/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	14	14	12	16
Total mass of sample received	kg	0.1	NONE	0.6	0.6	0.6	0.6	0.6
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	PKU	PKU	PKU	PKU	-
Analysis completed	N/A	N/A	N/A	27/02/2025	27/02/2025	27/02/2025	27/02/2025	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.2	8.5	7.4	8.2	8.4
Total Sulphate as SO_4	mg/kg	50	MCERTS	420	340	440	360	-
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	23	24	22	23	35
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0114	0.0122	0.0109	0.0115	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	11.4	12.2	10.9	11.5	17.4
Organic Matter (automated)	%	0.1	MCERTS	2.3	2	1.9	1.7	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.12	0.12	1.2	0.06	-
Acenaphthylene	mg/kg	0.05	MCERTS	0.2	0.15	0.32	0.12	-
Acenaphthene	mg/kg	0.05	MCERTS	0.18	0.26	0.74	0.13	-
Fluorene	mg/kg	0.05	MCERTS	0.19	0.24	0.68	0.14	-
Phenanthrene	mg/kg	0.05	MCERTS	2	2.5	6.6	1.5	-
Anthracene	mg/kg	0.05	MCERTS	0.61	0.72	1.6	0.43	-
Fluoranthene	mg/kg	0.05	MCERTS	4.4	4.3	10	2.6	-
Pyrene	mg/kg	0.05	MCERTS	4	3.8	8.7	2.4	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.2	2	4	1.2	-
Chrysene	mg/kg	0.05	MCERTS	2.2	1.9	4.2	1.2	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.9	2.6	5.2	1.6	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.1	0.84	2	0.64	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.6	2.3	4.6	1.5	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.2	1.1	2.2	0.72	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.27	0.23	0.4	0.15	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.3	1.1	2.3	0.8	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	25.6	24.2	54.6	15.2	-

Analytical Report Number: 25-008252
Project / Site name: Stubbins Wood Nursery

Lab Sample Number				459091	459092	459093	459094	459095
Sample Reference				WS1	WS2	WS3	WS4	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.10	0.20	0.10	0.20	0.70
Date Sampled				18/02/2025	18/02/2025	18/02/2025	18/02/2025	18/02/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	12	11	8.6	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	0.4	0.4	0.3	-
Chromium (hexavalent) Low Level	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	14	12	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	31	25	17	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	59	54	42	30	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	13	11	8.5	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	24	23	20	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64	65	62	45	-

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

Analytical Report Number: 25-008252
Project / Site name: Stubbins Wood Nursery

Lab Sample Number				459096	459097
Sample Reference				WS3	WS3
Sample Number				None Supplied	None Supplied
Water Matrix				N/A	N/A
Depth (m)				0.80	1.50
Date Sampled				18/02/2025	18/02/2025
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.7	8.5
Total mass of sample received	kg	0.1	NONE	0.6	0.5
Asbestos					
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	-
Asbestos Analyst ID	N/A	N/A	N/A	-	-
Analysis completed	N/A	N/A	N/A	-	-
General Inorganics					
pH (L099)	pH Units	N/A	MCERTS	8.6	8.8
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	26	24
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	12.8	11.8
Organic Matter (automated)	%	0.1	MCERTS	-	-
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	-

Analytical Report Number: 25-008252
Project / Site name: Stubbins Wood Nursery

Lab Sample Number				459096	459097
Sample Reference				WS3	WS3
Sample Number				None Supplied	None Supplied
Water Matrix				N/A	N/A
Depth (m)				0.80	1.50
Date Sampled				18/02/2025	18/02/2025
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-
Chromium (hexavalent) Low Level	mg/kg	1.2	NONE	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-

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

Analytical Report Number : 25-008252
Project / Site name: Stubbins Wood Nursery

* 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 *
459091	WS1	None Supplied	0.1	Brown loam and sand with gravel and vegetation
459092	WS2	None Supplied	0.2	Brown loam and sand with gravel and vegetation
459093	WS3	None Supplied	0.1	Brown loam and sand with gravel and vegetation
459094	WS4	None Supplied	0.2	Brown loam and sand with gravel and vegetation
459095	WS2	None Supplied	0.7	Brown clay with gravel
459096	WS3	None Supplied	0.8	Brown clay with gravel
459097	WS3	None Supplied	1.5	Brown clay with gravel

Analytical Report Number : 25-008252
Project / Site name: Stubbins Wood Nursery

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Hexavalent chromium in soil (low level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-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.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

APPENDIX D

LABORATORY TEST CERTIFICATE
MATERIALS LABORATORY

Our Reference: 02/25/44

Clients Reference: IV.12.25 **Certificate No:** 02/25/44

Order No:

To: Richard Sutton

Client: Ivy House Environmental
Linden
Potter Street
Spondon
Derby
DE21 7LH

Dear Sirs,

FIELD TESTING

Introduction

We refer to samples taken from Stubbins Wood Nursery School and delivered to our laboratory on the 19th February 2025.

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Contract Details

Tested By	:	MATtest Ltd
Our Test Reference	:	S0208 - S0210
Clients Job Reference	:	IV.12.25
Date Tested	:	24th February 2025 onwards
Source	:	Ex site

Test Results;

Please see attached reports

Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks;

Report Checked By:

John Pullar
National Quality Manager

Unit 10, Queenslie Point,
Queenslie Ind Estate,
Glasgow, G33 3NQ.

Tel: 0141 774 4032
Fax: 0141 774 3552
Email: site@mattest.org

Registered in Scotland 214905
VAT Reg. No. 761 9492 95

Approved for Issue Date: 24/03/2025

MATtest Limited
materials testing & consultancy

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

LABORATORY TEST CERTIFICATE

Certificate No : **25/239 - 01-1**

To : **Richard Sutton**

Client : **Ivy House Environmental**
Scotland Farm
Ockbrook
Derby
DE72 3RX

LABORATORY TESTING OF SOIL

Introduction

We refer to samples taken from Stubbins Wood and delivered to our laboratory on 24th February 2025.

Material & Source

Sample Reference	:	See Report Plates
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plates
Description	:	See Page 2
Date Sampled	:	18th February 2025
Date Tested	:	24th February 2025 Onwards
Source	:	IV.12.25 - Stubbins Wood

Test Results

As Detailed On Page 2 to Page 4 inclusive

Comments

The results contained in this report relate to the sample(s) as received
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks

Approved for Issue

T McLelland (Director)

Date 10/03/2025

UKAS TESTING
2643

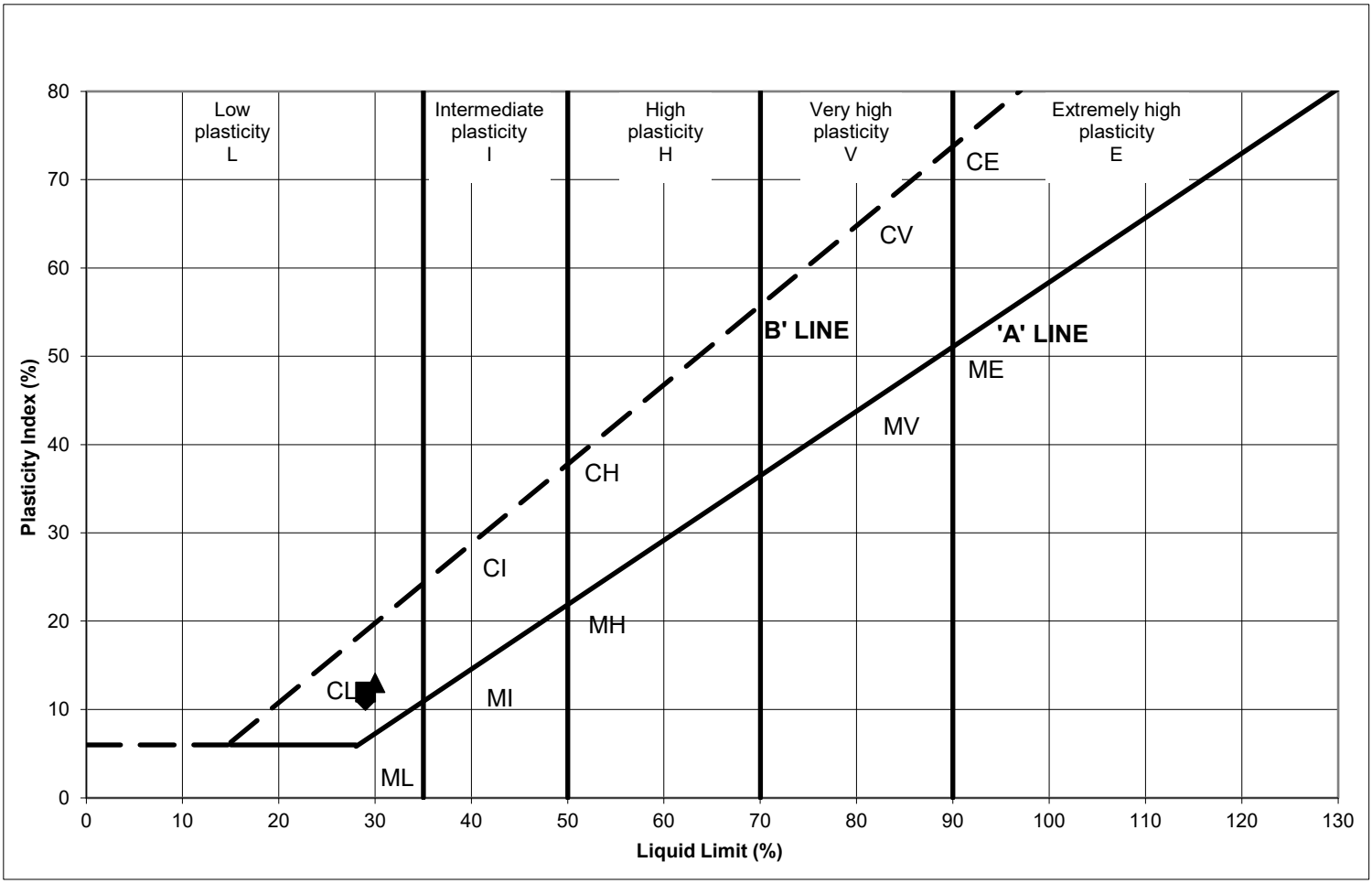
BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
WS2	S0208	1.00	Reddish brown gravelly sandy CLAY. Gravel is fine to coarse.
WS2	S0209	1.80	Reddish brown gravelly sandy CLAY. Gravel is fine to coarse.
WS3	S0210	1.00	Reddish brown slightly gravelly sandy CLAY. Gravel is fine to medium.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	WATER CONTENT (%)
WS2	S0208	1.00	12.1
WS2	S0209	1.80	11.1
WS3	S0210	1.00	11.0

Tested in accordance with BS 1377 - 2 : 2022 : Clause 4.1

SUMMARY OF WATER CONTENT TEST RESULTS



Symbol	Borehole	Sample	Depth	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm Sieve	Remarks
■	WS2	S0208	1.00	12.1	29	17	12	65	Clay with low plasticity
◆	WS2	S0209	1.80	11.1	29	18	11	76	Clay with low plasticity
▲	WS3	S0210	1.00	11.0	30	17	13	63	Clay with low plasticity
●									
□									
◇									
△									
○									
×									
✳									

All samples were tested in accordance with BS 1377 - 2 : 2022 : Clause 5.3 and 6
All samples were washed on a 0.425mm test sieve prior to test.

SUMMARY OF ATTERBERG LIMITS TEST RESULTS

APPENDIX E

IVY HOUSE environmental

Scotland Farm, Ockbrook, Derby, DE72 3RX

rps@ivyhousenv.co.uk • www.ivyhousenv.co.uk • 01332 661 987

GENERIC ASSESSMENT CRITERIA

Generic Assessment Criteria

Land Use Scenario					
Contaminants	**Residential With Produce**	**Residential Without Produce**	**POS (Resi)**	**Commercial**	**Source**
Arsenic	37	40	79	635	
Cadmium	11	85	120	230	
Chromium VI	6	6	8	34	
Chromium III	910	910	1500	8840	
Copper	2400	7100	12000	71700	
Lead	200	310	630	2300	
Mercury, elemental	1	1	16	83	**S4UL**
Mercury, inorganic	40	56	120	3640	
Mercury, methyl	11	15	40	409	
Nickel	180	180	230	980	
Vanadium	410	1200	2000	9000	
Zinc	3700	40000	81000	730000	
Selenium	250	430	1100	13000	
Asbestos Fibre	>0.001%	>0.001%	>0.001%	>0.001%	**LOD**

Note:
All figures are in mg/kg
LQM/CIEH/S4UL Adopted.
Soil type chosen is sandy loam, pH 7
LOD - Limit of Detection

IVY HOUSE environmental

Generic Assessment Criteria

Contaminants	Land Use Scenario												
	Residential With Produce			Residential Without Produce			POS (Resi)			Commercial			Source
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	
Arsenic			37			40			79			635	S4UL
Cadmium			11			85			120			190	S4UL
Chromium VI			6			6			8			33	S4UL
Chromium III			910			910			1500			8600	S4UL
Copper			2400			7100			12000			68000	S4UL
Mercury, elemental			1			1			16			58[25.8]	S4UL
Mercury, inorganic			40			56			120			3640	S4UL
Mercury, methyl			11			15			40			407	S4UL
Nickel			180			180			230			980	S4UL
Vanadium			410			1200			2000			9000	S4UL
Zinc			3700			4000		81000	81000			73000	S4UL
Selenium			250			430		1100	1100			12000	S4UL
Benzene*	0.087	0.17	0.37	0.38	0.7	1.4	72	72	73	27	47	90	S4UL
Ethylbenzene*	47	110	260	86	190	440	24000	24000	25000	570[518]	13, 000[1220]	27, 000[2840]	S4UL
Phenol	280	550	1100	750	1300	2300	760[11000]	1500 [35000]	3200[37000]	760[31000]	1500[35000]	3200 [37000]	S4UL
*Toluene	130	290	660	880	1900	3900	56000	56000	56000	56000[869]	110, 000[1920]	180, 000[4360]	S4UL
*Xylene, o	60	140	330	88	210	480	41000	42000	43000	6600[478]	15000[1120]	33000[1350]	S4UL
*Xylene, m	59	140	320	82	190	450	41000	42000	43000	6200[625]	14000[1470]	31000[1350]	S4UL
*Xylene, p	56	130	310	79	180	430	41000	42000	43000	5900[576]	14000[1350]	30000[1350]	S4UL
Benzo(a)pyrene*	2.20	3	3	3	3	3	5.7	5.7	5.7	35	35	36	S4UL
Dibenzo(a,h)anthracene*	0.24	0.28	0.3	0.3	0.3	0	0.57	0.57	0.58	4	4	4	S4UL
Acenapthene*	210	510	1100	3000	4700	6000	15000	1500	1500	84, 000	97000	100, 000	S4UL
Acenapthylene*	170	420	920	2900	4600	6000	15000	1500	1500	83, 000	97, 000	100000	S4UL
Anthracene*	2400	5400	11000	31000	35000	37000	74000	74000	74000	52, 000	54, 000	54, 000	S4UL
Benzo(a)anthracene*	7.2	11	13	11	14	15	29	29	29	170, 000	170, 000	180, 000	S4UL
Benzo(b)fluoranthene*	2.6	3.3	3.7	4	4	4	7.1	7.2	7.2	44	44	45	S4UL
Benzo(g,h,i)perylene	320	340	350	360	360	360	640	640	640	3900	4000	4000	S4UL
Benzo(k)fluoranthene*	77	93	100	110	110	110	190	190	190	1200	1200	1200	S4UL
Chrysene*	15	22	27	30	31	32	57	57	57	350	350	350	S4UL
Fluoranthene*	280	560	890	1500	1600	1600	3100	3100	3100	23000	23000	23000	S4UL
Fluorene*	170	400	860	2800	3800	4500	9900	9900	9900	63000[30.9]	68, 000	71, 000	S4UL
Indeno(1,2,3-c,d)pyrene*	27	36	41	45	45	46	82	82	82	500	510	510	S4UL
Phenathrene*	95	220	440	1300	1500	1500	3100	3100	3100	22, 000	22, 000	23, 000	S4UL
Pyrene*	620	1200	2000	3700	3800	3800	7400	7400	7400	54, 000	54K	54, 000	S4UL
Napthalene*	2.3	5.6	13	2	6	13	4900	4900	4900	190[76.4]	460[183]	1110[432]	S4UL
Aliphatic C5 - C6*	42	78	160	42	78	160	570[304]	590, 000	600, 000	3200[304]	5900[558]	12000[1150]	S4UL
Aliphatic C6 - C8	100	230	530	100	230	530	600, 000	610, 000	620, 000	7800[144]	17000[322]	40K[736]	S4UL
Aliphatic C8 - C10	27	65	450	27	65	150	13000	13000	13000	2000[78]	4.8K[190]	11K[451]	S4UL
Aliphatic C10 - C12	130[48]	330[118]	760[283]	130[48]	330[118]	770[283]	13000	13000	13000	9700[48]	23K[118]	47000[283]	S4UL
Aliphatic C12 - C16	1100[24]	2400[59]	4300[142]	1100[24]	2400[59]	4400[142]	13000	13000	13000	59K[24]	/82K[59]	90000[142]	S4UL
Aliphatic C16 - C35	65000[8.48]	92, 000[21]	110000	65000[8.48]	92000[21]	1100[24]	250000	250, 000	250, 000	1600000	1700000	1800000	S4UL
Aliphatic C35 - C44	65000[8.48]	92, 000[21]	110000	65000[8.48]	92000[21]	110000	250, 000	250, 000	250, 000	1600000	1700000	1800000	S4UL
Aromatic C5 - C7 (benzene)	70	140	300	370	690	1400	56, 000	56, 000	56, 000	26000[1220]	46000[22000]	86000[47.10]	S4UL
Aromatic C7 - C8 (toluene)	130	290	660	860	1800	3900	56, 000	56, 000	56, 000	56000[869]	110000[1920]	180000[4360]	S4UL
Aromatic C8 - C10	34	83	190	47	110	270	5000	5000	5000	3500[513]	8100[1500]	17000[3580]	S4UL
Aromatic C10 - C12	74	180	380	250	590	1200	5000	5000	5000	16000 [364]	280000[899]	34000 [2150]	S4UL
Aromatic C12 - C16	140	330	660	1800	2300[419]	2500	5100	5100	5000	36, 000[169]	37, 000	38, 000	S4UL
Aromatic C16 - C21	260	540	930	1900	1900	1900	3800	3800	3800	28, 000	28, 000	28, 000	S4UL
Aromatic C21 - C35	1100	1500	1700	1900	1900	1900	3800	3800	3800	28, 000	28, 000	28, 000	S4UL
Aromatic C35 - C44	1100	1500	1700	1900	1900	1900	3800	3800	3800	28, 000	28, 000	28, 000	S4UL
											28, 000	28, 000	S4UL

Note:
All figures are in mg/kg
LQM/CIEH/S4UL Adopted.
Soil type chosen is sandy loam, pH 7
All inorganic determinands calculated using 6% SOM
[SOL] Solubility Saturation Limit
[Vap] Vapour Saturation Limit

IVY HOUSE environmental

UK Drinking Water Standards (UKDWS)		
Parameter	**Concentration**	**Units**
Acrylamide	0.1	µg/l
Aluminium	200	µgAl/l
Ammonium	0.5	mgNH4/l
Antimony	5	µgSb/l
Arsenic	10	µgAs/l
Benzene	1	µg/l
Benzo(a)pyrene	0.01	µg/l
Boron	1	mgB/l
Bromate	10	µgBrO3/l
Cadmium	5	µgCd/l
Chromium	50	µgCr/l
Chloride (i)	250	mgCl/l
Conductivity (i)	2500	µS/cm at 20°C
Copper(ii)	2	mgCu/l
Cyanide	50	µgCN/l
1, 2 dichloroethane	3	µg/l
Epichlorohydrin	0.1	µg/l
Fluoride	1.5	mgF/l
Hydrogen ion	6.5 - 9.5	pH value
Iron	200	µgFe/l
Lead (ii)	10	µgPb/l
Manganese	50	µgMn/l
Mercury	1	µgHg/l
Mineral Oil (TPH) (x)	10	µg/l
Nickel (ii)	20	µgNi/l
Nitrate (iii)	50	mgNO3/l
Nitrite (iii)	0.5	mgNO2/l
Phenol	0.5	µg/l
Polycyclic aromatic hydrocarbons (vii)	0.1	µg/l
Selenium	10	µgSe/l
Sodium	200	mgNa/l
Sulphate (i)	250	mgSO4/l
Tetrachloroethene and Trichloroethene (viii)	10	µg/l
Tetrachloromethane	3	µg/l
Trihalomethanes: Total (ix)	100	µg/l
Vinyl chloride	0.5	µg/l
Zinc	5000	µg/l

Pesticides (iv, v)		
Aldrin	0.03	µg/l
Dieldrin	0.03	µg/l
Heptachlor	0.03	µg/l
Heptachlor epoxide	0.03	µg/l
other pesticides	0.1	µg/l
Pesticides: Total (vi)	0.5	µg/l

Notes:

i) The parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water. This is controlled by product specification.

ii) New level for Lead has been in force since 25/12/2013. See also regulation 6(6)

iii) See also regulation 4(2)(d)

iv) See the definition of “pesticides and related products” in regulation 2

v) The parametric value applies to each individual pesticide.

vi) "Pesticides: Total" means the sum of the concentrations of the individual pesticides detected and quantified in the monitoring procedure.

vii) The specified compounds are:
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- benzo(ghi)perylene
- indeno(1,2,3-cd)pyrene.

viii) The parametric value applies to the sum of the concentrations of the individual compounds detected and quantified in the monitoring process.

The parametric value applies to the sum of the concentrations of the individual compounds detected and quantified in the monitoring process.

ix) The specified compounds are:
- chloroform
- bromoform
- dibromochloromethane
- bromodichloromethane.

The parametric value applies to the sum of the concentrations of the individual compounds detected and quantified in the monitoring process.

x) Revoked

References for UKDWS and EQS

Drinking Water Inspectorate Advice for consumers leaflet. DWS, Jan 2010
Thames Water Drinking Water Standards. TW website, accessed May 2016
Technical Guidance Manual for Licensing Discharges to Water: Annex G Environmental Quality Standards (EQS) List, Scottish Environmental Protection Agency, October 2004
Hydrogeological Risk Assessment for Landfills, Appendix 8: Selected Water Quality Standards, Environmen Agency, 2003
Petroleum Products in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality, WHO (WHO/SDE/WSH/05.08/123)
Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) (as amended)
Water Supply (Water Quality) Regulations 2000 (SI 2000/3184) (as amended).
Directive 2008/105/EC

Environmental Quality Standards (EQS) Groundwater Thresholds for List 1 & 2 Substances

Table 1: Environmental Quality Standards (EQS) for List 1 Dangerous Substances	
Substance	**All Freshwater EQS (ug/l)**
Mercury	1
Cadmium	5
Hexachlorocyclohexane	0.02
Carbon tetrachloride	12
Total DDT	0.025
pp DDT	0.01
Pentachlorophenol	0.4
Dieldrin	see total
Isodrin	see total
Aldrin	see total
Endrin	see total
Total 'Drins	0.01
Hexachlorobenzene	0.01
Hexachlorobutadiene	0.1
Chloroform	2.5
1,2-dichloroethane	10
Trichlorethylene	10
Perchlorethylene	10
Trichlorobenzene	0.4

Table 2a: Environmental Quality Standards (EQS) for List 2 Dangerous Substances

Substance	EQS Type	All Freshwater EQS (ug/l)	Substance	EQS Type	All Freshwater EQS (ug/l)
1,1,1-Trichloroethane	Annual average	100	Fenitrothion	Annual average	0.01
1,1,2-Trichloroethane	Annual average	400	Flucofuron	95 percentile	1
2,4-D (ester)	Annual average	1	Iron (dissolved)	Annual average	1000
2,4-D (non-ester)	Annual average	40	Lead (dissolved)	Annual average	Hardness related (see table 2b for details)
2,4-Dichlorophenol	Annual average	20	Linuron	Annual average	2
2-Chlorophenol	Annual average	50	Malathion	Annual average	0.01
4-Chloro-3-methyl-phenol	Annual average	40	Mecoprop	Annual average	20
Arsenic (dissolved)	Annual average	50	Mevinphos	Maximum concentration	0.02
Atrazine & Simazine	Annual average	2	Naphthalene	Annual average	10
Azinphos-methyl	Annual average	0.01	Nickel (dissolved)	Annual average	Hardness related (see table 2b for details)
Bentazone	Annual average	500	Omethoate	Annual average	0.01
Benzene	Annual average	10	PCSDs	95th percentile	0.05
Biphenyl	Annual average	25	Permethrin	95th percentile	0.01
Boron (dissolved)	Annual average	2000	pH	95th percentile	6 - 9
Chloronitrotoluenes	Annual average	10	Sulcofuron	95th percentile	25
Chromium (dissolved)	Annual average	Hardness related (see table 2b for details)	Toluene	Annual average	50
Copper (dissolved)	Annual average	Hardness related (see table 2b for details)	Triazaphos	Annual average	0.005
Cyfluthrin	95th percentile	0.001	Tributyltin	Maximum concentration	0.02
Demeton	Annual average	0.5	Trifluralin	Annual average	0.1
Dichlorvos	Annual average	0.001	Triphenyltin	Maximum concentration	0.02
Dichlorvos	Maximum concentration	-	Vanadium (dissolved)	Annual average	Hardness related (see table 2b for details)
Dimethoate	Annual average	1	Xylene (m and p, o)	Annual average	30
Endosulphan	Annual average	0.003	Zinc (total)	Annual average	Hardness related (see table 2b for details)
Ammonia (as NH3)		15			

Table 2b: Environmental Quality Standards (EQS) for hardness related List 2 dangerous substances

		EQS (ug/l) for Hardness bands (mg/l CaCO3)					
Substance	**EQS type**	**0-50**	**>50-100**	**>100-150**	**>150-200**	**>200-250**	**>250**
Freshwaters, suitable for all fishlife							
Copper (dissolved)	Annual average	0.5	3	3	3	8	12
Nickel (dissolved)	Annual average	8	20	20	40	40	40
Vanadium (dissolved)	Annual average	20	20	20	20	60	60
Chromium (dissolved)	Annual average	2	10	10	20	20	20
Lead (dissolved)	Annual average	4	10	10	20	20	20
Zinc (total)	Annual average	8	15	15	50	50	50

TPHCWG WATER VALUES

TPHCWG Fraction	Assessment Value (µg/l)	
Aliphatic > C5 – C6	15,000	
Aliphatic > C6 – C8	15,000	
Aliphatic > C8 – C10	300	
Aliphatic > C10 – C12	300	
Aliphatic > C12 – C16	300	
Aliphatic > C16 – C21	300	
Aliphatic > C21 – C34	300	
Aromatic > C5 - C7 *	10	Assumed to be 100% Benzene
Aromatic > C7 - C8	700	Assumed to be 100% Toluene
Aromatic > C8 - C10	300 / 500	Assumed to be either: Ethylbenzene (300) or Xylenes (500)
Aromatic > C10 – C12	90	
Aromatic > C12 – C16	90	
Aromatic > C16 –C21	90	
Aromatic > C21 – C25	90	

Contaminant Thresholds for Subsurface Water Pipes

Contaminant	Material selection Threshold Level (mg/kg dried soil)
Corrosion	
Sulphate (SO4)	2000
Sulphur (S)	5000
Sulphide (S)	250
pH	<pH5, >pH8
Toxic Substances	
Antimony (Sb)	10
Arsenic (As)	10*
Cadmium (Cd)	3
Chromium (hexavalent) (Cr)	25
Chromium (total)	600
Cyanide (free) (Cn)	25*
Cyanide (complexed) (Cn)	250*
Lead (Pb)	500
Mercury (Hg)	1
Selenium (Se)	3
Thiocyanate (SCN)	50
Organic Contaminants	
Coal Tar	50
Cyclohexane extractable	50
Phenol	5
Poly Aromatic Hydrocarbons	50
Toluene extractable	50
TPH DRO (diesel, kerosene)	100
Petrol	10
Mineral oils	1000

* It is not recommended that water pipes should be laid in sites where these substances are identified or suspected

Ref: Water Regulations Advisory Scheme (WRAS) (No. 9-04-03 Issue 1)

APPENDIX F