



VERIFICATION REPORT

**1 – 4 TROSTREY STREET
NEWPORT
WALES
NP19 7BB**

**Reference Number 3188/Rpt 3v1
February 2025**

Prepared for
ADRA Homes LLP

By

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Client	ADRA Homes LLP
Report Title	Verification Report: 1 – 4 Trostrey Street, Newport
Reference Number	3188/Rpt 3v1
Date	February 2025

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TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.2	Proposed Development	1
1.3	Objectives	1
2	SUMMARY OF PREVIOUS INVESTIGATION WORK	2
2.1	Ground Conditions	2
2.2	Contamination Assessment	2
2.3	Pre-remediation Phase Conceptual Model	3
3	REMEDIALATION WORKS UNDERTAKEN	5
3.1	Remediation Objectives	5
3.2	Remediation of Proposed Gardens	5
3.3	Water Supply Pipework	5
3.4	Gas Protection Measures	5
	VERIFICATION	6
3.5	Site Visit	6
3.6	Exploratory Fieldwork	6
3.7	Chemical Analysis	6
3.8	Gas Protection Measures	6
4	RESULTS	7
5	CONCLUSIONS AND RECOMMENDATIONS	9

FIGURES

Figure 1	Site Location Plan
Figure 2	Verification Trial Pit Locations

APPENDICES

Appendix I	Limitation and Constraints
Appendix II	Soil Import Notes
Appendix III	Soil Supplier Chemical Analysis
Appendix IV	Barrier Pipe Details
Appendix V	Gas Protection Measures and Reports
Appendix VI	Photographic Evidence
Appendix VII	Chemical Analysis Report

1 INTRODUCTION

1.1 Background

Brown 2 Green Associates Ltd have been commissioned by ADRA Homes LLP to undertake verification of remediations works completed at 1-4 Trostrey Street, Newport, Wales. The site is located at National Grid Reference 331790, 188800. The site location is presented in Figure 1.

In April 2022, Intégral Géotechnique (Wales) Ltd prepared a Phase 1 Geo-environmental Desk Study for the site. The Desk Study identified some potentially active pollution linkages. Following the site investigation completed by Brown 2 Green Associates Ltd, it has been identified that the presence of lead, arsenic and individual PAHs are above the adopted screening levels for human health. Also, gas protections measures are required due to the concentrations of ground gases. Mineral oils identified in the made ground from the eastern part of the site have the potential to impact the water supply infrastructure. From the results of the investigation works completed at the site, recommendations for remediation have been made.

The investigation identified a requirement for remediation. A remediation strategy has been prepared by Brown 2 Green Associates. The information is presented in the report titled:

- Remediation Method Statement: 1 – 4 Trostrey Street, Newport; dated March 2023; Ref 3188/Rpt 2v1.

The report recommended the remediation should be undertaken to mitigation the unacceptable level of risk from contamination that was identified at the site. This report presents of verification works that have been undertaken following the remediation works.

1.2 Proposed Development

The development consists of the demolition of the existing building and erection of eight dwellings. The proposed layout is presented in a drawing prepared by AMMRO Consulting Ltd, drawing number 20.0372/01. The proposed development layout is presented in Figure 2.

As part of the development ground levels need to be raised to a minimum level of 8.47m AOD.

1.3 Objectives

The objective of the verifications works is to:

- Provide a record of the remediation works undertaken at the site.
- Provide suitable and sufficient evidence that the work undertaken has satisfied the objective of the remediation.
- Provide information to demonstrate that the site is suitable for its intended use and there is not an unacceptable level of risk posed by contamination at the site.

2 SUMMARY OF PREVIOUS INVESTIGATION WORK

2.1 Ground Conditions

Made Ground

The boreholes indicate that the hardstanding is underlain by up to 1.0m of made ground. The made ground generally consists of dark grey to black slightly gravelly, sandy, silty clay with occasional bricks and charcoal in the western part and dark grey to black sand and gravel with occasional concrete, bricks, slate and metal in the western part.

Alluvium

The made ground is underlain by dark grey and brown mottled silty clay. A layer of black amorphous peat has been identified between 6.5m and 8.6m in BH1. The peat deposit is underlain by brownish red clay to 9.8m below ground level. A layer of brownish grey silty clay has been identified between 9.8m and 11.1m which is in turn underlain by dense

Bedrock

Hard red mudstone has been identified below 12.0m in BH1.

Visual and Olfactory Evidence of Contamination

Hydrocarbon odours were noted between 0.2m and 1.0m bgl in WS2.

Groundwater Conditions

During the drilling groundwater was struck in the alluvial deposits between 3.0m and 3.5m below ground level. Perched water was also noted between 0.7m and 0.8m in the made ground present underneath the northern building.

During the collection of the groundwater samples on 4th January 2023, the depth to groundwater was determined immediately prior to the purging of the monitoring wells. The depths to groundwater are presented below.

Monitoring Well	Depth to groundwater (m bgl)
WS1	0.67
WS2	0.51
WS3	0.39
WS5	0.70

It should be noted that groundwater levels can fluctuate seasonally and therefore, may be encountered at higher or lower elevations than those recorded in this site investigation.

2.2 Contamination Assessment

The previous site investigation and risk assessment identified:

The made ground within HP4, WS2 and WS5 contained concentrations of arsenic and individual PAHs at levels that are greater than the GAC. Concentrations of lead and individual PAHs at levels

above their respective GAC threshold values were also identified in HP4 and WS3. WS2 and WS5 were drilled in areas proposed to be developed. For lead the principal exposure pathways are the inhalation of dust and the ingestion of soil and dust. For arsenic and PAHs the principal exposure pathways are the ingestion of soil and dust. These pathways would normally be active in areas to be developed as soft landscaping. Within the proposed development ground levels must be raised by approximately 1m as a flood prevention measures. The placement of suitable clean soil will act as a barrier to break any pollution linkages. Within the footprint of the building and beneath the proposed areas of hard standing a barrier to exposure will be provided (HP4, and WS3). It is therefore considered that the concentrations of individual PAHs, arsenic and lead identified within the made ground will not pose an unacceptable level of risk to futures site users and off-site human receptors.

Within the natural soils all concentrations were below the generic assessment criteria.

The Tier I Controlled Water Risk Assessment has determined that the groundwater samples retrieved exceed UK DWS for arsenic within WS3. All other analytes tested were below EQS and DWS. Within the context of the developed CSM for the site, it is considered that the site does not pose an unacceptable level of risk to controlled waters.

During the monitoring visits completed to date, elevated concentrations of methane (8.2% v/v) were recorded in WS3. Slightly elevated levels of carbon dioxide (up to 5.1% v/v) were also recorded in WS3. The maximum flow rate was 3.6 litre/hour and was recorded in WS2. Based on the risk assessment the site is classified as Characterisation Situation (CS) 2/Amber 1. Site classified as CS2/Amber 1 require gas protection measures.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would pose a potential risk.

Within the front gardens of Plots 1 and 2, concentrations of mineral oils (C11 – C20) in the sample from 0.2m-0.6 bgl (710mg/kg) are recorded above the threshold values of 10mg/kg listed in the guidance and there is the potential for these organic compounds to permeate polymer-based pipe work and impact on the quality of potable water or cause degradation of the pipe construction. The extent of the area where hydrocarbon resistant barrier pipework should be adopted in presented in Figure 2. Beneath the remainder of the site the results indicate that concentrations are at levels that enable PE/PVC pipe work to be adopted. It is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR. However, it has been understood that during the construction phase, the ground levels will be raised, hence the risk for the pipe work to be exposed to the above-mentioned concentrations is negligible.

2.3 Pre-remediation Phase Conceptual Model

In light of the results of the site investigation, the chemical analysis and the risk screening assessment presented in the previous reports, a Conceptual Model showing the identified pollution linkages was developed. The Conceptual Model is presented below.

Source	Potential migration pathway	Potential Receptors	Discussion, Remedial or Precautionary Measures and Mitigating Factors
Lead	Ingestion of contaminated soils Inhalation of dust	Residents and construction workers	As flood protection measures, ground levels are to be raised to 8.47m AOD. The presence of the soil placed to raise ground levels a barrier to exposure to concentrations

Source	Potential migration pathway	Potential Receptors	Discussion, Remedial or Precautionary Measures and Mitigating Factors
Arsenic and individual PAHs	Ingestion of contaminated soils	Residents and construction workers	of lead, arsenic and PAH will be provide. To ensure suitability of the soil as a capping layer the soil must not contain levels of contaminants that would pose a risk to human health. The imported soil must conform to the specifications presented in Table 1 - Residential with Plant Up-take.
Mineral oils (C11 – C20)	Contact with contaminated soils	Water supply infrastructure	Protected water supplies are required should the pipe work to Plots 1 and 2 come in contact with the high concentrations of mineral oils identified in the area where HP4 was excavated. Final confirmation of the specification should be obtained from the local water company.
Ground gas	Vapours into buildings	Residents and building structure	Gas protection measures are required (CS2).

3 REMEDIATION WORKS UNDERTAKEN

3.1 Remediation Objectives

The objectives of the remediation are to:

- Break the pollutant linkages that were identified as being active during the site investigation works.
- Render the site suitable for the intended end use as a residential development with private gardens.
- Render the site incapable of determination as contaminated land under Part 2A.

3.2 Remediation of Proposed Gardens

As part of the development ground levels will need to be raised to provide flood protection measures. The raising of the ground levels will also provide a barrier of suitable thickness to breaking the pollution linkage identified between the contaminated made ground and future site users. Soil importation notes are presented in Appendix II, while the soil supplier chemical results are presented in Appendix III.

3.3 Water Supply Pipework

Due to the presence of concentrations of mineral oils that were identified in soils that will become the front garden of Plot 1 and 2, hydrocarbon resistant barrier pipework has been adopted within this part of the site. Details of the barrier pipe installed on site are presented in Appendix IV.

3.4 Gas Protection Measures

The gas monitoring has identified that gas protection measures will be required. Based on the current results and the gas risk assessment that has been completed, it is considered that it is feasible to develop the site and the risk from the ground gas can be controlled. The site was classified as CS2/Amber1, as required by BS8485:2015+A1 2019 Code of practice for the design and protective measures for methane and carbon dioxide ground gas for new buildings a minimum gas protection score of 3.5 would be required.

VERIFICATION

3.5 Site Visit

As part of the remediation process, hand dug pits were excavated in each garden to confirm that sufficient material has been placed in the proposed garden areas. Photographic evidence is presented in Appendix VI.

3.6 Exploratory Fieldwork

The verification was completed on 27th January 2025 and consisted of the excavation of hand dug trial pits to the base of the placed material. The locations of the trial pits are presented in Figure 2.

Soil samples destined for chemical testing were collected in laboratory prepared jars. Samples for organic analysis were placed in amber glass jars, samples for volatile analysis in vials with septums and samples for inorganic analysis in plastic tubs. During the site works recovered soils were geologically logged by an experienced Geo-environmental Engineer.

The inspection concluded that within the rear gardens, a minimum of 600mm of capping has been provided. It has been noted that the imported material comes from the same source. A geotextile membrane and no dig barrier were also noted at the base of the placed material.

3.7 Chemical Analysis

As required by the Remediation Method Statement soil samples were obtained and submitted to a UKAS accredited laboratory for chemical analysis. Samples were analysed in accordance with the chemical suite detailed in the Remediation Method Statement. Samples of the top and sub soil were analysed for metals, speciated polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, organic matter, pH and asbestos. The soil samples were submitted to Eurofins/Chemtest Ltd of Newmarket, Suffolk. The chemical analysis was carried out under UKAS/MCERTS accreditation protocols. The laboratory results are presented in Appendix VII.

3.8 Gas Protection Measures

As required, following the installation of the gas protection measures, verification was undertaken by GeoShield. The verification report (ref: GEO104558 R01) ad concluded that the gas membrane has been successfully installed to BS8485:2015+A1 2019 and was passed and verified in accordance with CIRIA 735.

Details of the gas protection measures installed on site and the verification report are presented in Appendix V.

4 RESULTS

Depth of Excavation

A total of nine trial pits were excavated. The following ground conditions were encountered:

Plot 1 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 2 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 3 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 4 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 5 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 6 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 7 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 8 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Plot 9 – Back Garden

Depth Range (m bgl)	Description
0.0 – 0.6	Dark brownish grey silty fine SAND with occasional fine to medium gravel, roots and rootlets. Geotextile membrane and no dig mesh present at the base of the pit.

Chemical Analysis

Samples of the top soil and sub-soil used to backfill the excavation were submitted for analysis. The laboratory reports are presented as Appendix VII.

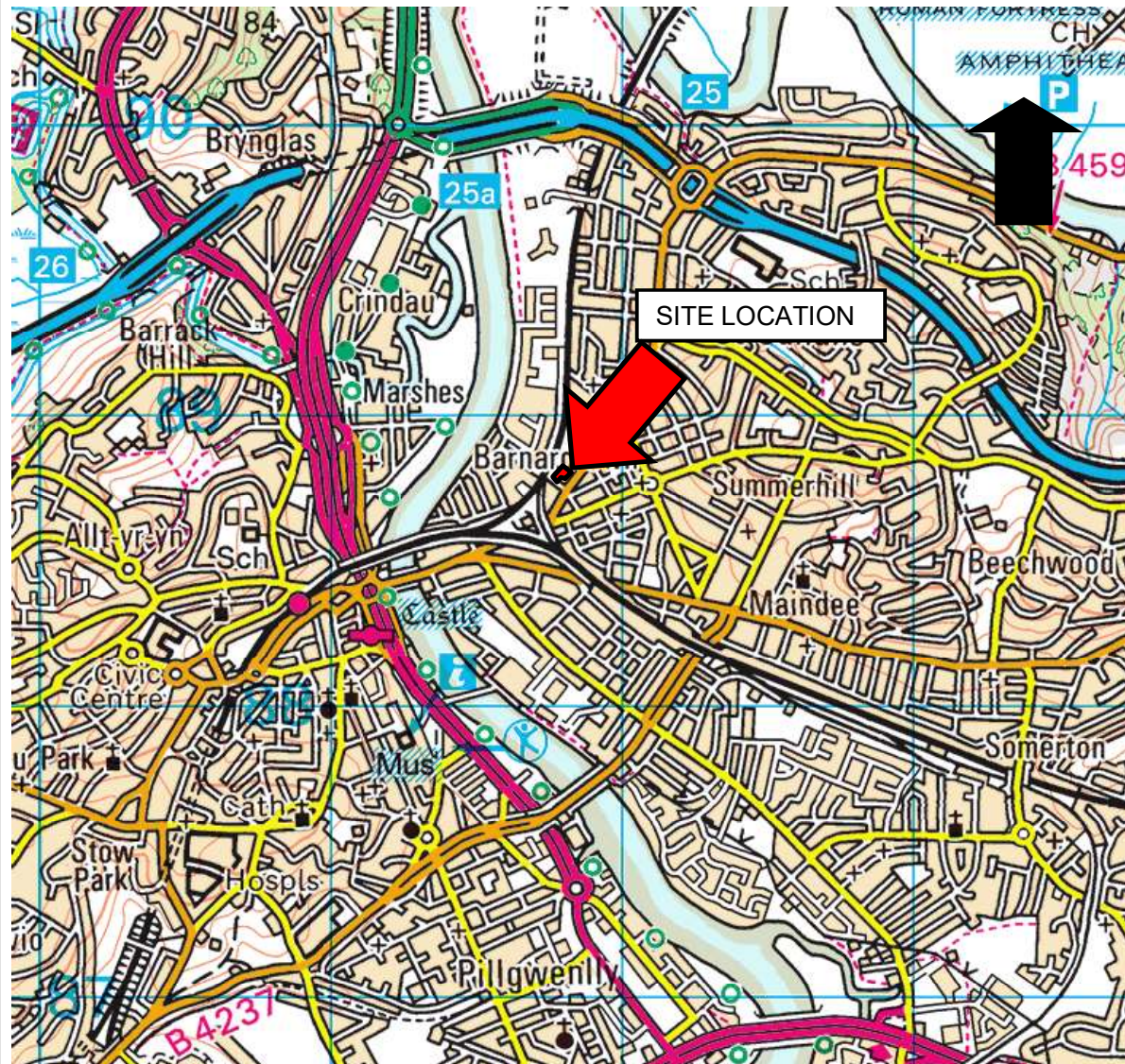
5 CONCLUSIONS AND RECOMMENDATIONS

From the results the verification confirms that:

- A suitable depth of excavation and thickness of replacement soil is present.
- The chemical quality of the soil used in the back gardens conforms to the chemical specification detailed in Table 1 of the Remediation Method Statement.
- The design and installation of the gas protection measures and barrier pipe are in accordance with the Remediation Method Statement and will provide suitable protection.
- The remediation completed satisfies the specification detailed in the Remediation Method Statement and satisfies the objective of the remediation. All identified pollution pathways have been broken.

From the results of the works completed, it is considered that contamination will not pose a significant risk to human health, controlled waters, environmental receptors, historical receptors, ecological receptors or livestock.

FIGURES



Based on an Ordnance Survey map with permission of HMSO. Crown copy right reserved. Licence number 100053399

Project Number: 3188	Project: 1 – 4 Trostre Street, Newport, Wales	Scale: NTS
Figure 1	Site Location Plan	



APPENDIX I
LIMITATIONS AND CONSTRAINTS

Brown 2 Green Associates Limited has prepared this report in accordance with our standard Terms and Conditions solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

Brown 2 Green Associates Ltd cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The client cannot place reliance on the report until full payment has been made. The copyright in this report and other plans and documents prepared by Brown 2 Green Associates Ltd is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of the report may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Brown 2 Green Associates Ltd in this connection without their explicit written agreement thereto by Brown 2 Green Associates Ltd.

For the work, reliance has been placed on publicly available data obtained from the sources identified and data supplied by other parties. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information. Brown 2 Green Associates Ltd does not warrant work / data undertaken / provided by others.

APPENDIX II
SOIL IMPORT NOTES



Delivery POD Details

Aggregates Express Limited
 Garth Isaf Farm
 Efail Isaf
 Pontypridd
 Rhondda Cynon Taf
 CF38 1SN

Tel 01443 203 276
 Fax
 E Mail accounts@aggregatesexpress.com



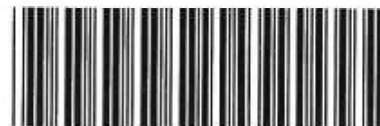
Details			
Collect From AGGREGATES EXPRESS QUARRY PRODUCTS LTD FOREST WOOD QUARRY PONTYCLUN RCT CF72 9XD		Deliver To FREELAND ADRA HOMES 1-4 TROSTREY STRE ADRA HOMES 1-4 TROSTREY STRE NEWPORT NEWPORT NP19 7BB	
Contact Tel		Contact GAVIN Tel	
Job 5857 Con 1 Customer Freeland Horticulture Limited Priority SD Job Type AGG Reference NP197BB - 253545 Instructions Collection Date/Time 21/01/2025 Delivery Date/Time 21/01/2025			
Goods SUBSOIL		Consignment Reference	
Weight 19420 Quantity 0 Volume 0	Pallets 0 Half Pallets 0 Qtr Pallets 0	Notes	
Signature (obtained via signature capture) 		Signed By Ryan Lewis Signed On 21/01/2025 Signed At 0817 Arrived On Arrived At Departed On 21/01/2025 Departed At 0821	



Delivery POD Details

Aggregates Express Limited
 Garth Isaf Farm
 Efail Isaf
 Pontypridd
 Rhondda Cynon Taf
 CF38 1SN

Tel 01443 203 276
 Fax
 E Mail accounts@aggregatesexpress.com



Details			
Collect From AGGREGATES EXPRESS QUARRY PRODUDCTS LTD FOREST WOOD QUARRY PONTYCLUN RCT CF72 9XD		Deliver To FREELAND ADRA HOMES 1-4 TROSTREY STRE ADRA HOMES 1-4 TROSTREY STRE NEWPORT NEWPORT NP19 7BB	
Contact Tel		Contact GAVIN Tel	
Job 5858 Con 1 Customer Freeland Horticulture Limited Priority SD Job Type AGG			
Reference NP197BB - 253546		Instructions	
Collection Date/Time 21/01/2025		Delivery Date/Time 21/01/2025	
Goods SUBSOIL		Consignment Reference	
Weight 19380	Pallets 0	Notes	
Quantity 0	Half Pallets 0		
Volume 0	Qtr Pallets 0		
Signature (obtained via signature capture)		Signed By Ryan	
		Signed On 21/01/2025	Signed At 0820
		Arrived On	Arrived At
		Departed On	Departed At

APPENDIX III
SOIL SUPPLIERS CHEMICAL ANALYSIS



ANALYTICAL REPORT											
Report Number	41800-24	G281	PHILIPPA LAMBOURNE	Client	FOREST WOOD AUG 24						
Date Received	28-JUN-2024		FREELAND HORTICULTURE LTD		SUBSOIL						
Date Reported	10-JUL-2024		ROSEDALE NURSERY								
Project	SOIL		COLLEGE ROAD								
Reference	FOREST WOOD SUBSOIL		HEXTABLE								
Order Number			KENT BR8 7LT								
Laboratory Reference		SOIL703130									
Sample Reference		FOREST WOOD SUBSOIL									
Determinand	Unit	SOIL									
pH water [1:2.5]		8.3									
Available Phosphorus (Index)	mg/l	<2.5 (0)									
Available Potassium (Index)	mg/l	110 (1)									
Available Magnesium (Index)	mg/l	134 (3)									
Sand 2.00-0.063mm	% w/w	82									
Silt 0.063-0.002mm	% w/w	12									
Clay <0.002mm	% w/w	6									
Stones 2-20mm	% w/w	1.3									
Conductivity Sat CaSO4	uS/cm	2121									
Available Sodium	mg/l	13.2									
Available Calcium	mg/l	451									
Organic Matter LOI	% w/w	2.4									
Neutralising Value as CaCO3 eq.	% w/w	2.6									
Neutralising Value as CaO eq.	% w/w	1.4									
Total Copper	mg/kg	7.3									
Total Zinc	mg/kg	67.6									
Total Nickel	mg/kg	68.2									
Total Fresh Weight (Fresh)	g	1689.8									
Total Visible Contaminants	%	0.00									
Stones 20-75mm	%w/w	0.0									
Stones >75mm	%w/w	0.0									
Mass of Sharps	g	0.0									
Glass/Sharps	%	0.00									
Plastic	%	0.00									
Textural Class **		LS									



ANALYTICAL REPORT											
Report Number	41800-24		G281	PHILIPPA LAMBOURNE				Client FOREST WOOD AUG 24			
Date Received	28-JUN-2024			FREELAND HORTICULTURE LTD				SUBSOIL			
Date Reported	10-JUL-2024			ROSEDALE NURSERY							
Project	SOIL			COLLEGE ROAD							
Reference	FOREST WOOD SUBSOIL			HEXTABLE							
Order Number				KENT BR8 7LT							
Laboratory Reference			SOIL703130								
Sample Reference			FOREST WOOD SUBSOIL								
Determinand		Unit	SOIL								
Estimated CEC		meq/100g	6.9								
Notes											
Analysis Notes		The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated. Organic material reincorporated.									
Document Control		This test report shall not be reproduced, except in full, without the written approval of the laboratory.									
Reported by		** Please see the attached document for the definition of textural classes. <i>Dr R C Wilkinson</i> Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com									

ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand*, *loamy sand*, *sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam* classes according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27–35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

Analytical Notes

Accreditation and method details

NRM is a UKAS-accredited testing laboratory (No 2334), accredited to BS EN ISO 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF communique dated April 2017). <http://ilac.org/2download=120917>

NRM is accredited for particular determinands in specific matrices as set out in the laboratory's current UKAS schedule of accreditation https://www.ukas.com/wp-content/uploads/schedule_upds/00002/2334Testing_Multiple.pdf

Accreditation applies to the following parameters in this report and is applicable to SOLL samples only. All other tests within this report are unaccredited.

Test	Analysis SOP	Method Description
Fluoride	JAS-487	Sulphuric acid extraction (1:10 ratio) and determination by ion selective electrode
Arsenic	JAS-510 / JAS-300	Aqua regia digest on hot block and determination by ICP-OES
Barium		
Beryllium		
Cadmium		
Chromium		
Cobalt		
Copper		
Lead		
Molybdenum		
Mercury		
Nickel	JAS-510 / JAS-455	Aqua regia digest on hot block and determination by AFS
Vanadium		
Zinc		
Selenium	JAS-510 / JAS-455	Aqua regia digest on hot block and determination by AFS

Analysis Notes

Analysis is carried out on the air-dried (<30°C) and ground sample.

The results as reported relate only to the item(s) submitted for testing.

The results are presented on a dry matter basis.

Indices are derived solely from the numerical value and test result without reference to measurement uncertainty.

Document Control

This test report shall not be reproduced, except in full, without the written approval of the laboratory.

We cannot offer interpretation or opinions for results.

Sampling Information

BS ISO 18512:2007 (Soil quality – Guidance on long and short-term storage of soil samples) states that for pH the period of stability and therefore holding time for a wet or 'fresh' soil sample is one week from sampling. Other determinants in the fresh sample may be considered stable for up to a month. Once the sample has been dried the sample may then be considered stable for up to 3 years. No records are maintained by NRM on date sampled or date dried so all samples within this report are considered not to be meeting the requirements of this BS / ISO. Consequently, all pH results given are those of the as-received sample and may not reflect the pH value of the sample when taken.

END OF REPORT



Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Attention: Philippa Lambourne

Our Ref: 1313-SA

15 August 2024

Dear Philippa

Topsoil Analysis Report: Forest Wood, Cardiff Topsoil – August 2024

We have completed the analysis of the topsoil sample recently taken from the above site and it has been forwarded to an approved laboratory for analysis and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes and its compliance with the current British Standard for topsoil (BS3862).

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as dark brown, slightly moist and friable with a well-developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS and MCERTS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- ⊕ pH & electrical conductivity values;
- ⊕ major plant nutrients (N, P, K, Mg) & organic matter content;
- ⊕ particle size distribution and stone content;
- ⊕ heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- ⊕ sulphate, sulphur, sulphide;
- ⊕ total cyanide and total (mono) phenols;
- ⊕ speciated PAHs (US EPA16)
- ⊕ banded aromatic and aliphatic petroleum hydrocarbons (C₅-C₃₅).
- ⊕ Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Phone: 01322 619161

*Freeland horticulture Ltd. Registered in England: Rosedale Nursery, College Road, Hextable, Kent BR8 7LT
Company Registration No: 04015968*

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in nature (pH 7.8) with a pH value that would be considered suitable for general landscaping purposes.

The electrical conductivity (salinity) value using the soil:water extract was (1439 μ S/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

The electrical conductivity values by CaSO₄ extract (BS3882 requirement) fell below the maximum specified value (3300 μ S/cm) given in BS3882:2015.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

The C:N ratio of the sample was acceptable for general landscape purposes.

Particle Size Distribution & Stone Content

The sample contained 68% sand and fell into the sandy loam texture class. This particle size distribution is considered suitable for a broad range of landscape applications including tree and shrub planting, turfing and seeding.

The sample was Virtually free from stones of 50 mm and upwards in diameter and only contained a slight fraction of smaller stones (0.9%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels for the proposed end-use of this topsoil. This includes human health, environmental protection and metals considered toxic to plants. In the absence of any site-specific assessment criteria, the concentrations that affect human health have been compared with the 'residential with homegrown produce' and use in the Suitable For Use Levels presented in 'The LQM/CIEH S4UIs' for Human Health Risk Assessment (2015) and DEFRA SP1010: 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014)'.
Chain of custody required for Freeland Ticket 20322619161

Of the potential contaminants determined, none was found at levels that would exceed their respective guideline values.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, sandy loam. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Forest Wood, Cardiff
Month/Year	August 24
Our Ref	1313-SA
Date	15 August 2024

pH Value & Salinity

pH value (1:2.5 soil/water ext)	units
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm
Electrical Conductivity (1:2.5 soil/CaSO4 ext)	µS/cm

Composite sample

7.8
1439
3392

Organic Matter & Nutrient Status

Organic Matter (LOI)	%
Organic Carbon (Derived)	%
Total Nitrogen	%
Carbon:Nitrogen Ratio	:1
Available Phosphorus	mg/l
Available Potassium	mg/l
Available Magnesium	mg/l

6.8
4.0
0.313
12.6
41.8
1001
152

Particle Size Analysis & Stones

Clay (<0.002mm)	%
Silt (0.063-0.002mm)	%
Sand (2.0-0.063mm)	%
Texture Class	UK Class

12
20
68
SandyLoam

Stones 2-20mm	% by DW
Stones 20-50mm	% by DW
Stones >50mm	% by DW

0.9
0.0
0.0

Potential Contaminants

Total Arsenic (As)	mg/kg
Total Cadmium (Cd)	mg/kg
Total Chromium (Cr)	mg/kg
Hexavalent Chromium (CR ^{VI})	mg/kg
Total Copper (Cu)	mg/kg
Total Lead (Pb)	mg/kg
Total Mercury (Hg)	mg/kg
Total Nickel (Ni)	mg/kg
Total Selenium (Se)	mg/kg
Total Zinc (Zn)	mg/kg
Total Beryllium (Be)	mg/kg
Total Barium (Ba)	mg/kg
Total Vanadium (V)	mg/kg
Hot Water Soluble Boron (B)	mg/kg
Total Cyanide (CN)	mg/kg
Elemental Sulphur (S)	mg/kg
Easily Liberated Sulphide (S ²⁻)	mg/kg
Water Soluble Sulphate (SO ₄)	mg/l
Total Phenols Index	mg/kg
Asbestos Screen	-

13.0
0.41
52.9
<0.2
23.6
38.7
<0.2
41.4
0.14
117
<1
84.2
16.2
1.3
<1
26.2
<1
288
<1
N.D.

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Forest Wood, Cardiff
Month/Year	August 24
Our Ref	1313-SA
Date	15 August 2024

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	0.2
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	0.3
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C ₅ -C ₆	mg/kg	0.33
Aliphatic TPH >C ₆ -C ₈	mg/kg	<0.05
Aliphatic TPH >C ₈ -C ₁₀	mg/kg	<0.05
Aliphatic TPH >C ₁₀ -C ₁₂	mg/kg	<10
Aliphatic TPH >C ₁₂ -C ₁₆	mg/kg	16
Aliphatic TPH >C ₁₆ -C ₂₁	mg/kg	<10
Aliphatic TPH >C ₂₁ -C ₃₅	mg/kg	13.0
Aliphatic TPH >C ₃₅ -C ₄₄	mg/kg	12

Aromatic TPH >C ₅ -C ₇	mg/kg	<0.05
Aromatic TPH >C ₇ -C ₈	mg/kg	<0.05
Aromatic TPH >C ₈ -C ₁₀	mg/kg	0.20
Aromatic TPH >C ₁₀ -C ₁₂	mg/kg	<10
Aromatic TPH >C ₁₂ -C ₁₆	mg/kg	12.0
Aromatic TPH >C ₁₆ -C ₂₁	mg/kg	13.0
Aromatic TPH >C ₂₁ -C ₃₅	mg/kg	87.0
Aromatic TPH >C ₃₅ -C ₄₄	mg/kg	15.0

Total Petroleum Hydrocarbons (C ₅ -C ₄₄)	mg/kg	187
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BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p- Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

APPENDIX IV
WATER BARRIER PIPE DETAILS